

Journal of the Federated Malay States Museums

Selangor State Museum, Perak State Museum

Digitized by Google

HARVARD UNIVERSITY



LIBRARY

OF THE

PEABODY MUSEUM OF AMERICAN ARCHAEOLOGY AND ETHNOLOGY

IN EXCHANGE WITH

The Museums.

Received 1906-16.

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

JOURNAL OF THE F.M.S. MUSEUMS.

Digitized by Google

NOTICE.

FROM time to time, as material is available, it is proposed to publish numbers of this periodical. The dates of publication cannot be stated, but it is hoped that it will be possible to issue one volume of four parts every year. It will include matter more or less connected with Museum work and the results of any investigations and researches carried on by the Members of the Staff of the Federated Malay States Museums.

This Journal will take the place of the "Perak Museum Notes"; the first number of which was issued in 1893.

Digitized by Google

JOURNAL

OF THE

FEDERATED MALAY STATES

MUSEUMS.

VOL. I.

JANUARY, 1905, TO MAY, 1906.

KUALA LUMPUR:

PRINTED AT THE F.M.S. GOVERNMENT PRINTING OFFICE.

1906.

275/5-06.

Digitized by Google

B 1172
20

Mus. 74.9 5.8
In exchange with the Museum.
1906 - 16.

Digitized by Google

CONTENTS.

No. 1.

Page.

The Eggs and Embryos of Schlegel's Gavial (*Tomistoma schlegeli*, S. Müll.), by A. L. Butler 1

Report on *Termes gestroi* as affecting Para Rubber, by H. C. Robinson ... 2

Further Notes on the Cave Dwellers of Perak (with three plates), by L. Wray 13

Note on a Genus of Butterflies new to the Malay Peninsula, by H. C. Robinson 15

Note on a Blight affecting Sugar Canes at Nova Scotia Estate, Lower Perak, by L. Wray 15

Note on *Ratufa bicolor*, the large Malay Squirrel, by F. W. Knocker ... 17

Further additions to the Batrachian Fauna of the Malay Peninsula, with a List of the Species at present known to occur therein, by H. C. Robinson 19

A Malay Method of Treating Toothache, by L. Wray 25

List of a small Collection of Mammals, Birds and Batrachians from Gunong Angsi, Negri Sembilan, by H. C. Robinson 25

Correction, Letter from Sir D. Morris 30

Note on a Sample of Coal from Upper Perak, by L. Wray 30

Report on the Perak Museum for 1903 31

Report on the Selangor Museum for 1903 35

No. 2.

Description of a New Frog of the Genus *Ixalus* from Selangor, by G. A. Boulenger (with plate) 39

Notes on the Sugar Cane Rat, *Mus jalorensis*, by L. Wray 39

A Synopsis of the Birds at present known to inhabit the Malay Peninsula south of the Isthmus of Kra, by H. C. Robinson 45

On a Flying-Squirrel (*Pteromys*) from Perak, by F. W. Knocker... ... 57

A Rare Squirrel from Kuala Lumpur, by H. C. Robinson 60

A Sakai Counting-Stick or Tally, by F. W. Knocker (with plate) ... 60

Note on the Malay Sapi Utan, by R. Lydekker 61

Rhinoceros Trapping, by L. Wray 63

On a Squirrel New to the Fauna of the Malay Peninsula, by H. C. Robinson 65

Notes on Para Rubber Seed Oil, by L. Wray 66

Digitized by Google

No. 3.

Page.

On a New Species of *Mus* from Pulau Jarak, by J. Lewis Bonhote ... 69

Report on a Sample of "Minyak Surin" fromt he Federated Malay States, by Professor Wyndham R. Dunstan 70

A System for the Registration of the Contents of Museums, by L. Wray... 72

A Short Account of some "Ancient Remains" found on Gunong Jerai, Kedah (with one plan), by F. W. Irby 76

Fossil Tooth of *Elephas Namadicus* from Perak 81

Destruction of Noxious Animals (Extract from the Report on F.M.S. Police Force for the year 1904) 82

Report on the Museums Department for 1904 83

Report on the Perak Museum for 1904 87

Report on the Selangor Museum for 1904 97

On a New Species of Whistling-Thrush from Selangor, by W. R. Ogilvie-Grant 104

On a New Species of Tree-Partridge from the Mountains of the Malay Peninsula, by Herbert C. Robinson; with Notes, by W. R. Ogilvie-Grant 105

No. 4.

On a collection of *Longicorn Coleoptera* from Selangor and Perak, by Charles J. Gahan (with plate) 109

Notes on the Petrology of Stone Implements from the Federated Malay States, by J. B. Scrivenor 123

A Synopsis of the Birds at present known to inhabit the Malay Peninsula, south of the Isthmus of Kra, by Herbert C. Robinson (*continued*) ... 124

Return of Thermometer Readings at Trig. Stations in the F.M.S. in order of Altitude (Extract from the Report on the Trigonometrical and General Survey Department for the year 1905) 133

Digitized by Google

THE EGGS AND EMBRYOS OF SCHLEGEL'S GAVIAL (*TOMISTOMA SCHLEGELI*, S. MÜLLER).

By A. L. BUTLER, F.Z.S., M.B.O.U., ETC.,
Late Curator of the Selangor Museum.

SCHLEGEL'S GAVIAL has only been recorded from the Malay Peninsula since 1896 (*Boulenger, P.Z.S.*, 1896, p. 628), and so little is known of its habits that the following note on its eggs and young may be of interest.

On the 28th of July, 1899, when I was at Kuala Selangor, Mr. Hale, the District Officer, gave me six large crocodile's eggs for the Museum. He told me that a batch of seventeen of them had been taken at the same time and brought in for the Government reward of 10 cents an egg. Of these eleven were destroyed and half-a-dozen kept for me. Four I found to be addled, the remaining two containing young crocodiles, which, from their abruptly pointed beak-like snouts, I at once recognised as young gavials.

All the eggs were very uniform in size; two of them measured $4 \times 2\frac{1}{2}$ inches and $3\frac{7}{8} \times 2\frac{1}{2}$ inches.

From the large size and number of the eggs they were probably deposited by a gavial considerably larger than any yet obtained in the Peninsula. The largest Peninsular specimen at present recorded (from Perak) measured 8 feet 9 inches.*

One of the two young gavials extracted from the eggs measured $6\frac{1}{2}$ inches in total length and $3\frac{1}{4}$ inches from snout to vent. In colour it was dark grey, the tail lighter; marked above with 12 transverse black bands, interrupted on the dorsal line (5 bands on the body and 7 on the tail); the lower parts were white.

The top of the head had a whitish appearance caused by the brain showing through thin and semi-transparent skull, but this probably disappeared before the young leave the egg.

The snout of this embryo specimen was only about twice as long as its width at the base, or about the same length as the rest of the head.

---

* This specimen, which was caught in the Perak river, near Pulau Tiga, in Lower Perak, is now in the Reptile Gallery of the Natural History Museum at South Kensington.

It is rather doubtful if the inference here drawn is correct. In the case of the common crocodile the eggs are of very uniform size, quite irrespective of the dimensions of the mother. There are five eggs of the Malayan Gavial in the Perak Museum. Their measurements are as follows:—

Locality.	Long.		Diameter.	
The Kinta river	$3\frac{13}{16}$ inches	×	$2\frac{1}{2}$	inches
,, ...	$3\frac{3}{4}$,,	×	$2\frac{9}{16}$	,,
Perak river, near Telok Anson ...	$3\frac{15}{16}$,,	×	$2\frac{3}{8}$	,,
... ...	$3\frac{3}{4}$,,	×	$2\frac{7}{16}$	,,
Selangor, given by Mr. Butler ...	$4\frac{3}{16}$,,	×	$2\frac{7}{16}$	,,

L. W.

Digitized by Google

As a rule, young gavials of 3 or 4 feet in length have the snout proportionately much longer and narrower than in adults; it is therefore remarkable that they should leave the egg with the snout so short.

Besides the difference in the shape of the head, the black-banded, grey young one of the gavial looks very different to the black-spotted, greenish-olive young of the common crocodile (*Crocodilus porosus*); another very noticable point is that in the young *Tomistoma schlegeli* the nuchal and dorsal scutes form a single continuous back shield of 22 transverse rows; in *Crocodilus porosus* four large nuchal scutes form a distinct square, separated from the dorsal plates by an interval of unarmoured skin.

Since writing the above I have received from Mr. A. Hale the following additional notes:—

"The eggs were brought from Batang Berjuntai. They were found on a stream called Parit Champedak, about a mile away from the Selangor river. The nest was composed of a heap of dead leaves, heaped, about 2 feet high. The man who got them did not see the crocodile, but says that he is aware that both buaya jinjulong (gavial) and buaya katak (crocodile) are to be found about Batang Berjuntai. The stream Parit Champedak is about 12 feet wide. The nest was on the bank on a little high ground with swamps all round."

REPORT ON TERMES GESTROI AS AFFECTING PARA RUBBER (*HEVEA BRASILIENSIS*).

By HERBERT C. ROBINSON,
Curator, Selangor State Museum.

I.—GENERAL.

THE *Termitidæ*, or family of white ants, are a division of the Neuroptera, almost exclusively confined to the tropics and numbering about 150 known species, arranged in four or five genera. The group has, however, been but little studied and probably includes at least 2,000 species. They are most abundant in Africa, Northern Australia and the Indo-Malayan region, but appear to be by no means so universally distributed in tropical South America. From the Malay Peninsula and Borneo, which are probably better known as regards their termite fauna than any other part of the world, about sixty species have been recorded referable to two genera, while very many more remain to be described.

The family has not hitherto been considered as very destructive to living plants. An unrecorded species (probably *T. tabrobanes*) is known to destroy rambong seedlings in Assam, while another (*T. flavipes*) damages fruit trees in Florida by girdling them beneath the surface of the ground.

Digitized by Google

II.—SYSTEMATIC.

The Malayan species are included in two genera, *Calotermes* and *Termes*. Members of the former genus, which is not very extensive, are nestless, do not as a rule build covered ways, and are responsible, especially the species *Calotermes domesticus*, for the bulk of the damage done to buildings by white ants. A large number of the species of *Termes* build small spherical nests in trees or shrubs at varying heights from the ground and are of little or no importance from an agricultural point of view.

The following species are the only ones which are at all common on rubber estates and may, it is hoped, be recognised by the following key, which is based on the characters of the soldiers, derived in the main from Dr. Haviland's classical paper on the subject.

III.—KEY TO COMMONER SPECIES OF TERMITES.

I. Lobes of the thorax projecting over the underparts; head large and broad with powerful mandibles; legs projecting beyond the apex of the abdomen. Fungus growers.

- (i.) General colour above blackish ... *Termes carbonarius.*
- (ii.) General colour pale with rufous head—
  - (*a*) Size larger; antennæ with 17 segments ... *Termes malayanus.*
  - (*b*) Size smaller; antennæ with 15 segments ... *Termes pallidus.*

II. Lobes of the thorax projecting but slightly over the underparts; head with a large foramen (hole) secreting milky fluid; mandibles fairly long but slender; outline of body oblong, head rufous, abdomen white, sometimes grey from intestinal contents ... ... *Termes gestroi.*

III. Lobes of the thorax not projecting; species usually of a small size; abdomen arched—

- (i.) With slender mandibles; abdomen sulphur yellow ... ... *Termes sulphureus.*
- (ii.) Mandibles rudimentary; with a conical projection on head; general colour blackish brown—
  - (*a*) Head much swollen ... *Termes lacessitus.*
  - (*b*) Head but slightly swollen *Termes umbrinus.*

IV.—DESCRIPTION OF SPECIES AND THEIR NESTS.

Termes Carbonarius.

This is one of the largest species of termites and is by no means uncommon both in jungle country on land overgrown with lalang, and

Digitized by Google

on abandoned tapioca estates, where it forms nests four or five feet high. It occasionally attacks coconuts, but does not do any serious damage, being more of a nuisance from the nips the powerful mandibles of the soldiers can inflict on the coolies plucking the nuts.

When the plantations are allowed to grow up in grass, the termites do not seem to ascend the trees.

Termes Malayanus.

This is the species usually written of under the name of *Termes bellicosus*, which is an allied form, confined to Africa. The nest of the species varies much in shape according to the age of the community and the type of soil in which it has been built, but large mounds may be as much as six feet high and thirty feet in circumference. It has been well described and figured by Haviland (Journ. Linn. Soc. Zool., XXVI., pp. 381 *et seq.*) and I can confirm his observations in every respect.

The species constructs globular honey-combed masses of comminuted woody fibre and cultivates a species of fungus thereon, on which the young are fed. There is not the slightest evidence that this species does any harm to living plants, and much to the contrary, and it is a very moot point as to whether the money spent in eradicating their nests might not be better employed in other directions. Should, however, the nests be destroyed care should be taken that the whole mound is thoroughly levelled and the earth well broken up and exposed to the sun. It is of no use capturing the king and queen, as the community possesses the power of rapidly replacing them by special treatment of certain larval forms. The lenticular chambers seen on the sides of road-cuttings, etc., are in the majority of instances young communities or colonies from a larger mound either of this or a closely allied species.

Termes Pallidus.

A very much smaller species generally found nesting in the outer shell of the mounds of the preceding species. It also is a fungus grower and appears to be equally harmless.

Termes Sulphureus.

A small species readily recognised by its arched abdomen, which is coloured pale primrose yellow. The nests of old and undisturbed communities are roughly cylindrical, tapering somewhat at the summit. Large nests are four or five feet in height and rather less in diameter, and are composed of a blackish grey material, more honey-combed and with far less earthy matter than that forming the nests of *T. malayanus*, and often excessively hard. The species is commoner on hill than on flat land and is not injurious.

Termes Lacessitus.

Occasionally seen on the trunks of Para and Rambong but not doing any damage. Nest of papery material, usually on trees and shrubs in secondary jungle. A species of no economic importance.

Termes Umbrinus.

This species nests in the stumps of dead trees and is often seen on the march in enormous numbers frequently travelling a distance of two

Digitized by Google

or three hundred yards in columns a couple of inches wide. It apparently feeds on dead leaves, twigs, etc., and is occasionally seen in houses situated near jungle, but does not do any harm.

V.—NATURAL HABITAT AND SURROUNDINGS OF TERMES GESTROI.

Under normal conditions—*i.e.*, on unopened land—Termes gestroi, the only white ant with which we are concerned as an agricultural pest, is by no means a common species in the Federated Malay States.

It has been met with, but only sporadically, in low-lying jungle in the Kuala Selangor and Kuala Lumpur districts, and is fairly common in the neighbourhood of Rantau Panjang and behind Morib.

So far as has been observed, it is scarce or does not occur on granite and limestone soils, nor at any great elevation. Low laterite hills, covered with small jungle, and older jungle growing on land with a heavy clay sub-soil are the most favoured localities, but as it has been met with outside the zone of cultivation only on some twelve or fourteen occasions it is unwise to dogmatise on the point. It is evident that wherever it exists some natural cause must keep it rigidly in check, as otherwise the trees on which it feeds would probably become extinct.

VI.—REASONS FOR PRESENT ABUNDANCE.

Its present abundance is only an instance of what frequently happens when the balance of nature is interfered with by the operations of man, and one has only to mention as a case in point, the plague of voles which occurred some years ago in the South of Scotland and which was directly traced to high game preserving and the consequent destruction of owls and hawks, the natural enemies of the insectivore.

The *Phylloxera*, too, originally an American insect, was never seriously dangerous to American vines, whose roots possessed the power of accommodation to the insect's attack. But when the American vine stocks, and with them the *Phylloxera*, were introduced into Europe, the native vines, which had not acquired this resisting power, were rapidly attacked and destroyed.

The conditions under which Para rubber is reputed to grow in its native forests are not such as would favour the co-existence of any great number of termites. The tree, therefore, when transported to this country, has to contend with difficulties to which the native Malayan trees have, under the stimulus of natural selection, become largely immune, and the increase of an otherwise unimportant member of the local insect fauna is abnormally stimulated.

VII.—NATIVE TREES ATTACKED.

Among native trees *T. gestroi* appears mainly to attack species of the genus *Macaranga*, which, it is significant to note, belongs to the same natural order as *Hevea brasiliensis*. Jelutong (*Dyera costulata*) is also affected, but not to any serious extent, and so are various species of *Mango*, both wild and cultivated.

Grown under artifical conditions tembusu (*Fagraea fragrans*) has been damaged, especially in the neighbourhood of Seremban and near Tampin. On one estate, where *Grevillea robusta* has been planted as

Digitized by Google

a shade tree, the ants have practically exterminated it. Coconuts are also affected but not to anything like the same extent as Para rubber. Rambong is but slightly attacked, and when it is, generally survives, a result probably due in part to its constitutional powers of resistance and in part to its habit of growth.

VIII.—AGE OF PARA WHEN ATTACKED.

It is very rare for any material damage to be done before the tree is $3\frac{1}{2}$ years old, but I can find no satisfactory explanation of this undoubted fact. It may possibly be that *Termes gestroi* is naturally so scarce and scattered that it takes an appreciable time for a sufficient stock to accumulate, but more probably the species cannot work without a minimum amount of shade, which is not afforded until the age of 3 to 4 years is attained. A third theory, to which a certain amount of plausibility attaches, is that the nests of the ants, as with certain South African species, are normally situated at a considerable depth beneath the surface, to which the roots of the rubber do not extend until the age of about four years, though this again is discounted by the situation of the nests as actually found.

IX.—INFLUENCE OF SOIL UPON T. GESTROI.

It has been demonstrated from returns sent in and from various typical estates visited, that, other things being equal, the damage caused by this pest varies more or less directly with the heaviness of the soil, light sandy loams being almost unaffected, while heavy clay soils have sometimes as many as 25 per cent. of the trees attacked. As regards drainage it is impossible to lay down any general rule. Swamp land is almost free from any species of termite, but, on the other hand, where the natural water level lies far beneath the surface termites can penetrate to a correspondingly great depth, and speaking broadly it may be said that the hill country estates in Negri Sembilan are more badly affected than those of the flats in Selangor, though possibly other causes may also have contributed to this.

Taking all considerations into account, it has, I think, been fairly demonstrated that the land best suited to Para rubber is a fairly stiff soil, capable of retaining a certain amount of moisture during drought, which is provided with a thoroughly efficient system of drainage. The slightly increased percentage of trees destroyed by ants in such a situation as compared with a light soil is probably far more than compensated for by the quicker and more luxuriant growth of the trees that escape.

X.—SPACING.

The distance between the trees is also a decided factor in their liability to attack, the wider the spacing the smaller being the proportionate number of trees lost. This is no doubt due to the desiccation of the trunks and surface soil by the sun's rays. This slight advantage seems to be far more than counterbalanced by the much smaller return per acre and the slower growth of the trees when widely planted.

XI.—INFLUENCE OF SEASON.

White ants are much more active during periods of heavy rain, or rather immediately after such rain.

Digitized by Google

XII.—METHOD OF ATTACK.

The methods of attack of *T. gestroi* are eminently characteristic, and when once their earthworks are seen and recognised, they can never be mistaken for those of any other species. The tree seems first of all to be prospected, by two or three tunnels run straight up the trunk; if the indications are favourable the whole circumference is then rapidly invested by a thick layer of mud under cover of which the ants speedily eat down to the cambium. The vast majority of attacks by individual termites are repelled by the cambium, but sooner or later a non-resistant spot is reached and the whole body of termites gains access to the interior of the tree, which is rapidly eaten out and falls. In a very considerable percentage of cases, there are no external signs of damage, and the insects enter the tree either by a lateral root from a point beneath the surface of the soil, or by way of the taproot itself. In such cases the tree may appear perfectly sound, until it falls or is blown over. Damage is caused not so much by the actual death of the tree, for in many cases the living tissues are perfectly sound, but from the weakening of the trunk and taproot added to the natural brittleness of the wood, rendering them unable to resist the slightest wind pressure. On certain estates it has been noted, that where tapping has been somewhat roughly performed, and the cambium extensively cut into, white ants have gained access through the scars thus produced. It is therefore highly important that the cuts should be made down to but not into the cambium layer, as is the case on the Sungei Rengam Estates, where in no single instance have ants secured a foothold in the manner indicated above.

XIII.—GENERAL BIONOMICS OF TERMES GESTROI.

I have not been successful, nor, so far as I am aware, has any other naturalist, in finding the king and queen of *Termes gestroi*. Amongst numerous communities investigated one was found containing immature winged forms and eggs, but careful search failed to reveal anything in the nature of a royal cell, which in all probability is not built by this species. The vast majority of nests contain merely soldiers and workers, and I concur with Dr. Haviland in thinking that it is extremely probable that the greater number of communities are without king or queen and are merely offshoots from some central nest, from which immature forms, and possibly eggs, are conveyed. Under conditions with which we are at present unfamiliar, it is not unlikely that sexually active males and females may be produced by post-metamorphic changes. The termitaria or nests are contained within the trunks of the trees attacked and are formed of narrow labyrinthine chambers composed of woody and earthy matter that has passed through the alimentary canal of the insects, the whole of the interior of the tree being more or less filled up with this material, which replaces the wood as it is eaten away. Judging from the state of development of the immature winged forms above referred to, it is probable that the swarming season, like that of the other species of termites in this country, is from September to Christmas, and it is before and during this period that repressive measures should be most energetically carried out. It appears, too, that on any given estate, the *centres* of attack are comparatively few in number, and there is therefore the more reason to believe that if vigorous preventive measures are persevered in for a considerable time, the pest will gradually abate.

Digitized by Google

XIV.—NATURAL ENEMIES OF TERMITES.

The most important enemies of termites are undoubtedly the true ants, which may often be seen carrying off the workers to their own nests. Three specially active species are the kĕringa (*Oecophylla smaragdina*) a small red species of *Camponotus* often seen running about the trunks of the rubber, and a very long-legged, slender black species, also probably a *Camponotus*, whose nests are often found inside the termitaria, and seem to be regularly provisioned with larval white ants. Of the vertebrates, bears are reputed to occasionally break open the larger mounds, and I have seen the stomach of a binturong crammed with a small jungle-dwelling species. Birds of many varieties gorge themselves with the winged forms during swarming. Frogs and toads, including *Megalophrys nasuta*, *Bufo melanostictus* and *Callula pulchra*, also live largely on termites.

None of those enemies, however, could be made any practical use of, but it might be possible to utilise the services of a species of South African mongoose, *Herpestes badius*, subsp. *gracilis*, which experiment * has shown to feed almost entirely on white ants. Ventures in acclimatisation, however, are always hazardous, and often end in the most unlooked for and unwelcome results.

XV.—REMEDIES.

Of the host of remedies tried, it cannot be said that a single one has shown itself a conspicuous success. From the habits of the pest, as detailed in a previous paragraph, it is obvious that no ordinary insecticide can be effectual, as it is rapidly bridged over by earth, in the case of external attacks, whilst it cannot readily be applied internally. "Gondal's Fluid," a peculiarly malodorous compound containing assafœtida, London purple, copperas, petroleum, an extract of vasumba root, tuba and other direct poisons have been tried with practically no effect. At Jugra, Mr. Baxendale is using applications of hot water with satisfactory results, but his estate is by no means badly infested and the method would probably be impracticable on at all an extensive scale, and is at best a palliative.

The most successful treatment yet devised is to thoroughly scrape off all incrustation from the tree, taking care to kill the ants in so doing, and to powder the trunk thickly with freshly-slaked lime, applied in a dry state. The earth round the base of the tree should be removed to the depth of a foot or eighteen inches, and a liberal dressing of dry-lime applied. The trees should be inspected every other day, and treatment repeated if necessary.

It is a well-established fact, that white ants are very intolerant of any form of decaying animal or fœcal matter, and should the materials be available a compost of cow-dung applied to the tree might be efficacious in repelling the external attacks, while night-soil dug in to the base of the tree might ward off internal attack. The treatment of affected trees with a small quantity of an ammonium salt, preferably the sulphate, might not improbably have the same action, as Dr. Wright, of Perak, informs me that urine appplied to damaged trees rapidly

* Report of the Hope Professor of Zoology, Oxford, 1903, p. 53.

Digitized by Google

drives off the ants, the result apparently depending on the production of ammonia during decomposition. The saving of trees attacked from the tap-root, or beneath the ground level, is a far more difficult matter, for, as noted in previous paragraphs, there is very frequently no indication of damage. Should this be detected in time, the base of the tree should be well exposed and treated with lime. If large cavities exist, two or three ounces of carbide of calcium should be introduced, with a little water, and the aperture plugged with damp clay. The acetylene gas thus produced is a fairly powerful insecticide, but its usefulness is impaired by its great diffusive power and consequent ephemeral effect. Carbon bisulphide has been suggested as suitable, and there is no doubt that this chemical is a most valuable insecticide which could be put to a multitude of uses in this country if only it was procurable at a reasonable cost and with some regularity. In England it is much used for freeing grain from weevils and could be applied to rice in this country for a similar purpose. I do not, however, think that the apparatus suggested by Mr. Bamber would prove workable in practice; it would certainly be cumbersome, extremely wasteful, and probably very deleterious to the coolies working it. Its efficacy would probably depend rather on the amount of sulphur vapour and sulphur dioxide formed, than on its output of carbon bisulphide. I have gone into the question in detail, and believe that the chemical could be produced in bulk in this country at a far less cost than it would be possible to import it for, when the prohibitive freight and heavy loss in transport is taken into account. My estimates and the facts on which they are based are embodied in Appendix *A*.

XVI.—SUMMARY.

Summarising the above information, it may fairly be taken as proved:—

(*a*) That *Termes gestroi*, comparatively a scarce and unimportant species under conditions normal to the country, has risen to the rank of a serious agricultural pest, owing to the provision in large quantities of a suitable food tree;

(*b*) That the damage caused to estates is, in the main, due to termites bred within their limits, and not in the adjacent jungle; otherwise trees near the boundaries would be most affected, which is not found to be the case;

(*c*) That less damage occurs on light soil, and when the spacing is very wide, but that this is far more than counterbalanced by the more vigorous growth and better return per acre on heavier soil more thickly planted;

(*d*) That the mischief is most active in rainy weather;

(*e*) That the nests of the termites are to be found inside the trunks of the trees destroyed, and that these nests swarm—*i.e.*, attempt to form new communities—sometime between September and Christmas;

(*f*) That no species of termite other than *T. gestroi* is injurious to living Para;

(*g*) That the attacks of the termites do not appear to be due to antecedent disease, fungoid or otherwise, though sometimes induced by mechanical injury to the cambium.

Digitized by Google

XVII.—RECOMMENDATIONS.

I have to make the following recommendations:—

(*a*) That where possible, planting be carried out by means of seed at stake and not by stumps;

(*b*) That when affected externally, trees be treated with dry lime in accordance with previous paragraphs and that when internal damage is suspected, by means of carbon bisulphide vapour forced into the cavities by means of a small pump fitted with three valves, one for admission of carbon bisulphide, from an attached receiver, one for admixture of air near the end of the stroke, and one for the expulsion of the gaseous mixture. A rough diagram* is included in Appendix A. Failing carbon bisulphide, solid calcium carbide may be used;

(*c*) That whenever a tree falls from the attacks of white ants, it should be split open, the earthy matter within removed and well mixed with lime, the stump dug out and burnt together with the trunk. The hole should be filled in with earth and lime and the ground changkoled within a radius of 20 feet. This should be done immediately on the fall of the tree and especial promptitude is indicated if the event happens at all near the swarming season;

(*d*) That the larger mound-building species be not interfered with, as in this country they largely take the place of earth worms in more temperate climates, and play an important part in the economy of nature by rapidly converting dead timber and decaying vegetable matter into a form immediately available for plant nutrition;

(*e*) That the possibility and even probability of mismanaged and neglected estates becoming a breeding ground for *T. gestroi* and hence a source of danger and expense to their neighbours, be seriously considered by the Planters' Association.

XVIII.—CONCLUSION.

In conclusion, I must express my acknowledgments for the great assistance rendered to me by the planting community in general, and to Mr. P. W. Parkinson, of Sungei Rengam Estate, in particular, to whom I am indebted for much material aid and many valuable suggestions, which are embodied in the present report.

HERBERT C. ROBINSON,
Curator.

SELANGOR STATE MUSEUM,
KUALA LUMPUR, *13th October, 1904.*

---

* Not printed.

Digitized by Google

APPENDIX A.

MANUFACTURE AND USE OF CARBON BISULPHIDE.

Theoretically 100 lbs. of sulphur should yield 119 lbs. of carbon bisulphide, but after allowing for leakage and loss from imperfect condensation, it will be safer to assume that 150 lbs. of sulphur are required to produce 100 lbs. of CS_2.

Plant and building; capital cost	$2,500
Monthly production 600 lbs.	
* Sulphur, 8 cwt. at $12.50	$100
Charcoal, 10 cwt. at $1.50	15
Firewood, etc.	50
Wages	40
Interest on capital 10%, sinking fund 15% ...	52
Repairs	40
	$297

or, roughly speaking, 50 cents per lb.

With a consumption of 1,200 lbs. per mensem we have—

Establishment charges	$132
Cost of materials	330
	$462

or, $0.39 per lb., which is a very great deal lower than carbon bisulphide can possibly be imported for. The cost of materials, of wages, repairs, and capital cost of apparatus have been estimated at a very much higher rate than is likely to prevail, an exceedingly low condensation factor has been assumed, and a liberal allowance made for interest and sinking fund.

I would, nevertheless, suggest that previous to any action being taken, the Government should instruct the Crown Agents to refer the question to either Professor Tilden, F.R.S., Professor of Chemistry, Royal College of Science, or else to Professor T. E. Thorpe, of Somerset House, with the request that they should obtain plans for a plant on the following scale:—

Daily production required	70 lbs.
Working hours per day	7
Working days per month	20
Temperature of condensing water	80° F.

All parts to be easily accessible, readily replaced and as uncomplicated as possible.

---

* Present price in London, retail, 16*s.* per cwt.

Digitized by Google

APPENDIX B.

OTHER INSECT ENEMIES OF RUBBER.

With the exception of *Termes gestroi* both Para rubber and Rambong are singularly free from insect pests of all descriptions.

The following are the only species that have been noticed as doing damage, and in all cases the damage has been quite insignificant, and shown little tendency to spread.

1. *Eumeces squamosus.*—A weevil about $\frac{1}{2}$ inch long and covered with powdery scales of a greenish or yellowish tint, which are readily rubbed off, when the insect becomes of a dull black colour. The adults cause injury by defoliating the trees, but the grubs are harmless. Described in the "Agricultural Bulletin" for January and July, 1904.

2. *Anthribid sp.*—A mottled grey and black beetle about $1\frac{1}{4}$ inch long, with antennæ (in the male) more than twice the length of the body, but shorter than half the body in the female; head of large size, elongated, and set at right angles to the body. Very common in this country. A single specimen was caught emerging from the trunk of a Para tree, and others have been seen flying about plantations. The larvæ of this family of beetles are normally feeders on wood.

3. *Epepeotes luscus.*—Size very variable from $\frac{3}{4}$ to $1\frac{3}{4}$ inch; antennæ more than twice the length of the body; general colour blackish, mottled with pale cream, a velvety black spot on each shoulder, surrounded by a narrow cream line. A very common species, the larvæ, like those of the majority of the Longicorns, feeding on wood. Found once on the trunk of a Para rubber tree.

4. *Clytanthus annularis.*—(Longicorn). A narrow insect about $\frac{1}{2}$ to $\frac{3}{4}$ inch long by $\frac{3}{16}$ inch or less broad; antennæ filiform, not so long as the body; general colour mustard yellow varied with black. A common and wide-spread insect, found *once* ovipositing on the stems of Para seedlings. Somewhat closely allied to the coffee borer of Southern India.

5. *Aspidiotus sp.*—A scale insect apparently belonging to this genus has once been noted on Para, but nothing more has been heard of it.

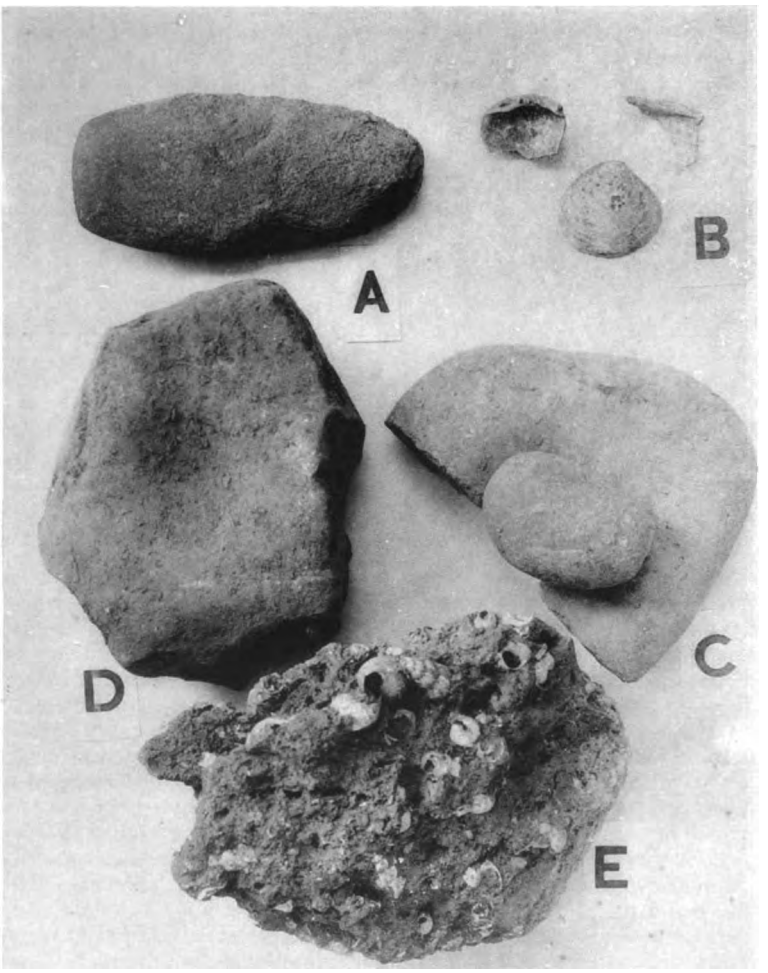
6. Small beetles of the families *Bostrychidæ* and *Scolytidæ* frequently attack the bark of Para rubber. Their efforts seem, however, to be frustrated by the latex, which exuding from the wounds coagulates round the head of the beetle and stops further progress.

7. The larvæ of a small moth, greyish-brown in colour with a pinkish tinge, and about $\frac{2}{3}$ of an inch in spread, has sometimes been found feeding on Rambong and may possibly attack Para. The species appears to be closely allied to, if not identical with, *Rhodoneura myrsusalis* found in Brazil, Natal, India, Ceylon, Burma and Borneo. The food plants in this country are species of *Palaquium* (getah taban) in whose rolled-up leaves the larvæ pupate, and the trees are damaged considerably both in a wild and cultivated state. The rigid leaves of *Ficus elastica*, however, are not quite suited to the habits of the larvæ and the damage at present effected is hardly noticeable.

It will be unwise, however, to allow taban to be planted in the immediate vicinity either of Para or Rambong.

Digitized by Google

Digitized by Google



Digitized by Google

FURTHER NOTES ON THE CAVE DWELLERS OF PERAK

(WITH THREE PLATES).

By L. WRAY, I.S.O., M.I.E.E., F.Z.S., ETC.

SOME more work has been done in exploring the caves at Gunong Cheroh, near Ipoh, since the first paper on the subject was published in the "Journal of the Anthropological Institute," and one very interesting find made. This is the stone implement which is shown in Plate I., Fig. A. It was found about 2 feet below the present surface of the floor of the cave in the midst of the shell-and-bone deposit, very close to where the figure is seen sitting in the photograph, Plate II. This implement is made out of a hard dark stone similar to others which have been found in Perak. It may have been used in a handle, but possibly was a hand celt. It is $7\frac{3}{4}$ inches long, $3\frac{3}{4}$ inches at the widest part, $2\frac{3}{8}$ inches at the cutting edge and $\frac{15}{16}$ inch thick at the centre. It weighs 2 lb. $5\frac{3}{4}$ oz. avoirdupois. The edge is ground nearly equally from either side, and, as may be seen, is in perfect condition.

This would appear to be the first implement which has been found in the caves of the limestone hills of the Malay Peninsula. The possibility of finding them has been already discussed, and as stated in the previous paper the discovery is no proof that the stone implements, which are so numerous in the State, were made by the cave dwellers, but only that they were contemporaneous with the makers of the implements, from whom they sometimes obtained one by barter or otherwise, in the same way as the modern Sakais get iron axes and chopping knives from the Malays.

The mealing stone, Fig. D, was found in the same cave and not far from the celt, while that marked Fig. C came from the cave represented in Plate III. One perfect valve of the marine shell of *Cyrena sumatrensis*, Lour., and two portions of other valves are shown at Fig. B. Ipoh, it should be mentioned, is a long way inland, and a very difficult country must have intervened at the date of the occupation of the caves as dwellings. It is true that there is a river flowing from the hill to the sea, but before it was cleared of fallen trees and snags the navigation of it must have been attended with great difficulty, even supposing that the cave dwellers were possessed of boats, which seems to be very doubtful. The mass of shell and bone stalagmite shown at Fig. E was from the cave depicted in Plate III. There is a quantity of similar conglomerate in this cave, and apparently at an earlier date there was a thick layer of it covering a great portion of the floor. At present the floor of the cave is composed of shell and bone refuse as far out as the rocks on the right hand side of this photograph.

Further digging in the cave shown in Plate II. brought portions of three human skulls to light. The other bones of these skeletons were also found in a more or less perfect state, in their natural positions. These bones, like those previously found, were all in a very much crushed and broken state from the trampling of the elephants which used to frequent these caves. The only chance of getting a perfect skull would be to find one close up to the rock where the slope of the roof would be such as to have prevented the approach of an elephant. These fresh finds of human skeletons go far to confirm the theory of

Digitized by Google

burial advanced in the former paper. Few of the other bones found were more than fragments, but some of wild pig and deer were determinable.

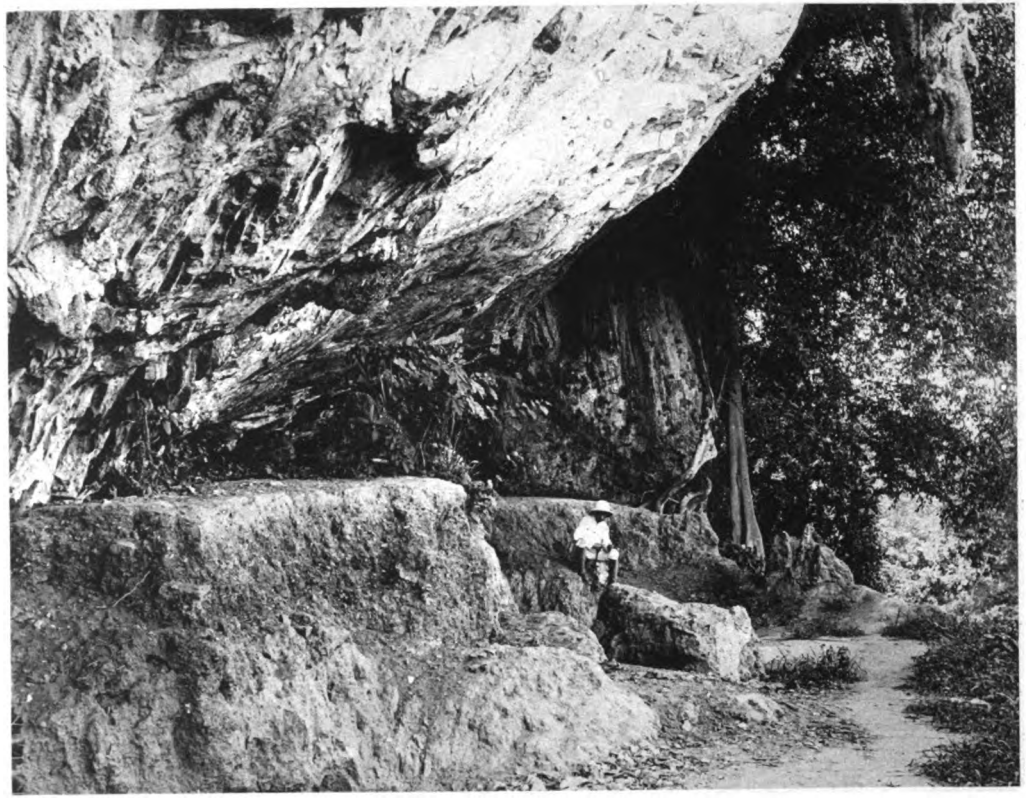
In the photograph of this cave a section of the deposit is shown, and with a magnifying glass the shells may be distinctly made out. Beneath the human deposit is a layer of coarse river sand. This was undoubtedly deposited by the river, as it shows distinct traces of bedding. No shells were found in it, but this is the case with the other river and alluvial deposits everywhere in the State. The bed of the Kinta river is at present some 40 feet lower than the floor of these caves and it flows about 100 yards to the right of the foot of the hill.

The caves are about 150 yards round the cliff to the right from the marble quarry. Between the two places are some extensive and beautiful caverns which the Chinese have unfortunately been allowed to vulgarise by making into a tawdry temple. Altars, incense, candles and the other adjuncts of the lower forms of religion seem so much out of place when brought into close proximity to the beautiful works of nature. The floors of these caverns contain no evidences of human occupation.

Since the above was written, I have seen near Pulau Tawar, in Pahang, quite a number of Sakai living-places, in the caves of a limestone hill called Kota Glanggi and a hill near it. The caves were mostly of the rock-shelter type. There were no Sakais then in them, but they had been there quite recently. The living-places were quite simple, consisting of a number of small sticks placed side by side on the ground, forming a small *lanti* on which to sleep; by the side of it was a raised *lanti* of sticks, with the fireplace beneath it. On this shelf they keep firewood, edibles, etc. The fireplace was on the ground and the fire of sticks was made between three or four stones. In some cases there were two beds with a fire in the middle and in others only one; each bed being just large enough to accommodate one person, measuring about 5 feet long by 2 feet wide. The whole was more or less enclosed by a fence of sticks, some 4 to $4\frac{1}{2}$ feet high. Sometimes this fence was on one side, sometimes on two sides and occasionally on three sides. In one case the hedge was formed of sticks on which the branches and dead leaves still remained. The others were mere open-work fences of small sticks tied together with rattan and jungle creepers. In some of the caves there were five or six of these separate sleeping places. In most cases, near each was a stick planted in the ground, having two or more forks, formed by cutting off the branches some six or eight inches from the main stem, at the upper end of it. It appeared to be used for hanging baskets, etc., on and also for leaning blowpipes and spears against, and in fact to take the place of our hat-stand. On the ground near the sleeping places were many bones, shells, Indian corn husks and the shells of kapayong and other jungle fruits. The molluscan shells were both land and fresh water. In one place there were a number of *Unio* shells.

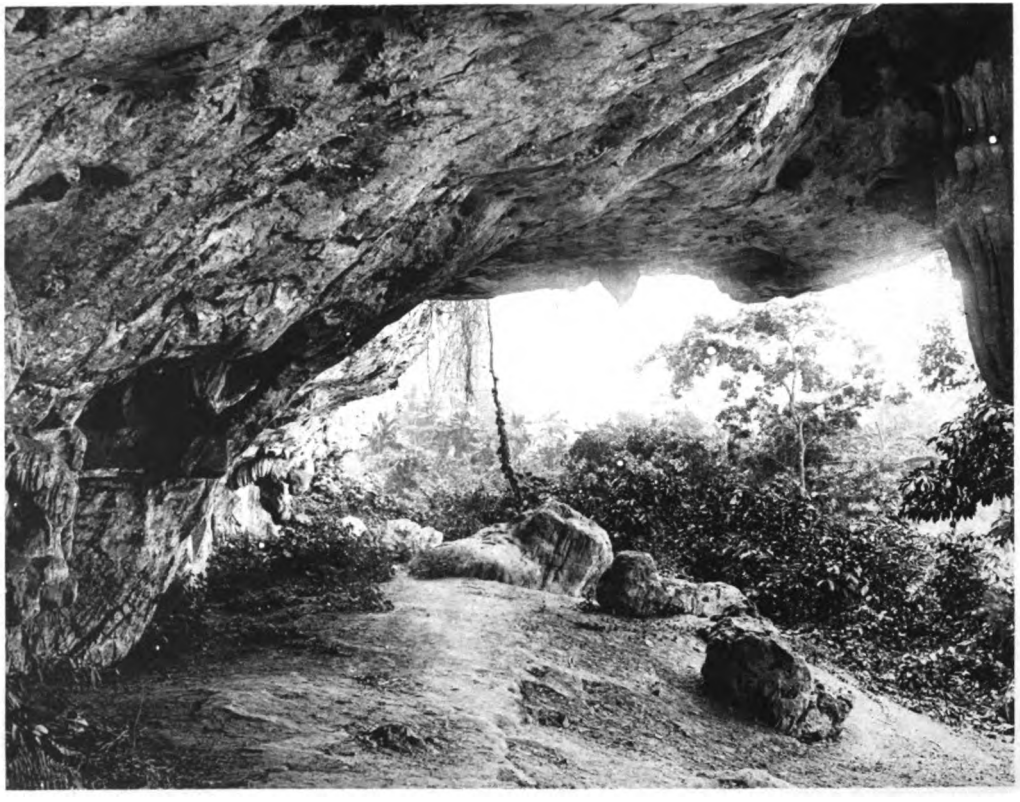
Wrapped up in leaves were bundles of bones of animals. These packets were placed in holes in the walls and roof of the caves. I found many of these packets, and brought some away with me. These latter are now in the Perak Museum. The packets did not contain the whole of the bones of an animal, but portions only, apparently the

Digitized by Google



Digitized by Google

Digitized by Google



Digitized by Google

Digitized by Google

bones of the part eaten by a single individual at a meal. In three cases there were the skulls of gibbons; other packets were of the bones of musangs (*Viverridæ*), while lying about were some fragments of large bones, possibly deer.

We have in this most interesting case an example of the way in which the modern Sakai, of Pahang, lives in these limestone caves. It bears out the conjectures I ventured to make regarding the cave remains in Perak and goes a long way towards proving that the people who inhabited the Perak caves were Sakais also.

NOTE ON A GENUS OF BUTTERFLIES NEW TO THE MALAY PENINSULA.

AMONGST a few butterflies collected in July, 1904, by the Museum collectors on Bukit Kutu, Selangor, at an approximate altitude of 3,200 feet, there occurs a species of the Lemoniid genus *Dodona*, Hewitson, which has not hitherto been recorded from the Malay Peninsula, though a species is known from Borneo.

The specimen in question appears to be referable to *Dodona deodata* of which the synonymy is as follows:—

DODONA DEODATA, HWTSN.

Dodona deodata, *Hewitson, Ent. Month. Mag.*, xiii. p. 151 (1876); *Marshall and de Nicéville, Butter. of India*, ii. p. 312 (1886); *Elwes*, P.Z.S., 1891, p. 288, pl. xxvii., fig. 8.

Dodona longicaudata, *de Nicéville, Proc. Asiat. Soc. Beng.*, 1881, p. 121; *Marshall and de Nicéville*, op. cit. p. 313 pl. xxiv., fig. 117.

Dodona deodata was originally described from a worn specimen which had lost its tails and is now considered identical with the more recently described *D. longicaudata.*

General Range. Assam (Shillong), Burma (Karen Hills), Moulmein?

All members of the genus are hill-ranging species found on deep forest, and the locality, Moulmein, whence the original specimen of *D. deodata* is said to have come, is open to considerable doubt.

NOTE ON A BLIGHT AFFECTING SUGAR CANES AT NOVA SCOTIA ESTATE, LOWER PERAK.

BY L. WRAY.

THE so called "black mould" on the sugar canes is only a secondary symptom, the true cause of the disease being one of the insects popularly known as "mealy bugs." The adult insect is coated with a white powdery covering, hence its name. It lives by sucking the juice of the leaves and leaf-stalks and the black substance is excreted by it, being very noticeable on the dead and dying leaves.

Digitized by Google

The blight occurs in patches amongst the young canes and afterwards spreads, over considerable areas, as the canes grow. Each centre of infection may spread to as much as 400 square feet, by the time the canes are fit to crush. The size of the patches evidently depends on the period of infection. The blight may be carried about and distributed by the coolies passing along the rows of cane, or along the footpaths round their edges, as the insects fall off when the cane is shaken or a person brushes against it. This view is supported by the fact that the edges of the fields are more affected than the interiors.

The blight attacks the leaves, and, as they die off, ascends to the younger ones. Ultimately the cane also either dies or stops growing, and in the latter case is of little or no use in the mill, as it contains hardly any sugar.

I would suggest that the best way of arresting the progress of the blight is to spray the affected plants with kerosene oil emulsion. The emulsion I would recommend is made as follows:—

Calvert's carbolic soft soap	1 lb.
Hot water	2 gallons
Kerosene oil	4 „

The water should be boiled and the soap dissolved in it. Then while still hot the oil is added and the whole violently agitated until it assumes the appearance and consistency of cream and there is no free oil floating on the surface, after standing for a short time.

The best way to churn it up, is to use a syringe. Sucking it up and then squirting it out again into the containing vessel. This action if continued for about ten minutes will usually suffice. This emulsion will keep for any length of time. When required for use it should be stirred up and diluted by mixing one part of it with nine parts of water. The water used should be fresh and soft, for if salt, or even if very hard, the soap is deposited and the oil separates out and rises to the surface. Rain water or condensed water would be the best to use. If neither can be obtained a milk emulsion might be tried. This is made in the same way as above described, but in place of the soft soap, a tin of condensed milk is substituted.

The fluid is to be sprayed on to the blighted cane with some sort of syringe. The best kind is one fitted with a cyclone nozzle, as it gives the finest spray and therefore wets a greater surface in proportion to the amount of liquid used.

A handy form of apparatus is made in America, consisting of a flat tank, to be worn as a knapsack on the back, containing a pump; which is worked by a handle hanging over one shoulder with one hand and having a flexible pipe ending in a cyclone nozzle which can be directed with the other hand. This apparatus costs about ten American dollars. There is one in the Perak Museum which can be seen by anyone interested in the subject.

It may be mentioned here that the kerosene oil emulsion, above described, has been successfully used for a long time past to kill various insect pests attacking the vegetables grown on the hill gardens near Taiping. It was first suggested by me to kill the caterpillars which at that time were destroying all the cabbages in the gardens.

Digitized by Google

If possible, the soap emulsion should be used for the mealy bugs, as it will be more likely to get at them than other forms of emulsion. The white waxy covering protects the insects from water. Soapy water would, however, probably break down this defensive protection and allow the emulsion to get at the insect. The young are not protected and will therefore easily be killed.

If a lookout is kept on the fields and the patches of blighted canes are sprayed as soon as noticed, it is probable that it may quite easily and cheaply be kept in check. This blight lives on many plants besides sugar canes and should be destroyed wherever found about the estate. All insects of this class are most prolific and multiply with extraordinary rapidity, when there is a sufficiency of suitable food available. It might, therefore, at any time assume serious proportions, though, I understand, up to the present it has not done much damage on Nova Scotia Estate.

2nd October, 1904.

NOTE ON *RATUFA BICOLOR*, THE LARGE MALAY SQUIRREL.

By FREDERIC W. KNOCKER.

A FEMALE specimen of, what the writer considers to be, one of the numerous varieties of *Ratufa bicolor*, recently presented to the Perak Museum by Mr. Lauder Watson, of Sungei Siput, is worthy of note as not only differing slightly from any variety yet described, but also in its close resemblance to a male squirrel from Simpang already in the Museum collections and labelled *Sciurus laticaudatus*.

A description of the former, made whilst still in the flesh, is as follows:—

Length of body and head	1 ft. 3½ in.
Length of tail to extremity of caudal vertebrae, without hair	1 ft. 4½ in.
Length of hind-foot...	3 in.
„ ear	1 in.

The inguinal mammae (six in number), soles and palms, black.

The prevailing colour is rufous, the whole of the back, with the fore-limbs and back of neck grizzled with black, which appearance is given by the markings of the single hairs being dusky brown at the basal portion, then a single annulation of light rufous and tipped with black (? very dark brown). The whole of the underparts pale ferruginous, this colour continuous also on the inside of the limbs, but a shade darker. The outer portion of the hind limbs is dusky rufous, not grizzled; whilst on the upper part of the thigh is a broad band of pale buff about an inch wide. The feet are dark brown, the inner half being streaked slightly with yellow. The hair on the back of the hands is darker than that of the fore-arm; the fingers same as the feet. Crown of the head is grizzled rufous but lighter than that of the back. Forward it shades off to a grizzly grey, which extends downwards in front of the eye to the chin. The nose dark rusty brown; cheeks greyish white, from which spot spring the blackish moustachois, the

Digitized by Google

whiskers and other bristles of the face being of the same hue. The ears are small, with short dark brown hairs; irises reddy brown, and there is a dark crescent-shaped streak under each eye. The long distichous tail is of a uniform dull brick red, excepting the last four inches, which is dark brown, slightly mixed with pale buff hairs, preceded by a dark brown bar. The underneath is paler, and the vertebrae are covered with short blackish hairs, forming a conspicuous central line.

This distinct structure of the tail from that of the typical black specimens seems to have been overlooked by writers subsequent to Cantor, although even this author does not actually draw attention to the difference. But he classifies these varieties under "Var. B" with the "*Syn.-Sciurus auriventer*, Is. Geoff. apud Schinz," and in the course of the description he notes:—"On the lower surface of the distichous tail the roots of the hairs form a white line on either side of the vertebræ, which are covered with short dark brownish or fulvous hairs." This, however, is not the case with the black specimens, the hairs directly covering the central line of the vertebræ on the ventral surface, although distinct, being much longer, and the whole appendage is round and bushy compared with the flat and "feathery" structure of the so-called varieties. On close examination it is found that the long hairs of the varieties mostly spring from the sides of the vertebræ, being quite scanty on the dorsal surface—hence the feathery appearance. But in the typical animals they spring from all round the vertebræ and are much more profuse—hence the apparent roundness. These notes, which the writer ventures to think may be of significance, are made from the three specimens now in the Perak Museum collections, but Mr. Wray assures me that it is exactly the same with the specimens in the Selangor Museum, which he has quite recently examined. Measurements taken of the short vertebral hairs of the Perak specimens result as follows:—

Typ.	...	...	...	...	27 mm.
Var.	...	...	...	...	(Simpang) 11 mm.
Var.	...	...	...	...	(S. Siput) 9 mm.

Thus apart from the other differences pointed out this alone would appear to be worthy of attention.

The squirrel from Simpang has been noted by Flower in his "Mammalia of Siam and the Malay Peninsula," as *Funambulus laticaudatus* ("P.Z.S.," 1900, p. 359). Mr. Wray, however, is now of the opinion that it is not this species but that it is one of the so-called varieties of *bicolor*. In general appearance it resembles the specimen above described very closely, the light band on the thigh and the dark brown and greyish markings of the face being characteristically alike. Two differences readily recognised, however, in the Simpang specimen, are absence of the rich grizzled appearance of the back, the whole coat by comparison being yellowish, and the shortness of the tail, which is the exact length of the body and the head (1 ft. 3 in.). The hair on the upper part of the tail also is blacker, but the dark-coloured bar and darker extremity is absent; and underneath, the dark medial line, formed by the short hairs covering the vertebræ, is bordered on either side by a broad whitish line irregularly banded with dark brown. These latter notes, however, are made from the specimen as it is now after many years' exhibition in the Museum. On the whole

Digitized by Google

it may possibly bear some resemblance to the Pahang squirrels of the same species mentioned by Ridley ("Journ. Str. Br. Roy. Asiatic Soc." No. 25, 1894, p. 58) as "of a dirty yellowish white colour almost tawny on the back."

The new specimen from Sungei Siput, I am inclined to think, finds its nearest resemblance in specimen "R" of the Indian Museum catalogue ("Cat. Mamm. Ind. Mus." ii., 1891, p. 8) "from the crown of the head to the root of the tail it is a bright grizzled yellow, each hair being brown with a bright yellow tip, the hands, cheeks and throat are whitish, the end of the nose and chin alone being dark." Again, the two Bornean specimens "Z" and "A 2" are "very dark grizzled above but with yellowish not blackish feet." It is just possible therefore that the squirrel under consideration is intermediate between these two varieties. The specimen "R" is a male animal from Perak.

There is but one typical specimen (from the Larut Hills) in the Perak Museum—the animal with the "intense shining black" upper-parts and under-parts of a "deep golden fulvous," the quoted words being Cantor's.

Other references not mentioned in the context are:—

CANTOR.—p. 38 (reprinted in "Misc. Papers relating to Indo-China" vol. II., pp. 34-36).

BLANDFORD.—"Faun. Brit. Ind." Mamm. pp. 373 and 374.

BONHOTE.—"Fascic. Malay," Zool. Pt. I., 1903, p. 18.

PERAK MUSEUM,
2nd November, 1904.

FURTHER ADDITIONS TO THE BATRACHIAN FAUNA OF THE MALAY PENINSULA WITH A LIST OF THE SPECIES AT PRESENT KNOWN TO OCCUR THEREIN.

BY HERBERT C. ROBINSON.

IN the "Proceedings of the Zoological Society of London, 1902 (2)," pp. 188 *et seq.*, Mr. A. L. Butler gives a list of recent additions to the Batrachians known from this country, bringing up the total number to 58 species. To these should be added two species, *Ixalus horridus* and *Rhacophorus robinsonii* recently described by Mr. Boulenger, while I have now to include four more species, also identified by the same distinguished authority.

NECTOPHRYNE HOSII, BOULENGER.

Originally collected by Mr. Hose in the neighbourhood of Mt. Dulit, Sarawak, Borneo, and described by Mr. Boulenger.

Two specimens, male and female, were captured in a tree in deep jungle about nine miles from Kuala Lumpur, and, owing to the striking dissimilarity in the sexes,* were at first thought to be distinct species.

The female, which is very much larger than the male, is coloured greenish olive and is profusely spotted with clearly defined bright chrome yellow spots, while the male is uniform dull olive brown above, dirty white beneath.

* This difference has also been noted by Mr. Shelford (*cf.* Report, Sarawak Museum, 1901-2, p. 14).

Digitized by Google

The genus *Nectophryne* is notable for the abnormal distribution of its numbers, species being known from the Malayan countries, Malabar, and from West Africa, but not from the intervening regions, a parallel case occurring in the genus *Pitta* among birds and in certain genera of longicorns. *Nectophryne* is as a rule decidedly rare and it may be worth while recording that the other Peninsular species, *N. guentheri*, previously only known from Singapore, so far as this fauna is concerned was recently found by me on the Sungei Longkoi, a small stream on the borders of Selangor and Jelebu.

RANA NIGROVITTATA, Blyth.

This species was originally described from Tenasserim by Blyth (*Journ. Asiat. Soc. Beng.* xxiv. 1855, p. 718), but his description was bad and the species remained unrecognised until it was rediscovered in Upper Burma by Signor Fea, whose collections were worked out by Mr. Boulenger (*Ann. Mus. Civ. Genoa* (2) xiii. 1893, p. 334, pl. viii. fig. 3). Immature specimens were obtained in January, 1904, from muddy pools at the foot of the limestone hills in which the Batu Caves are situated.

RANA NICOBARIENSIS, Stol.

First discovered in the Nicobar Islands and subsequently in Nias and Sumatra. Several young individuals were secured in the same situation as the preceding species.

IXALUS, Sp. Nov.

This frog, which Mr. Boulenger informs me is a new species, was noted by Mr. Ridley in the jungle near Batu Tiga. It was sitting on a gingerwort with the body much flattened and presented an extraordinary resemblance to a dead and bleached leaf. Its forelegs were extended in front of its head and its hind legs closely adpressed to the body so that the posterior portion of the body appeared to be the anterior, an illusion that is commonly cultivated as a means of protection by several animals, notably butterflies of the genus *Cyrestes* and by certain Homoptera.

BIBLIOGRAPHY.

Boulenger, G. A., F.R.S.:

1. Catalogue of the Batrachia Salientia sive Ecaudata in the Collection of the British Museum, London, 1890.
2. First Report on Additions to the Batrachian Collection in the Natural History Museum. *Proc. Zool. Soc., London*, 1886, pp.. 411 *et seq.*, pl. xxx.
3. On Reptiles and Batrachians collected by Mr. Hervey in Malacca. *Ann. and Mag. Nat. Hist.* (5) xix. pp. 346 *et seq.*, pl. x. (1887).
4. List of the Reptiles, Batrachians, and Fresh Water Fishes collected by Professor Moesch and Mr. Iversen in the District of Deli, Sumatra. *P.Z.S.*, 1890, pp. 31 *et seq.*
5. Second Report on Additions to the Batrachian Collection in the Natural History Museum. *P.Z.S.*, 1890, pp. 323 *et seq.* pls. xxv, xxvi.

Digitized by Google

6. The Fauna of British India, including Ceylon and Burma—Reptilia and Batrachia. London, 1890.

7. An Account of the Reptiles and Batrachians collected by Mr. Hose on Mt. Dulit, Borneo. *P.Z.S.*, 1892, pp. 505 *et seq.* pl. xxx.

8. An Account of the Reptiles and Batrachians of Celebes, with special reference to the Collections made by Drs. P. & F. Sarasin in 1893-96. *P.Z.S.*, 1897, pp. *et seq.* pls. vii-xvi.

9. On Reptiles and Batrachians from the Malay Peninsula. *Ann. and Mag. Nat. Hist.* (7) vi. pp. 188 *et seq.* (1900).

10. Report on the Reptiles and Batrachians. *Fasciculi Malayenses. Zool.* I. (i.), pp. 131-141, pls. v., vi. (1903).

BUTLER, A. L.:

11. On Recent Additions to the Batrachian Fauna of the Malay Peninsula. *P.Z.S.*, 1902 (2), p. 188 *et seq.*

12. Batrachians of the Malay Peninsula. *Journ. Bombay Nat. Hist. Soc.* xv. pp. 193-205; 387-402 (1903-4).

CANTOR, THEODORE:

13. Catalogue of Reptiles (and Batrachians) inhabiting the Malayan Peninsula and Islands. *Journ. Asiat. Soc. Beng.* xvi., pp. 607-656; 877-952; 1026-1078 (1847-48). Reprinted in *Essays Relating to Indo-China* (i.) II. pp. 112-257 (1886).

FLOWER, STANLEY S.:

14. Notes on a Collection of Reptiles and Batrachians made in the Malay Peninsula in 1895-96, with a list of the Species recorded from that Region. *P.Z.S.*, 1896, pp. 885 *et seq.*, pls. xliv.-vlvi.

15. Notes on a Second Collection of Batrachians made in the Malay Peninsula and Siam from November, 1896, to September, 1898, with a list of the species recorded from those Countries. *P.Z.S.* 1899, pp. 885 *et seq.*, pls. lix., lx.

HANITSCH, R.:

16. Check List of the Reptiles and Amphibians in the Raffles Museum, Singapore. *Singapore*, 1900.

LAIDLAW, F. F.:

17. On the Frogs collected during the "Skeat Expedition to the Malay Peninsula, 1899-1900." *P.Z.S.* 1900, pp. 883, *et seq.* pl. lvii.

MOCQUARD, M. F.:

18. Reherches sur la Fauna Herpetologique des Iles de Borneo et de Palawan. *Nouvelle Archives du Museum, Paris*, 1890. Reprinted in Whitehead's "*The Exploration of Kina Balu*," pp. 264-284, *London*, 1893.

STOLICZKA, DR. F.:

19. Notes on some Species of Malayan Amphibia and Reptiles. *Journ. Asiat. Soc. Beng.*, xlii. (ii.), pp. 111-126 (1873) Reprinted in *Essays Relating to Indo-China.* (ii.), i. pp. 72-87 (1887).

Digitized by Google

DISTRIBUTION OF THE BATRACHIANS AT PRESENT KNOWN TO OCCUR IN THE MALAY PENINSULA.

Name.	Penang and Kedah.	Perak.	Selangor and Negri Sembilan.	Malacca, Johore and Singapore.	East Coast, Malay Peninsula.	Ceylon.	Peninsular India.	Assam, Burma, Tenasserim.	Siam, Indo-China, S. China.	Borneo and Natuna Ids.	Java.	Sumatra and Mentawei Ids.	Remarks.
APODA.													
Cæciliidæ.													
1. Ichthyophis glutinosus, Linn.	—	—		—	—	—	—	—	—	—	—	—	
2. „ monochrous, Blkr.		—				—	—			—	—		
ECAUDATA.													
Pelobatidæ.													
3. Megalophrys montana, Kuhl.	—	—	—		—						—	—	Also in Palawan and Dinagat.
4. „ nasuta, Schlg. ...	—	—	—	—						—	—	—	
5. „ longipes, Blgr. ...		—	—										
6. Leptobrachium hasselti, Tsch.		—	—	—	—			—		—	—	—	
7. „ heteropus, Blgr.		—											
8. „ pelodytoides „		—						—					
Bufonidæ.										—			
9. Bufo penangensis, Stol. ...	—	—								—			
10. „ jerboa, Blgr.		—	—										
11. „ asper Gravenh.... ...	—	—	—	—	—			—		—	—	—	
12. „ melanostictus, Schn.	—	—	—	—	—	—	—	—	—	—	—	—	
13. „ parvus, Blgr.	—	—		—	—			—		—		—	
14. „ quadriporcatus, Blgr. ...		—		—						—		—	
15. „ divergens, Ptrs. ...			—							—			
16. Nectophryne guentheri, Blgr.			—	—						—		—	
17. „ hosii, Blgr. ...			—							—			New to this fauna.
18. Nectes subasper, Tsch. ...			—								—		

Digitized by Google

Engystomalidæ.													
19. Calophryne pleurostigma ...			—	—				—	—	—			
20. Phrynella pulchra, Blgr. ...				—								—	
21. „ pollicaris „		—								—			
22. Microhyla ornata, D. & B, ...	—				—	—	—	—	—				
23. „ inornata, Blgr. ...					—			—	—	—		—	
24. „ leucostigma „ ...		—								—			
25. „ butleri „ ...		—											
26. „ pulchra, Hallow. ...					—				—				Also known from China and Hongkong.
27. „ achatina, Boie. ...	—		—	—				—	—	—	—	—	Extending to the Moluccas.
28. „ annectens, Blgr. ...		—	—										
29. „ berdmorii, Blyth....				—				—	—				
30. Callula pulchra, Gray. ...			—	—	—	—	—	—	—				Also in Celebes.
Ranidæ.													
31. Oxyglossus lima, Gravh. ...	—				—		—	—	—		—		
32. „ lævis, Gunther.....		—			—			—		—	—	—	Reaching the Lesser Sunda Ids. and the Philippines.
33. Rana cyanophlyctis, Schn. ...	—					—	—						
34. „ kuhli, D. & B.		—	—					—	—	—	—	—	Also in Celebes.
35. „ laticeps, Blgr.		—		—			—						
36. „ macrodon, Kuhl. ...	—	—	—	—	-			—		—	—	—	Lesser Sunda Ids. and the Philippines.
37. „ doriæ, Blgr.		—						—					
38. „ plicatella, Stol.... ...	—	—											
39. „ hascheana „	—	—											Also the Lesser Sunda Ids.
40. „ tigrina, Daud.	—	—	—	—	—	—	—	—	—	—	—	—	China and Formosa.
41. „ limnocharis, Bore. ...	—	—	—	—	—	—	—	—	—	—	—	—	As above.
42. „ macrodactyla, Gthr. ...	—	—						—					
43. „ erythræa, Schlg. ...	—	—	—	—	—			—	—	—		—	Also in Celebes and the Philippines.

Digitized by Google

DISTRIBUTION OF THE BATRACHIANS AT PRESENT KNOWN TO OCCUR IN THE MALAY PENINSULA—(*cont.*)

Name.	Penang and Kedah.	Perak.	Selangor and Negri Sembilan.	Malacca Johore and Singapore.	East Coast Malay Peninsula.	Ceylon.	Peninsular India.	Assam, Burma, Tenasserim.	Siam, Indo-China, S. China.	Borneo and Natuna Ids.	Java.	Sumatra and Mentawei Ids.	Remarks.
ECAUDATA—(*cont.*)													
Ranidæ—(*cont.*)													
44. Rana nigrovittata, Blyth. ...			—					—	—				New to this Fauna.
45. „ labialis, Blgr.		—	—	—	—					—		—	
46. „ jerboa, Gthr.			—							—			
47. „ lateralis, Blgr.					—			—					
48. „ luctuosa, Ptrs.	—	—								—			
49. „ signata, Gthr.		—								—			
50. „ nicobariensis, Stol. ...			—									—	New to this Fauna.
51. „ glandulosa, Blgr. ...		—	—	—						—			Extending to Palawan.
52. „ livida (Blyth.)		—	—					—					
53. „ larutensis, Blgr. ...		—	—										
54. Rhacophorus leprosus, Tsch.		—	—									—	Lesser Sunda Ids.
55. „ leucomystax, Gravh.	—	—	—	—	—			—	—	—	—		Philippine and Borneo.
56. „ bimaculatus, Blgr.		—						—					
57. „ robinsonii, Blgr. ...					—								
58. „ nigropalmatus, Blgr.		—			—					—		—	
59. Ixalus larutensis, Blgr. ...		—			—								
60. „ pictus, Ptrs.		—	—	—						—			
61. „ vermiculatus, Blgr. ...		—											
62. „ asper, Blgr.		—	—					—	—				
63. „ horridus, Blgr. ...					—								
64. „ sp. nov.			—										

Digitized by Google

A MALAY METHOD OF TREATING TOOTHACHE.

By L. WRAY.

THE following method of expelling the maggots or worms (*ulat*) which are supposed by the Malays to be the cause of toothache was observed recently in Larut, Perak; the patient being a Javanese gardener, who said he had had toothache for some days past.

The blade of a changkul or digging hoe was supported horizontally on two bricks, one placed at either end of it, and a fire of sticks kindled on the ground between them and beneath it. On the middle of the changkul was put a small heap of the seeds of a red-fruited variety of bringal or egg-plant (*trong*), and over this was inverted the half of a coconut shell (*tempurong*) having a hole in the top of it. A piece of bamboo about eighteen inches long and three quarters of an inch in diameter was stuck on to the shell over the hole by means of a lump of clay. As soon as the changkul got hot, vapour issued from the upper end of the bamboo tube and the patient inhaled this by placing his lips to the top of the tube. After a short time he spat into a bucket of water, which had been provided for the purpose, and then again inhaled the vapour from the bamboo, continuing the process for some time. A friend meanwhile kept examining the ejected matter in the bucket, and, after the lapse of perhaps a quarter of an hour's treatment, said he could detect a worm in the water, and after another inhalation and expectoration discovered a second. Both men after looking at the worms in the bucket were quite satisfied with the success of the operation and the fire was put out and the treatment concluded. The Javanese the next day stated that he was quite cured.

The vapour from the seeds was said to be very pungent (*pedas*) and bitter (*pahit*). The variety of the egg-fruit used in this cure is a thorny bush, bearing small red fruit. It is wild and fairly common in scrub jungle around villages.

It is, perhaps, needless to add, that a close inspection of the supposed worms, disclosed the fact that they were only thin strings of saliva floating in the water.

LIST OF A SMALL COLLECTION OF MAMMALS, BIRDS AND BATRACHIANS FROM GUNONG ANGSI, NEGRI SEMBILAN.

By HERBERT C. ROBINSON, M.B.O.U.

I AM not aware that any account of the fauna of the mountains of the Malay Peninsula between Batang Padang on the north and Gunong Ledang (Mt. Ophir) on the south has as yet been published. The present list may therefore be of interest as showing that the characteristic Himalayo-Sondaic forms, such as *Sibia*, *Mesia*, *Pterythius*, do not occur on the mountains of Negri Sembilan, which appear to be inhabited, so far as our present information goes, by typical Malayan forms identical with those found on Mt. Ophir and in the Johore hills.

Digitized by Google

Gunong Angsi is the highest point of a range of hills, which attain a maximum elevation of about 3,200 feet, and is situated about eleven miles from Seremban. It is not connected with the main range, and is covered with heavy timber, but the jungle is drier and more open than that found on the mountains of Selangor and S. Perak. The collection, of which a list is given below, was made by the Dyak hunters of the Selangor Museum during the last fortnight in November, 1904.

MAMMALIA.

1. HYLOBATES SYNDACTYLUS (DESM.); *Flower, P.Z.S.*, 1900, p. 313.

   A very large male of the Siamang, which, with the exception of the specimen recorded by Mr. Flower, does not seem to have been previously obtained in the Negri Sembilan.

2. HYLOBATES LAR (LINN.); *Flower, op. cit.*, p. 312.

   A single immature female of the black form. The parent, which was not secured, was said to be yellowish white. The occurrence of these two species on the same hill is interesting, as according to native statements they are never found together.

3. SCIURUS TENUIS (HORSF.); *Flower, op. cit.*, 357.

   One specimen.

4. FUNAMBULUS INSIGNIS (F. CUV.); *Flower, op. cit.*, p. 360.

   Agreeing precisely with others from Tetom (Perak-Pahang border) and Bukit Kutu, in having much rufous on the upper surface, thereby differing from the East Coast form. *F. insignis jalorensis*, Bonhote.

5. RATUFA BICOLOR (SPARRM.); *antea*, p.

   Two specimens, an old female and a younger male, agree very closely with that described by Mr. Knocker, both have the upper surface a dull gray with a yellow tinge becoming darker on the head. The tail of the female is a dark sooty grey, perfectly uniform on the upper surface, the basal portions of the hairs being a creamy buff showing through on the ventral aspect of the tail. The tail of the male is a dirty greyish drab, regularly barred with yellowish drab, the bars being equal in width to the interspaces.

AVES.

1. PARUS SULTANEUS (HODGS.).

   An adult and immature male of the Sultan Tit.

2. POMATORHINUS BORNEENSIS CAB.

   Four specimens of the Bornean Scimitar Babbler, agree perfectly with examples from the Larut Hills and from Sarawak. The species does not appear to occur on the Selangor Hills, as neither Mr. Butler, Mr. Craddock or myself have met with it.

3. TURDINULUS HUMEI, *Hartert, Nov. Zool.* IX., p. 564, (1902); TURDINULUS EXSUL, *Ogilvie Grant, Ibis*, 1896, p. 480; *Blanf. Faun. Brit Ind. Aves*, IV., p. 480 (1898).

Digitized by Google

Four specimens of a Short-tailed Babbler, agree perfectly with Mr. Hartert's description of the type from Gunong Tahan, while another specimen is also recorded from Klang. It is possible, however, that the form is identical with that described as *Turdinulus granti*, Richmond (Proc. U. S. Nat. Mus., xxii., p. 320, 1900). from the mountains of Trong, a small State on the West Coast of the Peninsula, about 100 miles north of Penang.

4. ANUROPSIS MALACCENSIS (HARTL.).

A single specimen of the Malaccan Wren Babbler.

5. MALACOPTERON MAGNIROSTRE (MOORE).

One female of the Brown-headed Tree Babbler.

6. ALCIPPE CINEREA (BLYTH).

One female of the larger Nun Thrush.

7. CYANODERMA ERYTHROPTERUM (BLYTH).

The Red-winged Babbler, of which one specimen was secured, is a decidedly rare bird in Malayan collections.

8. MIXORNIS GULARIS (RAFFLES).

A specimen of *Mixornis* must apparently be referred to this species, but has the shaft stripes on throat and chest very narrow.

9. LARVIVORA CYANEA (PALL.).

An adult male of the Siberian Blue Chat in full plumage; the only other specimen recorded from the Peninsula of recent years is one collected on Bukit Kutu, 3,300 feet, Ulu Selangor, in November, 1898, by Mr. A. L. Butler.*

10. HERPORNIS XANTHOLEUCA (HODGS.).

One specimen of the White-bellied Herpornis.

11. CRINIGER, SP.

A young bird, in full moult, appears to belong to *Criniger tephrogenys*, Jard and Selby, and not to the closely allied *C. ochraceus*, Moore, both of which species have until recently been confounded under the name *C. gutturalis*, Bp. (cf. Hartert, Nov. Zool. ix., pp. 558, 559, 1902.) All the specimens, eleven in number, that I have examined, from above 3,500 feet belong undoubtedly to the greyer, long-tailed *C. ochraceus*, which I am inclined to think will prove to be the mountain form, while *C. tephrogenys* inhabits the low country and foot-hills.

12. HEMIXUS CINEREUS (BLYTH).

The Ashy Bulbul is abundant on Gunong Angsi, and is a typical inhabitant of the mid-altitude forest zone.

---

* Since the above was written I have shot a somewhat immature male on the Pahang side of the main range, about 25 miles from Kuala Lumpur, at an altitude of 2,500 feet.

Digitized by Google

13. DENDROPHILA SATURATIOR (HARTERT).

Sitta frontalis saturatior, *Hartert, Nov. Zool.* ix., p. 573, (1902.)

All specimens of this Nuthatch from the Malay Peninsula that I have seen agree in having the under surface strongly suffused with lilac, the coloration being much more intense than in specimens from India, as is usually the case in a region of greater rainfall.

14. DICRURUS ANNECTENS (HODGS.).

A somewhat immature female of this Drongo has the belly, axillaries and under wing coverts broadly tipped with white.

15. PHYLLOSCOPUS BOREALIS (BLAS.).

A single male of the Arctic Willow Warbler.

16. TEPHRODORNIS GULARIS (RAFFLES).

The Malay Wood-shrike, a rare and local bird in the centre and north of the Peninsula, is well represented in the present collection.

17. CAMPOPHAGA NEGLECTA (HUME).

An immature male of Hume's Cuckoo-shrike, in banded plumage, with the supercilium fairly well marked.

18. HEMICHELIDON SIBIRICA (GM.)

A pair of the Sooty Flycatcher.

19. PHILENTOMA VELATUM (TEMM.)

Two females of the Maroon-breasted Flycatcher.

20. RHIPIDURA PERLATA (MÜLL.)

The Spotted-breasted Fan-tailed Flycatcher is by no means a common bird in the Malay Peninsula. Two males were secured.

21. TERPSIPHONE INCEI (GOULD).

A pair of the Chestnut-tailed Paradise Flycatcher.

22. GEOCICHLA DAVISONI (HUME).

I have doubtfully referred a single female Thrush in perfect plumage to this species. Males have been previously obtained by Mr. Wray on the Larut Hills and by myself on the Batang Padang mountains.*

23. ÆTHOPYGA TEMMINCKII (VIG.)

Two males of the Scarlet-breasted Sunbird. Always a very rare and local species. Mr. Butler collected it on Bukit Kutu and Ginting Bidei, in Selangor, and on the Larut Hills.

24. ANTHOTHREPTES HYPOGRAMMICA (MÜLL.)

A pair of the Banded Sunbird. In deep jungle this species takes the place of *A. malaccensis*, which is rarely, if ever, found far from villages and coconut palms.

---

* A male, either of this species or *G. sibirica*, was obtained by me on 19th December on Pulau Jarak, a small island off the mouth of the Perak River, about 50 miles from land. The skin was unfortunately stolen by rats.

Digitized by Google

25. ARACHNOTHERA CRASSIROSTRIS (MÜLL.).

A female of the Thick-billed Spider-Hunter. Very common round Kuala Lumpur.

26. EURYLŒMUS JAVANICUS (HORSF.).

27. EURYLŒMUS OCHROMELAS (RAFFLES).

28. CORYDON SUMATRANUS (RAFFLES).

These three species of Broad-bills are all evidently common on Gunung Angsi.

29. GAUROPICOICLES RAFFLERI (VIG.).

Raffles' Three-toed Woodpecker. Is apparently commoner in the southern parts of the Peninsula than in Perak and Selangor, in both of which States it is distinctly rare.

30. LEPOCESTES PORPHYROMELAS (BOIE).

One female of the Malay Bay Woodpecker. I am inclined to think that this species iso ne that is becoming exterminated by the progress of cultivation, especially that of tapioca. It was evidently common at one time in Malacca territory, in Singapore, Penang, and the neighbourhood of Klang, but no specimens have come to hand of recent years, though it is one of the species I have always kept a special look out for.

31. CHRYSOCOLAPTES VALIDUS (TEMM.).

A pair of the Golden-backed Woodpecker.

32. NYCTIORNIS AMICTA (TEMM.).

Two males of the Red-bearded Bee-eater.

33. RHOPODYTES SUMATRANUS (RAFFLES).

A female of the Sumatran Green-billed Malkoha. Very rare in Selangor, but evidently commoner further south. More of a jungle species than either of its congeners, *R. diardi* and *R. tristis*.

34. ARGUSIANUS ARGUS (LINN.).

A female of the Argus pheasant. Was snared in a jerat. It is barely separable from a female of the allied form *A. grayi* from Sarawak.

BATRACHIA.

1. MEGALOPHRYS LONGIPES (BLGR.).

Two specimens of this horned Toad. Hitherto only known from the Larut Hills, where it is very common, were captured hiding under dead leaves.

2. RHACOPHORUS LEPROSUS (TSCH.).

This rare Batrachian has only been captured on one previous occasion in the Malay Peninsula. Mr. Wray having captured seven or eight specimens ten or twelve years ago. The present specimen was captured on a tree trunk and when fresh had the phalanges beautiful coral pink.

Digitized by Google

3. IXALUS PICTUS (PTRS.).

Two specimens have previously been captured in the Peninsula, one on Bukit Timah, Singapore, the other in the Larut Hills.

4. BUFO ASPER (GRAVNH.).

Only noteworthy from the fact that it is thickly mottled above and below with crimson spots, probably a breeding livery.

5. RANA, SP.

Closely allied to *R. plicatella, Stol.*, but presenting certain marked differences.

A CORRECTION.

THE following letter by Sir Daniel Morris, K.C.M.G., D.Sc., Imperial Commissioner of Agriculture in the West Indies, has long remained unpublished, as, for reasons stated elsewhere, there has not been a number of the "Perak Museum Notes" issued since it was written. This periodical being in a way the continuation of the older one, it is thought advisable to print the letter here:

ROYAL GARDENS, KEW,
30th June, 1898.

DEAR SIR,—

I notice in the article in "Perak Museum Notes," Vol. 2, Part 2, page 116, Mr. Mathieu quotes me as having stated that "filasse, the finished fibre (of Ramie), was worth £14 per ton." I may at once say that I have nowhere made any such statement. What I did say was that the filasse, a finished fibre, obtained from 15 or 20 tons of green stems, might be worth that sum. In other words, that the filasse obtained from one acre, assuming that area to produce under favourable conditions, 15 to 20 tons of green stems, would be worth £14. This would be at the rate of £42 per ton of filasse.

I should be glad if this correction could appear in the next issue of the "Notes."

Very sincerely yours,
D. MORRIS.

To L. WRAY, ESQ.

NOTE ON A SAMPLE OF COAL FROM UPPER PERAK.

BY L. WRAY.

IN February of 1904 a sample of coal was sent to the Perak Museum for examination and report; a portion of it was added to the mineral collection and is now on view. This coal was said to have been found by some Chinese tributers working an alluvial tin mine belonging to Mr. D. Pasley, at Ayer Jeddah, near Kuala Kenering.

The sample weighed about two pounds and consisted of one large lump and several smaller ones. The coal is compact in structure,

Digitized by Google

hard and very tough. It breaks with a more or less conchoidal fracture, varies in colour from dead to shining black and does not soil the hands. Embedded in it are a few grains of waterworn quartz, but there is no rock in or attached to the specimen examined. It has a specific gravity of 1.334, so that a cubic foot of it would weigh, in round numbers, 83¼ pounds avoirdupois.

On heating, it burns with a good deal of flame but does not cake, so that the coke formed by it is in detached lumps, of the size and shape of the original pieces of coal before heating. On distillation in a retort it yields a considerable amount of gas of good illuminating power, and only traces of sulphur.

A commercial analysis gave the following figures:—

Fixed carbon—*i.e.*, weight of coke less ash ...	49.06
Volatile matters—*i.e.*, gas, tar, etc.	43.80
Ash	7.14
	100.00

The above results indicate a coal of very fair quality, that could be used for steam boilers and also for gas making, while its toughness and hardness show that it will stand transport well.

Some years ago Sir W. H. Treacher, K.C.M.G., presented to the Museum a sample of coal from Kedah. Although it is of very inferior quality, containing a large percentage of ash and much sulphide of iron, there is a certain resemblance between the two samples.

In April I visited Upper Perak, and took the opportunity of going to see Mr. Pasley's mine. It is situated in the small valley of the Ayer Jeddah, a tributary of the Kenering, about four and a half miles from Kuala Kenering. The mine-hole where the coal was said to have been dug up was full of water and no other working afforded an opportunity of examining the rocks of the locality. There were many pieces of rock containing graphite to be found in the refuse of the wash-dirt. These were as a rule much waterworn. The lumps of coal which have been found, were, on the other hand, all sharp and angular and show no signs of having travelled. Beyond the fact that granitic rocks appear in the bed of the stream and that the hill on the western side of the valley is composed of some stratified rock, there is nothing to be made out; and until some prospecting work is done it would be unwise to hazard any conjectures respecting this interesting discovery.

REPORT ON THE PERAK MUSEUM, 1903.

GROUNDS.

THE large ditch at the back of the Museum grounds was straightened and in part the sides were walled up. A new culvert was built across Museum Road to take the water by a short cut into the old ditch dividing the grounds of the Curator's quarters from those of the Treacher Girls' School.

Digitized by Google

BUILDING.

Hill's casement stays have been fitted to the windows in the Zoological and Ethnological rooms. Some broken squares of glass in some of the windows and doors have been replaced and eight of the blinds to the windows in the Ethnological room renewed. The passage leading from the Zoological to the new Ethnological rooms was floored with marble from the Ipoh quarry.

CASES.

The 18 wall cases for the lower room of the new Ethnological annexe were built, painted inside and glazed with plate glass. These cases have a total length of 160 feet and cover the two longer walls of the room. Twenty of the wall cases in the upper room were glazed and they were painted and varnished. Half of one of the table cases in the lower room was also glazed with plate glass.

The amount expended on the woodwork was	$ 990.00
On plate glass	1,552.29
And on paint, varnish, iron-work and fittings	497.87
Making a total of	3,040.16

An extra sum of $1,425, making the Museum expenses vote $4,000, was provided in the Estimates to meet the cost of case building. With the exception of a supplementary vote of $300 in 1902 and this sum of $1,425 the whole of the casing of these two rooms has been done out of the current expenses vote of $2,575. The 40 wall cases measure 346 feet in length and the 18 table cases have an area of 736 square feet. In the central gallery 26 hasps and staples were fitted to the table cases and brass handles were fixed to 18 of the wall cases.

ZOOLOGY.

There were numerous additions to this department. Sir J. P. Rodger, K.C.M.G., presented a very fine specimen of the gigantic Japanese crab, *Macrochira koempferi*, and Mr. Hollywood gave a number of crocodiles and their eggs. One of 2 feet 6 inches in length was stuffed and three skulls of different aged animals of 8 feet 9 inches, 6 feet 9 inches and 4 feet 7 inches were prepared. Two skulls of adult tigers and two of young ones were set up. These skulls show the growth of the teeth very well. Mr. Logan presented the cast of a footprint of the supposed man-eater taken at Padang Rengas.

A few birds were stuffed, and a number of snakes and other reptiles were collected and preserved.

A mounted specimen of the Estuarine crocodile was presented to the Manchester Museum and another to the Leicester Museum.

A certain amount of taxidermic work was done for private persons during the year.

GEOLOGY.

A large collection for the general geological series was given by the Trustees of the British Museum of Natural History. The specimens were selected from the duplicates in the Museum, were worked out,

Digitized by Google

packed and sent out to Perak by Mr. L. Wray. A few specimens of rocks and fossils were also collected by him in England and forwarded to Perak.

With the specimens previously in the Museum these additions will make a fairly complete series, representing most of the geological formations.

MINERALOGY.

Many additions were made to this section; amongst which the most important were a collection of Cornish minerals presented by Mr. S. Wickett, of Redruth; five specimens given by Mr. C. Wray and 31 specimens collected by Mr. L. Wray in England. Several of the local minerals were polished and a white topaz and smoke quartz or cairngorm from Chenderiang were cut and make quite handsome stones.

BOTANY.

Forty-four mounted herbarium specimens were received from the Royal Botanic Gardens, Calcutta, for the herbarium. Two lengths of the giant bamboo from Bikut, Ulu Slim, were given by Mr. Chan Heang Thoy.

A sample of Para Rubber seed was sent to the Imperal Institute for examination and has since been favourably reported on by Professor Dunstan, the Director; a sample of the Malayan varnish was also submitted for examination. It is obtained from a tree belonging to the genus *Garcinia* and appears to be quite equal to the Japanese lacquer, but like it is very difficult to apply. It is possible that this gum may prove a valuable product if only a solvent for it can be discovered.

ETHNOLOGY.

Two specimens of the so-called "hat-money" of Pahang, a round rattan Malayan shield, a mounted stone axe and a mounted stone adze from New Guinea, a Hindu brass fork, four stone implements and one specimen of the most ancient form of Chinese money, in the shape of a knife, were collected in England by Mr. L. Wray to fill up gaps in the series of objects representing various subjects in this section.

A paper entitled "Notes on Dyeing and Weaving as Practised at Sitiawan in Perak," and a second on "The Malayan Pottery of Perak," were communicated to the Anthropological Institute by Mr. L. Wray and printed in the Journal of the Institute. Both papers were illustrated with photographs of articles in the Museum collections.

A series of photographs of natives of the Malay Peninsula were presented to the British Museum of Natural History.

HISTORICAL.

Two seals of the late Mantri of Larut, two obsolete seals of the Secretary to Government and one of the Land Office were presented by Government. Three old pattern Krupp guns and one Nordenfelt machine gun were given by the Commandant, Malay States Guides. Sir F. A. Swettenham, K.C.M.G., presented a very interesting collection of old photographs.

LIBRARY.

Ten volumes were purchased out of the vote of $100 provided in the Estimates for this purpose and added to the Library.

Digitized by Google

A number of books were presented, amongst which may be mentioned fifteen works by Mr. H. Ling Roth, given by the author. Fifty-five books were lent to readers during the year.

GENERAL.

A considerable number of new labels of various sizes were typewritten and mounted on cards.

The whole of the floors in the older portions of the building were cleaned and earth oiled.

LIST OF DONORS TO THE PERAK MUSEUM DURING THE YEAR 1903.

The Assistant District Officer, Larut
Mr. H. F. Bellamy
The British Museum of Natural History
The Director, Royal Botanic Gardens, Calcutta
Mrs. Caulfeild
Mr. G. P. Cerruti
The Director, Royal Botanic Gardens, Ceylon
Mr. Chan Heang Thoy
Mr. J. Clarke
His Excellency the High Commissioner
The Divisional Engineer, Perak and Province Wellesley Railway
Mrs. Douglas
Mr. W. C. Ephraums
Captain S. S. Flower
The General Manager, F.M.S. Railways
The Government Printer, Perak
Mr. Gowland
Mr. M. J. Hollywood
The Trustees of the Indian Museum
Mr. D. Keilich
The Director, Royal Gardens, Ohio, U.S.A.
Mr. C. J. Lloyd
Mr. J. H. Logan
The Editor of the "Louisiana Planter"
The Director of the Manchester Museum
Mr. A. E. Marquis
The Missouri Botanical Gardens
The National Museum, Montevideo
Mr. D. Q. W. Pasley
The Committee of the Plymouth Museum and Art Gallery
The Publisher, "Perak Pioneer"
The Curator and Librarian, Raffles Museum, Singapore
The Resident-General, F.M.S.
Sir, J. P. Rodger, K.C.M.G.
Mr. H. Ling Roth
The Curator, Sarawak Museum
Miss H. Sayers
The Secretary to Resident, Perak
The Curator, Selangor Museum
Mr. J. N. Sheffield
The Publisher, "Singapore Free Press"
The Smithsonian Institution
Mr. F. A. Stephens
The State Surgeon, Perak
Sir Frank A. Swettenham, K.C.M.G.
The Traffic Manager, F. M. S. Railways
The United States National Museum
Colonel R. S. F. Walker, C.M.G.
The Commissioner, Imperial Department of Agriculture for the West Indies
Mr. S. Wickett
Mr. A. Wilson
Mr. D. C. Worcester
Mr. C. Wray
Mr. L. Wray, I.S.O.
Mr. S. Youshiwara

VISITORS.

The total number of visitors recorded during the year was 46,685. The museum was open to the public on 293 days, so that the daily

Digitized by Google

average attendance was 159. The maximum number of persons admitted in any one day was in February when 851 were recorded, and the greatest number in a month was also in February when 4,640 persons passed the turnstile.

STAFF.

Mr. L. Wray, the Curator and State Geologist, was on leave the whole of the year and Mr. E. Keilich, the Taxidermist, acted for him.

FINANCIAL.

The revenue collected amounted to $211.56. A saving of $1,906.30 was effected on the Estimates, exclusive of Establishments.

L. WRAY,
Curator and State Geologist.

REPORT ON THE SELANGOR MUSEUM, 1903.

COMMITTEE.—The Committee at the commencement of the year consisted of the following gentlemen—viz.,

Mr. W. G. Maxwell (*Chairman*).

Mr. A. M. Burn-Murdoch	Mr. B. E. Shaw
„ C. W. Hewgill	„ H. C. E. Zacharias (*Ex-Officio*)

In April, Messrs. Maxwell and Hewgill resigned their seats, on departure from the State, and Mr. B. E. Shaw was appointed Chairman. On 21st August Mr. C. W. Daniels, B.A., M.B., M.R.C.S., Mr. C. F. Leicester, M.B., C.M., Mr. E. V. Carey and Mr. J. H. Pye were added to the Committee. Meetings were held on 30th March, 30th April, 1st July and 18th November.

CURATOR.—Mr. H. C. E. Zacharias continued to act as Curator until 12th November, when I arrived in the State, and the report for this year must therefore be somewhat formal.

EXPENDITURE.

The annual vote of $4,000, for salaries and purchase of materials, was spent as follows:—

1.	Salaries of subordinate staff	$1,380.35
2.	Books and periodicals	830.50
3.	Preservatives and collecting materials ...	509.24
4.	Furniture and repairs	309.87
5.	Purchase of specimens	194.00
6.	„ of control clock...	82.00
7.	„ of type-writer	136.60
8.	Postage, transport and sundries	137.43
9.	Collecting trips	53.39
10.	Purchase of scientific apparatus	137.54
	Total ...	$3,740.92

Digitized by Google

The purchase of a control clock ensures the proper patrolling of the Museum at night and is also a check on the punctuality of the staff in the absence of the Curator. Item 10 includes the cost of a set of anthropometrical instruments as designed by Dr. Garson of the Home Office, which will be used for obtaining a series of physical measurements of the various races inhabiting the State.

VISITORS.

The number of visitors during the year 1903 amounted to 33,409, a decided falling off from the total for 1902, which was 42,956, an abnormal increase on the previous year, due to the exceptional number of public holidays and to a change in the hours during which the Museum was open to the public.

The percentage distribution according to race was as follows:—

	1901.	1902.	1903.	Population of Kuala Lumpur, 1901.
Europeans ...	1.3 ...	1.2 ...	1.3 } ...	3.2
Eurasians ...	5.1 ...	2.8 ...	2.5 }	
Bengalis ...	3.7 ...	4.1 ...	3.2 } ...	13.7
Tamils ...	18.4 ...	19.7 ...	16.5 }	
Malays ...	29.5 ...	27.2 ...	22.7 ...	11.5
Chinese ...	42.0 ...	45.0 ...	53.1 ...	71.6
	100.0 ...	100.0 ...	100.0	

It is evident that if account be taken of their proportion to the whole population, a larger number of Malays visit the Museum than of any other nationality, and that the Chinese attendance is really less than that of any other section of the community, while European interest appears to be almost negligible.

ADDITIONS.

(*a*) *Zoological.*

Owing to the absence, during the greater portion of the period, of a permanent Curator, the acquisitions have been unimportant. A considerable collection of Bornean animals was offered for sale and purchased as it contained numerous species known to occur in the Peninsula, but not represented in the Museum. A commencement was made with the formation of a fresh collection of lizards and several rare and interesting species were secured within a radius of a few miles from Kuala Lumpur. Amongst these may be mentioned a large species of flying lizard (*Draco maximus*) hitherto only known from Borneo and a large undescribed toad of brilliant coloration.

The only noteworthy mammal obtained was a single individual of the rare pentailed tree shrew (*Ptilocercus lowii*), which was previously supposed only to inhabit Borneo and the Natuna Islands.

About 500 specimens of insects of various orders were collected, but some time must elapse before any of the invertebrates can be adequately dealt with, as storage room and suitable cabinets, which in this climate must be of the finest construction and which are therefore correspondingly costly, are at present altogether lacking. It is hoped that this deficiency may be in part made good by the end of the year.

Digitized by Google

(*b*) *Ethnographical.*

There have been only some half a dozen additions in this department, including a Sakai sumpitan and quiver from Ulu Langat, a kris from the same locality and a finely embroidered Malay sleeping mat from Kuala Selangor.

CONSERVATION.

The state of repair of the Museum buildings has been so bad during the last two or three years that despite all that could be done by the Museum staff the collections have suffered considerably from damp and other causes. Those specimens that have been preserved in alcohol are now in a very indifferent condition, owing to the fact that they have mostly been stored either in corked bottles or in jars of German manufacture which are not provided with accurately-ground stoppers and which therefore permit the rapid deterioration of the preservative fluid.

HERBERT C. ROBINSON,
Curator.

F.M.S. Government Press.

Digitized by Google

Digitized by Google

Digitized by Google



2.



1a.



2a.





1.

J. Green del. et lith. Mintern Bros. imp.

1. IXALUS CASTANOMERUS. 2. IXALUS VERMICULATUS

Digitized by Google

DESCRIPTION OF A NEW FROG OF THE GENUS *IXALUS* FROM SELANGOR.

By G. A. BOULENGER, F.R.S.

IXALUS CASTANOMERUS, *sp. nov.*

(Pl. IV.)

HEAD rather large, a little broader than long; snout obtusely pointed, as long as the diameter of the orbit; canthus rostralis distinct; loreal region concave; nostril a little nearer the end of the snout than the eye; interorbital space as broad as the upper eyelid; tympanum slightly distinct, two-fifths the diameter of the eye. Fingers quite free; toes half webbed; disks of fingers a little larger than the tympanum; sub-articular tubercles moderate; a small inner metatarsal tubercle. The tibio-tarsal articulation reaches the tip of the snout. Upper parts finely shagreened; throat, belly and lower surface of thighs granulate. Greyish white, with a large darker grey blotch covering the greater portion of the back and extending T-shaped to between the eyes; this blotch, which is speckled with black, with sharp, concave outline on each side; upper lip and loreal and temporal region with dark marblings; limbs with oblique dark cross-bands; sides of thighs and lower surface of tibiæ chestnut-brown; lower parts whitish, with brown network.

From snout to vent, 32 millimetres.

A single specimen, a female, from Bukit Kutu, Selangor, 3,500 feet, presented to the British Museum by the Curator of the Selangor State Museum.

This new species is very closely allied to the *Ixalus vermiculatus*, Blgr. (Ann. Mag. Nat. Hist. (7) vi. 1900, p. 187), discovered a few years ago in the Larut Hills, at an altitude of 4,000 feet. This *I. vermiculatus*, which is figured alongside the new frog, differs in the more rounded snout, the more distinct tympanum, the rudiment of a web between the fingers and in the coloration.

NOTES ON THE SUGAR CANE RAT, *MUS JALORENSIS*.

By L. WRAY.

AT the request of the Hon. John Turner, M.L.C., Administrator and Attorney of the Penang Sugar Estates Company and Straits Sugar Company, I went to Lower Perak to superintend the administration of "rat virus" obtained from the Pasteur Institute, on the Rubana and Nova Scotia Estates, in September of 1904.

Digitized by Google

HISTORY OF THE RAT PLAGUE ON THE SUGAR ESTATES.

Rubana Estate is situated on the right bank of the Perak River and is about six miles below Telok Anson, in Lower Perak. It was opened some five years ago as a sugar estate. The rats, however, have proved so destructive to the growing canes that, as far as the cultivation of sugar is concerned, the estate has been practically abandoned. There were previously about 70 acres of padi fields near the estate and the rats were such a pest on them that the Malays were forced to desert them. It is believed that the rats from the padi fields came into the estate and, finding plenty of food, rapidly increased in numbers until the sugar had also to be abandoned.

Nova Scotia Estate, which is on the left bank of the river, immediately opposite Rubana, is now also being very seriously damaged by rats. It is reported that the rats swam across the Perak River in a body from one side of the estate to the other, but considering the width of the river and the strength of the current, it is more probable that they came from the jungle in the first instance and have been increasing and multiplying in the fields ever since. A certain number may have been brought over the river in the barges with the canes, for the mill is on the Nova Scotia side of the river, and all the canes were taken over in barges to be crushed.

The manager of the two estates, Mr. S. Anderson, informed me that last year over 300,000 rats were caught by the coolies for a reward of so much per head, without making any appreciable difference to the numbers present in the fields.

THE NATURE OF THE DAMAGE DONE TO THE CANE FIELDS.

The extent of the damage done to the canes by the rats is not to be measured by the amount they eat but by the amount they destroy. They begin their ravages when the canes are about three feet or so high, that is when a portion of the cane is showing below the growing shoot and the leaf stalks. They then gnaw the cane in one or more places, usually on one side only and always between the joints. The result is that the cane bends at the injured place and finally withers and dies or breaks off. A single cane may have as many as eight holes in it or there may be only one. The part of the cane chosen may be near the ground or quite at the top; for the rats can climb almost as well as squirrels and no part of the cane is inaccessible to them.

When many rats are in a field it assumes a very ragged appearence, from the bent and broken canes falling over beteen the rows. In bad cases, I was informed, a field is so damaged as not to be worth the expense of cutting and milling. For, as well as causing the canes to bend and break, when a rat has gnawed a cane, fermentation sets in and the inside of the cane begins to become discoloured and sour. In most cases this change starts from the central portion of the cane and enlarges outwards until the whole inside of it is involved. Meanwhile the cane may externally appear quite sound, showing perhaps only one small hole gnawed in it. Naturally canes in this condition are of little good for sugar making.

Digitized by Google

THE KIND OF RAT RESPONSIBLE FOR THE DAMAGE.

One branch of the enquiry was directed towards the determination of the species of rat causing the destruction of the sugar canes. A large number of the animals were trapped and caught by the coolies on the two estates. The result of an examination of them was that there appeared to be only two or three kinds of rats present. These may be separate species or perhaps only varieties of one species. As a large series of skins was made, this question can ultimately be settled when they have been examined and compared with the types.

In the meantime they may be differentiated as: *A*, a rat having the underparts white, probably *Mus jalorensis*; *B*, a rat having the underparts yellowish-brown; and *C*, a rat having the underparts brown, this latter rat was on a previous occasion identified by Mr. Oldfield Thomas as *Mus rattus*.

Variety *A* is a field rat, for in only one case was an individual caught in a house, and that was the Sugar Mill, an open building. This is the rat which does the damage to the sugar canes.

Varieties *B* and *C* were caught either in the houses or in the cane fields immediately adjoining the houses. All the specimens came from Nova Scotia; out of over sixty captured on Rubana there was not a single example of either *B* or *C*. These rats have probably been introduced from the town, *C* being the common house rat of Perak.

A very large rat is reported to be occasionally met with on the estates, but this animal appears to be quite rare. No mice were caught, either in the houses or fields.

HABITS OF THE RATS.

The habits of the field rat *A* are much like those of other rats. It lives in the fields in burrows made in the ground, also beneath roots of tree stumps and logs of timber. It retires to these holes in the daytime and comes out at night to feed. It makes nests of grass and leaves in these burrows and brings up its young in them. One litter brought in numbered eight and another six, but doubtless these numbers are often exceeded.

It is the practice to burn off the fields after each crop of canes is harvested, but I was informed that this does not kill the rats, who only burrow down a little deeper into the earth and thus escape the effects of the fire. They can swim well and so are able to cross the canals with which the estates are intersected. In fact, when chased they usually take to the water if there is any near.

From the above, it will be apparent that the rats are permanent inhabitants of the cane fields. It is also easy to see that when a few get into a field, as they have four or more litters per year of from six to a dozen each, it does not take long for it to be stocked with these destructive little rodents.

In captivity they sleep most of the day and are very active at night. They get together into a sort of heap to sleep. Ten or more will all lie one on the top of the other and if only two are put in a cage

Digitized by Google

together they always sleep one more or less over the other. This gregarious method of sleeping would therefore appear to be a habit with them and they probably so sleep in their burrows in the field. This would account for the great numbers which are often unearthed from a single hole.

They sometimes kill and eat one another when kept in captivity. In one case seven young rats were being kept in a cage and one of the number was killed and eaten by the others. How far this trait holds good in the natural state it is impossible to say, but, from quite young animals practising it, it is more than probable that sick or wounded ones are eaten by their companions. They do not, however, appear to be quarrelsome when caged together, though on one occasion a dead adult female was found after a fight in one of the cages. They soon became reconciled to captivity and got quite tame, though they would bite if given the chance. They are very nervous and timid and would cry out and stand up on their hind legs at the back of the cage if frightened.

The brown-bellied rats appear to be much more fierce. One caught in a trap seriously hurt itself in frantic attempts to get through the wires. The field rats have extremely sharp teeth and in many cases bit holes through the brass wire gauze of which the cages were made.

FORMER ATTEMPTS TO DESTROY THE RATS.

Many things have been tried to lessen the numbers of the rats. Amongst these may be mentioned the mongoose. About a thousand of these fierce little animals were imported and let loose on the estate, but they appear to have all gone away into the jungle and done no good in killing the rats. Wire netting was also tried, but as the rats can climb this material with the greatest ease and can even run along on the under surface of a piece of it when held up horizontally, this likewise proved of no avail. The killing of them at the rate of over 800 per day has been already mentioned.

PREVIOUS EXPERIMENTS WITH LOEFFLER'S TYPHI-MURIUM BACILLUS.

I was informed by Dr. M. J. Wright, the State Surgeon, Perak, that the rat virus had been previously tried on the rats on an estate in Lower Perak, and he very kindly allowed me to see his office copy of the correspondence relating to the experiment. From this paper, R.-G.O. 5011/1900, it appears that in 1900 two tubes of the virus were received through the Director of the Institute for Medical Research, Federated Malay States. They were unfortunately both broken in the post and arrived in Lower Perak in a dried and mouldy condition. The contents of the tubes were, however, put on bread and placed in the fields at Bagan Datoh Estate. Dr. J. T. Clarke, District Surgeon, Telok Anson, who conducted the experiments, writes that the results were negative, and it is quite probable, as he suggests, that the bacillus was dead at the time it arrived.

Digitized by Google

Another consignment was asked for, but Dr. Hamilton Wright, the then Director of the Institute for Medical Research, Kuala Lumpur, reported in November of 1901 that "a further supply is not available" and that "extensive experiments have been conducted in England and United States to test the usefulness of it. The reports sent in are all adverse and unless there is some special reason I do not advise that any more be procured."

RECENT REPORTED SUCCESS IN EUROPE.

Since the date of Dr. Hamilton Wright's letter, this mode of destroying rats appears to have been successfully accomplished in Europe, for in the "Pharmaceutical Journal" of 7th May, 1904, it is stated, "The French Government recently instituted a series of experiments, with the aid of the Pasteur Institute, and have now succeeded in making a poison, known by the name of the discoverer, Dr. Danysz, which, it is claimed, is fatal to rats and voles. . . . . With the object of encouraging the use of this method of destroying the pests, the French Government have voted the sum of 350,000 francs (£14,000), which is calculated to be a third of the amount necessary for treating the infested districts."

THE RECENT TRIAL IN PERAK.

The Directors of the Straits Sugar Company sent out from the Pasteur Institute a large consignment of the virus prepared by Dr. Danysz. It was of two kinds, the one being a culture in broth and the other in gelatine.

The cases arrived in Singapore by the French Mail on the 7th September and reached Teluk Anson on the 9th. On the 12th I examined the virus and it appeared to be in good condition.

The broth culture had a pale yellowish colour and was slightly cloudy, it had a very disagreeable putrescent smell and was slightly acid to test paper. Under the microscope the fluid was seen to contain long, thin, more or less curved rods, some being jointed, and other shorter rods, the whole of them being motile.

The gelatine in the test-tubes had been set on the slant and was still solid. It was of a yellowish-brown colour, cloudy, and most of the tubes had a greyish-brown sediment. In some tubes there was a slight smell resembling that of the broth. The gelatine was neutral to test paper. Under the microscope there appeared many short rods, more resembling cocci, which were not motile, but this was to be expected in a solid medium.

Several tubes of nutrient agar-agar, which had been previously prepared and sterilized, were inoculated by a platinum needle with both the gelatine and the broth cultures. After about 30 hours at the room temperature, growths appeared along the needle track and on the surface of the jelly. A number of tubes were inoculated, from time to time, from different bottles and tubes of the virus. The nature of the growth was the same in all but one of them. This was

Digitized by Google

doubtless due to the bottle of broth from which it was inoculated having been infected by some other bacterium. Cultivations were made from these again and grew in the same way. A second culture from gelatine, in a ten ounce flask of agar-agar, gave also what appears to be the characteristic smell.

From the above experiments it is reasonable to suppose that the virus, as received, was alive and active, as it was capable of starting new growths and in only one case was contaminated by some other organism. It of course is possible that although alive, its power of producing disease may have been modified or even lost, but in the absence of animals known to be susceptible to the virus, to experiment on, this point could not be determined.

EXPERIMENTS ON RATS.

On the 12th September three of the field rats were fed on bread soaked in a mixture of the gelatine and salted water, in the proportion of 10 tubes of the culture in gelatine to one litre of water and one teaspoonful of salt. Three other rats were fed on rice which had been steeped in broth culture diluted with salt water, in the proportion of one bottle, of 900 c.c., of broth to nine litres of water and nine teaspoons of salt.

These rats were each put in a separate cage and fed on sugar-cane and boiled rice. Up to the 27th September, the date of my leaving the estate, they remained in perfect health. The incubation period, given in the letter accompanying the virus, is fourteen days.

The virus was fed to other rats on the 13th and 14th and several other dates. One rat was also fed on bread on which the undiluted gelatine was spread and another with bread soaked in the undiluted broth. In the foregoing experiments rats of all ages and both sexes were used, and none of them showed any ill effects from the treatment.

Two rats were given a subcutaneous injection, by means of a hypodermic syringe, of a mixture of sterilized water and about 15 per cent. of the gelatine culture, taken from two tubes. The rats were chloroformed and the injection made near the root of the tail, one receiving two minims and the other four minims of the fluid. The result of this experiment was also negative, as it had no effect whatever on the rats, either locally or constitutionally.

APPLICATION IN THE FIELD.

From the 12th to the 25th September, infected food was laid in the fields. Bread, rice and Chinese green peas were used, soaked in both the broth and gelatine virus, diluted as directed. About 25 per cent. of the baits were found to be eaten in the morning after laying. Nothing happened, however, and after the lapse of the 14 days the distribution was stopped. As it was stated that the virus would only keep a short time after arrival, it was thought to be advisable to begin the use of it in the field before the experiments on the caged rats were concluded.

Digitized by Google

CONCLUSIONS.

The only deductions to be drawn from the above detailed experiments are, (*a*) that the virus arrived here in good condition, but (*b*) that the field rats of Perak are not susceptible to its action.

It would appear from a paragraph in the "Pinang Gazette," of 20th September, that the same virus has been tried recently on field rats at Buitenzorg, in Java, but failed there also, owing to the rats being immune.

TAIPING, *10th October, 1904.* L. WRAY.

A SYNOPSIS OF THE BIRDS AT PRESENT KNOWN TO INHABIT THE MALAY PENINSULA SOUTH OF THE ISTHMUS OF KRA.

BY HERBERT C. ROBINSON, M.B.O.U.,
CURATOR, SELANGOR STATE MUSEUM.

NO general work existing, which deals specially with the birds of the Malay Peninsula and its dependencies, it is intended, in this and subsequent numbers of the "Journal of the Federated Malay States Museums," to give a brief account of every species at present known to occur within the limits indicated above. As, however, a full description of every variety would occupy a greater amount of space than is available, it has been thought sufficient to give a "key" to each main group, which it is hoped will enable anyone interested in the subject to identify all birds that he is at all likely to come across, while the list of books and pamphlets given below, most of which are available for reference in the library of the Selangor Museum, will enable him to pursue the subject further, should he so desire.

The lists of Peninsular localities are mainly taken from the collections of the British Museum, the Perak, Selangor and Singapore Museums and from those of the Hon. W. Rothschild at Tring. East coast localities, north of Pahang, are derived from the collections of the "Skeat Expedition," now preserved at Cambridge, and from that made by Mr. Annandale and myself, the bulk of which is now in the British Museum.

It should be pointed out, however, that there are large tracts regarding which our knowledge is almost a blank, such as the States of Trengganu and Nakawn on the east coast and those north of Kedah on the west, as well as large portions of Kelantan and Pahang. Information and collections from any of these localities will be most acceptable.

LIST OF AUTHORITIES CONSULTED.

1. Catalogue of the Birds in the British Museum, vols. i.-xxvii., London, 1874-1898.

   Contains the descriptions of, and diagnostic keys to, all species known to science at the dates of publication of the respective volumes.

Digitized by Google

2. Hand-list of Birds, by R. B. Sharpe, vols. i.-iv., London, 1899-1903,

A British Museum publication, supplementary to the preceding, containing the names of all known species of birds and their geographical distribution, together with references to the original descriptions of all species discovered since the issue of the corresponding volume of the "Catalogue."

3. The Fauna of British India including Burma and Ceylon: Birds, vols. i.-iv., by Messrs. Oates and Blanford. London, 1889-1898.

A systematic account of the Birds of the Indian Empire A very large proportion of Malayan birds occurring also in Tenasserim this work is most useful to students of the local avifauna.

4. "Stray Feathers," a Journal of Ornithology for India and its Dependencies, edited by A. O. Hume, vols. i.-xi. Calcutta, 1873-1888.

Contains scattered references to, and descriptions of, Malayan birds. The only important papers as far as this fauna is concerned are contained in the volumes for 1878 and 1880.

5. Kelham, H. R. Ornithological Notes made in the Straits Settlements and in the Western States of the Malay Peninsula. *Ibis*, 1881, pp. 362-395; 501-532; *op. cit.* 1882, pp. 1-18; 185-204.

Contains interesting field-notes on most of the commoner species. (Reprinted in *Journ. Straits Branch Royal Asiat. Soc.*, ix. pp. 109-140 (1882); *op. cit.* xi. pp. 1-29; *op. cit.* xii. pp. 172-295 (1883).

6. Sharpe, R. B. Notes on some Birds from Perak. *Proc. Zool. Soc., London*, 1886, pp. 350-353.

7. Sharpe, R. B. On a second Collection of Birds formed by Mr. L. Wray in the Mountains of Perak, Malay Peninsula. *Proc. Zool. Soc., London*, 1887, pp. 431-447, pls. xxxvii, xxxviii.

8. Sharpe, R. B. List of a Collection of Birds made by Mr. L. Wray in the main Range of Mountains of the Malay Peninsula, Perak. *Proc. Zool. Soc., London*, 1888, pp. 268-281, pl. xv.

These three papers form one of the most important contributions to our knowledge of the avifauna of the Malay Peninsula, as showing that the higher mountains are inhabited mainly by species of Himalayan and Sumatran affinities. Reprinted in *Journ. Straits Branch. Roy. Asiat. Soc.* xix. pp. 125-141 (1888); op. cit. xxi. pp. 1-18 (1890).

9. Ridley, H. N. List of birds collected or observed during a trip in Pahang. *Journ. Straits Branch Roy. Asiat. Soc.* xxv. pp. 60-65. (1894).

A nominal list of 124 species obtained or noted during an attempt to ascend Gunong Tahan.

10. Ridley, H. N. Birds in the Botanic Garden, Singapore. *Op. cit. supra*, xxxi. pp. 73-89 (1898).

Digitized by Google

11 Butler, A. L. Birds of the Larut Hills. *Op. cit. supra*, xxxii. pp. 9-31 (1899).

A list, with field-notes, of 113 species.

12. Hartert, E. and Butler, A. L. Notes on Birds from Perak. *Nov. Zool.* v. pp. 506-8 (1898).

Contains descriptions of three new forms, which are also included in the preceding paper.

13. Bonhote, J. L. On the Birds collected during the "Skeat Expedition" to the Malay Peninsula, 1899-1900. *Proc. Zool. Soc., London*, 1901 (i.), pp. 57-81.

Enumerates 139 species none of which are new to science, mostly from the east coast States, though a few were collected in Kedah and on Gunong Inas in northern Perak.

14. Hartert, E. On Birds from Pahang, Eastern Malay Peninsula. *Nov. Zool.* ix., pp. 537–580 (1902).

A list of 196 species from the neighbourhood of Gunong Tahan, including, however, many from the lowlands of Kelantan and Pahang. Several species are described as new, amongst them a remarkable bullfinch and a form of the Tonquin Argus Pheasant (*Rheinardius ocellatus nigrescens.*)

PART I. THE PIGEONS.

The Pigeons and Doves form a well-marked group, which can be recognised by anyone without the slightest knowledge of ornithology. The only other birds with which they might possibly be confused are one or two of the game birds, from which they may be separated by possessing a "cere" or covering of soft skin at the base of the bill, in which the nostrils are situated.

No species is peculiar to the Malay Peninsula, which is the meeting place of two distinct zoological regions, many Indian species here finding their eastern limit, while others from Java, Borneo and Sumatra do not extend further west.

Species which are represented in the Perak Museum have an asterisk attached, while those of which the Selangor Museum possesses specimens are marked with a dagger.

KEY TO THE SPECIES.

A. Large birds with the wing more than 8.2 inches in length; tail square—

a. With elongated hackles on hind-neck *C. nicobarica* p. 49

a[1]. Feathers on hind-neck, normal.

b. General colour above, bronzy-green *C. aenea* p. 50

Digitized by Google

b^1. General colour above, maroon—		
1. Feathers of rump uniform with back	*C. badia*	p. 50
2. Feathers of rump grey ...	*C. punicea*	p. 55
b^2. General colour above, liver-brown	*C. griseicapilla*	p. 51
b^3. General colour ivory white, wings and tail black	*M. bicolor*	p. 51
b^4. General colour grey, wings and tail black	*C. grisea*	p. 55
B. Smaller birds, wing never more than 8 inches—		
c. Always with non-metallic green in the plumage—		
1. Tail graduated	*S. korthalsi*	p. 51
2. Tail square.		
d. Top of head, chin and patch on breast magenta	*P. jambu*	p. 51
d^1. With no magenta in plumage.		
e. Wing exceeding 7 inches, bill thick	*B. capellei*	p. 52
e^1. Wing less than 7 inches.		
f. Bill thick; swollen towards tip	*T. nipalensis*	p. 53
f^1. Bill slender; not markedly swollen towards tip.		
g. Wing less than 5 inches	*O. olax*	p. 53
g^1. Wing more than 5 inches.		
h. Feathers of the thighs uniform bright yellow in both male and female; male with head, breast and neck chestnut, female with the top of the head grey	*O. fulvicollis*	p. 54
h^1. Feathers of the thighs mingled with green; males with breast vinaceous succeeded by an orange patch; females with the head uniform green.		
j. With a narrow grey tip to tail	*O. vernans*	p. 53
j^1. With a broad grey tip to tail	*O. bicincta*	p. 54

Digitized by Google

c^1.	Always with metallic bronzy green in the plumage	*Ch. indica*	p. 56
c^2.	With no green whatever in the plumage—		
	k. Feathers of the hind-neck bifurcate, checquered black and white ...	*T. tigrinus*	p. 57
	k^1. Feathers of the hind-neck normal.		
	l. Outer tail feathers broadly tipped with white.		
	m. Sides of the neck, breast and flanks white with narrow black bars ...	*G. striata*	p. 56
	m^1. Sides of the neck, breast and flanks unbarred...	*T. humilis*	p. 56
	l^1. Outer tail feathers not tipped with white.		
	n. Outer tail feathers grey, size large	*M. leptogrammica*	p. 54
	n^1. Outer tail feathers rufous, size small	*M. ruficeps*	p. 55

† 1. *CALOENAS NICOBARICA*—THE NICOBAR PIGEON.

Caloenas nicobarica (Linn.); *Salvadori, Cat. Birds Brit. Mus.* xxi. p. 615 (1893); *Sharpe, Hand-list of Birds*, i. p. 91 (1899).

The Nicobar Pigeon is a heavily built bird, almost entirely terrestrial in its habits, only making use of its wings when hard-pressed. It has, however, been known to traverse stretches of sea exceeding one hundred miles. It is almost exclusively an inhabitant of small islands, where it frequents the brushwood near the shore, feeding on the ground and roosting at night in small trees.

Localities in the Peninsula.—The occurrence of this bird in a wild state anywhere on the mainland of Asia is open to very considerable doubt. The "Skeat Expedition" obtained a specimen at Khota Bharu, Kelantan, but it is highly probable that this was a cage-bird, originally from Pulau Redang or some more distant locality, these birds being frequently domesticated by Malays. The only authentic locality within the limits of the Straits Settlements is Pulau Jarak, a small island about thirty miles west of Pangkor in the Dindings, where two specimens were obtained by myself in December, 1904, the bird being by no means uncommon.

General Range.—From the Andamans and Nicobars throughout the islands of the Malay Archipelago, eastwards to New Guinea, New Britain and the Solomon Islands.

Digitized by Google

*† 2. *CARPOPHAGA AENEA*—THE GREEN IMPERIAL PIGEON.

Carpophaga aenea (Linn.); *Salvad. t.c.*, p. 190; *Sharpe, t.c.*, p. 64.

Widely distributed throughout the submontane and coastal districts of the Malay Peninsula, but not, so far as is known, ascending the hills to any great elevation. It is exclusively a fruit eater and usually flies very high, rarely descending to the ground. At certain times of the year it frequents the coastal creeks to feed on the fruits of a species of mangrove, when it becomes much bolder and large bags are often made, though it requires a quick eye and a heavy charge of shot to bring these birds down.

LOCALITIES IN THE PENINSULA.—Generally distributed along the western coast, including the island of Penang, but not hitherto recorded from Pahang or the east coast though it must undoubtedly occur there.

GENERAL RANGE.—Southern, Central and Eastern India, through Assam to Tenasserim and the Malay Peninsula, eastwards to Cochin China, Hainan and the Philippines. The Andamans, Sumatra, Java, Borneo and the lesser Sunda Islands as far as Flores.

MALAY NAME.—Pergam.

*† 3. *CARPOPHAGA BADIA*—COPPER-BACKED IMPERIAL PIGEON.

Carpophaga badia (Raffles); *Salvad. t.c.*, p. 218; *Sharpe, t.c.*, p. 67.

Common on the higher hills of the Malay Peninsula but rarely seen elsewhere, though at certain times of the year it appears to descend to the coast. It is by no means an easy bird to shoot, as it nearly always keeps to the ridges of the hills, except at early morning and late evening, when it may be seen flying high above the valleys from hill to hill, taking a very heavy charge of shot to bring down. Its call is a deep booming note, which carries a great distance and is usually heard for a short time in the early morning only. The nest is very similar to that of the English wood pigeon but is even less substantial. It is usually placed in small trees, close to the crest of a hill, ten or twelve feet from the ground, and very rarely contains more than one egg; which is regularly oval in shape, measuring about 43 by 32 mm. The shell is white, very slightly pitted and somewhat glossy. In Selangor the breeding season appears to be from December to February.

LOCALITIES IN THE PENINSULA.—Perak: Matang (*Wray*); Larut Hills (*Wray, Butler*); Batang Padang, Batu Puteh (*Wray*); Telom (*Robinson*); Selangor: near Klang (*Davison*), Bukit Kutu (*Butler*), Semangko Pass (*Robinson*), Mengkuang Lebir (*Robinson*); Pahang: Gunong Tahan, 5-9,000 feet (*Waterstradt*); Dindings, March (*Robinson*); Malacca.

GENERAL RANGE.—From the Mergui Archipelago (?) southward through the Malay Peninsula to Northern Borneo, Sumatra and possibly Java.

MALAY NAME.—Pergam bukit.

Digitized by Google

4. *CARPOPHAGA GRISEICAPILLA*—GREY-HEADED IMPERIAL PIGEON.

Carpophaga griseicapilla (Wald.); *Salvad. t.c.*, p. 217; *Sharpe, t.c.*, p. 67.

This species, which differs only from the preceding in its slightly larger size and in having the back and rump liver-brown, with only the very faintest tinge of maroon, has not hitherto been recorded from the Peninsula. A single specimen, shot at an altitude of 1,500 feet on Bukit Serudum, Kuantan, a district on the east coast of Pahang, by Mr. W. H. Craddock, late Deputy Conservator of Forests, Federated Malay States, has been identified as this species by Col. Bingham. The specimen should, perhaps, be more rigidly compared with the typical *C. badia* before *C. griseicapilla* is admitted to an authentic place in our faunal lists.

GENERAL RANGE.—From Manipur to Tenasserim.

*† 5. *MYRISTICIVORA BICOLOR*—THE PIED IMPERIAL PIGEON.

Myristicivora bicolor (Scop.); *Salvad. t.c.*, p. 227; *Sharpe, t.c.*, p. 67.

In the Malay Peninsula this species is absolutely confined to the islands and to the mouths of the rivers, where these are edged with mangroves, and is never seen more than two or three miles from the sea. It has not as yet been discovered on the east coast, though, doubtless, it exists there. It flies in large flocks, sometimes including as many as five hundred individuals, and is extremely local in its habitats, as its visits depend on the fruiting of particular trees.

LOCALITIES IN THE PENINSULA.—Perak: Larut (*Wray*); Dindings: Pulau Jarak (*Robinson*); Selangor: Kuala Selangor (*Butler*); Jugra (*Robinon*); Malacca.

GENERAL RANGE.—From the Andamans and Nicobars through the Malay Archipelago to the Philippines and New Guinea. Siam and Cochin China.

MALY NAME.—Rawa.

*† 6. *PTILINOPUS JAMBU*—THE PINK-HEADED FRUIT-DOVE.

Ptilopus jambu (Gm.); *Salvad. t.c.*, p. 80; *Sharpe, t.c.*, p. 56.

The Pink-headed Fruit Dove is now a decidedly rare and local bird throughout the more settled portions of the Peninsula, though it is doubtful if it was ever common in the northern districts, its reputed occurrence in Penang being founded on very insufficient evidence. It is largely a denizen of the mangroves fringing the coast and estuarine rivers, but at certain seasons it appears to travel inland and is not unfrequently found on the main range as high as 3,500 feet. In habits it is much more shy and retiring than the species of *Osmotreron* and is rarely found in parties of more than two or three, which are with difficulty seen in the high and densely foliaged trees that they affect, though, when on the coast, they are very much more in evidence. Nothing is known of the nesting habits.

Digitized by Google

LOCALITIES IN THE PENINSULA.—Perak: Larut, Kinta (*Wray*); Selangor: Klang (*Davison*), Bukit Kutu (*Butler*); Negri Sembilan: Linggi River (*Robinson*); Pahang: Gunong Tahan, 1,500-4,000 feet (*Waterstradt*); Kelantan: Kuala Aring (*Skeat Expedition*); Malacca; Singapore.

GENERAL RANGE.—The Malay Peninsula, Bangka, Billiton, Sumatra and Borneo.

MALAY NAME.—Punai gading; Punai jambu.

*† 7. *BUTRERON CAPELLEI*—THE LARGER THICK-BILLED GREEN PIGEON.

Butreron capellei (Temm.); *Salvad. t.c.*, p. 32; *Sharpe, t.c.*, p. 53.

This species, the largest of the Green Pigeons of the Malay Peninsula, is more of a true jungle bird than any of its relatives. It is found throughout the low country forests on both sides of the Peninsula, but does not seem to ascend the mountains. It is met with in flocks of from ten to twelve to as many as forty and fifty, and in common with many other birds is especially fond of the fruit of the kayu ara, a variety of parasitic fig, which attains a very great height. Nothing is known of the nest and eggs.

LOCALITIES IN THE PENINSULA.—Penang; Perak: Larut, Kinta, Batang Padang (*Wray*); Selangor: Klang (*Davison*), Kuala Lumpur (*Butler*); Patani: Mabak (*Robinson*); Pahang (*Waterstradt*); Malacca; Johore (*Davison*).

GENERAL RANGE.—From the Mergui Archipelago, whence one specimen has been obtained, through the Malay Peninsula to Borneo, Sumatra and, doubtfully, Java.

MALAY NAME.—Berkok; Lengkuas.

8. *SPHENOCERCUS KORTHALSI*—THE WEDGE-TAILED GREEN PIGEON.

Sphenocercus korthalsi (Temm.); *Salvad. t.c.*, p. 11; *Sharpe, t.c.*, p. 52.

The Wedge-tailed Green Pigeon can readily be distinguished from all others by having the central tail feathers considerably longer than the lateral ones and somewhat acuminate. The male has a maroon patch at the angle of the wing and an ill-defined rufous band across the breast, the female is more or less uniform green.

There are six or seven members of this genus the females of which resemble one another very closely, so that it is possible that when males have been obtained the Malayan form will prove to be distinct from *S. korthalsi*, with which I have provisionally united it.

LOCALITIES IN THE PENINSULA.—A single female specimen was shot on Gunong Mengkuang Lebir, at an altitude of 5,400 feet, on 4th April, 1905. The species has also been reported from "Malacca," but the report has been generally discredited. In view of the present specimen, however, it is quite possible that it occurs in the hills around Mount Ophir.

GENERAL RANGE.—Java and Sumatra, at considerable elevations.

Digitized by Google

*† 9. *TREERON NIPALENSIS*—SMALLER THICK-BILLED GREEN PIGEON.

Treron nipalensis (Hodgs.); *Salvad. t.c.*, p. 35; *Sharpe, t.c.*, p. 53.

Generally distributed throughout the Peninsula, but more common as a rule in thickly forested districts and near the main range. The species is evidently subject to periodical migrations, as in February, 1904, eleven birds killed themselves against the windows of the Semangko Pass Rest House.

LOCALITIES IN THE PENINSULA.—Perak: Larut (*Hartert, Butler, Wray*), Kuala Kangsar (*Kelham*); Selangor: Klang (*Davison*), Kuala Lumpur (*Butler*), Semangko Pass, 2,700 feet (*Robinson*); Malacca; Johore; Singapore.

GENERAL RANGE.—From Nepal and the Eastern Himalayas southward through Burma and Tenasserim to the Malay Peninsula, Borneo, Sumatra and the Palawan group. Siam and Cochin China.

MALAY NAME.—Punai daun.

*† 10. *OSMOTREERON VERNANS*—THE PINK-NECKED GREEN PIGEON.

Osmotreron vernans (Linn.); *Salvad. t.c.*, p. 16; *Sharpe, t.c.*, p. 54.

This is the commonest Pigeon in the Peninsula and is probably familiar to nearly everybody. It is found nearly everywhere except in thick jungle, but its favourite haunts appear to be patches of small second growth, the banks of rivers, just where the mangroves are beginning to thin out, and the trees surrounding the rice-fields.

In the breeding season, which in Selangor is usually from December to March, it is solitary, but at other times of the year it flies in flocks of from ten to thirty individuals.

LOCALITIES IN THE PENINSULA.—Almost universal, except in the mountains and in very dense jungle.

GENERAL RANGE.—Siam, Cochin China and Tenasserim, the Malay Peninsula and nearly all the islands of the Archipelago, including Celebes and the Philippines.

MALAY NAME.—Punai.

*† 11. *OSMOTREERON OLAX*—THE SMALL GREEN PIGEON.

Osmotreron olax (Temm.); *Salvad. t.c.*, p. 64; *Sharpe, t.c.*, p. 54.

This variety can be at once recognised by its small size and by having the whole of the back, below the nape, rich maroon in the male. It is somewhat less widely distributed than the foregoing species and keeps as a rule to less open country, being found also in smaller flocks, which rarely exceed ten or fifteen in number. Its flight is less powerful and it is much more apt to trust for protection to the shade of the trees in which it feeds. I have often found it in the same tree with *Treron nipalensis* but it does not seem to associate with *Osmotreron vernans*. The egg and nest have not as yet been described.

Digitized by Google

LOCALITIES IN THE PENINSULA.—Tonka; Province Wellesley; Penang; Perak: Larut (*Wray*); Batang Padang district (*Robinson*); Selangor: Klang (*Davison*), Kuala Lumpur (*Butler*); Pahang (*Waterstradt*); Malacca; Johore; Singapore.

GENERAL RANGE.—From the north of the Malay Peninsula to Singapore, Sumatra, Borneo and, possibly, Java.

MALAY NAME.—Punai siul.

† 12. *OSMOTRERON BICINCTA*—THE ORANGE-BREASTED GREEN PIGEON.

Osmotreron bicincta (Jerd.); *Salvad. t.c.*, p. 57, *Sharpe, t.c.*, p. 54.

Precisely similar in habits to *O. vernans*, but of very rare occurrence in the Malay Peninsula and only in the west coast districts.

LOCALITIES IN THE PENINSULA.—Junk Ceylon (*Weber*); Selangor: Kuala Selangor (*Robinson*); Malacca.

GENERAL RANGE.—Eastern Himalayas, Eastern Central Provinces of India, through Assam and Burma to Cochin China and Hainan; Ceylon: Tenasserim and the Malay Peninsula.

Though somewhat resembling *O. vernans*, this species is readily distinguished by the absence of the pink patch on the nape in the male and by the green coloration of the forehead, chin and neck, these parts being grey in *O. vernans*; The females are differentiated by the broad apical tailband of *O. bicincta*.

*† 13. *OSMOTRERON FULVICOLLIS*—THE CINNAMON-HEADED GREEN PIGEON.

Osmotreron fulvicollis (Wagl.); *Salvad. t.c.*, p. 52; *Sharpe, t.c.*, p. 54.

Fairly common along the coast, especially in the winter months, but rarer inland.

LOCALITIES IN THE PENINSULA.—Junk Ceylon (*Darling, Weber*); Perlis (*Darling*); Perak: Larut, Kinta (*Wray*); Dindings; Selangor (*Butler*), Klang (*Davison*), Morib (*Robinson*); Malacca; Johore.

GENERAL RANGE.—Southern Tenasserim, Malay Peninsula, Cochin China, Nias, Billiton and Southern Borneo.

MALAY NAME.—Punai bakau.

The male of this species is quite unmistakable and the female differs from those of the allied forms by having the top of the head dark grey.

* 14. *MACROPYGIA LEPTOGRAMMICA*—THE BAR-TAILED CUCKOO-DOVE.

Macropygia leptogrammica (Temm.); *Salvad. t.c.*, p. 340; *Sharpe, t.c.*, p. 73.

The Bar-tailed Cuckoo Dove is a very rare bird in the Malay Peninsula and is entirely confined to the higher hills. The only specimens as yet obtained are two shot by Mr. L. Wray on the Larut Hills and one on Gunong Batu Puteh. I have seen the bird on Gunong

Digitized by Google

Mengkuang Lebir, Selangor, 5,200 feet, and obtained its nest and eggs. The former is a flimsy platform of small twigs built in a tree, ten or twelve feet from the ground; the latter are pearly white, the shell slightly glossy and somewhat pitted; in shape they are regular ovals evenly pointed at both ends, measuring about 33 by 24 mm. The breeding season is December and January.

GENERAL RANGE.—The hills of Sumatra, Java and the Malay Peninsula.

*† 15. *MACROPYGIA RUFICEPS*—THE LITTLE MALAY CUCKOO DOVE.

Macropygia ruficeps (Temm.); *Salvad. t.c.*, p. 360; *Sharpe, t.c.*, p. 75.

The little Malay Cuckoo Dove is really by no means an uncommon bird in the Federated Malay States, though its shy and retiring habits render it unfamiliar to most of the inhabitants, Europeans and natives alike. It does not as a rule affect high jungle but is found in thick bluker, especially around deserted native gardens, as, like its congeners both in India and Australia, it is very fond of chillies. It is also abundant in the neighbourhood of the various thermal springs in Perak and Selangor. It is difficult to flush, but when forced to take wing flies with extreme swiftness, though only for a short distance. The nesting habits are unknown.

LOCALITIES IN THE PENINSULA.—Perak: Larut (*Wray, Butler*), Batang Padang (*Robinson*); Selangor: Semangko Pass (*Butler*), Dusun Tua (*Butler*), Klang (*Davison*); Pahang: Gunong Tahan (*Waterstradt*).

GENERAL RANGE.—Burma, Tenasserim, Malay Peninsula, Borneo, Java, Sumatra.

MALAY NAME.—Tekukor api.

16. *COLUMBA GRISEA*—THE GREY PIGEON.

Columba grisea, G. R. Gr.; *Salvad. t.c.*, p. 248; *Sharpe, t.c.*, p. 68.

This species is one of the very rarest of all Pigeons and but very few localities for it are as yet known. None have been actually obtained in the Malay Peninsula, but I believe I have seen it in the Batang Padang mountains and on Pulau Jarak. Mr. Boden Kloss obtained a specimen on Pulau Taya, a small island of the Linga group, and it is elsewhere known from Borneo (Pontianak), from the islands of the Sarawak coast, where it has been obtained in large numbers, and from Sumatra.

17. *COLUMBA PUNICEA*—THE PURPLE WOOD-PIGEON.

Columba punicea (Tick); *Salvad. t.c.*, p. 306; *Sharpe, t.c.*, p. 71.

The only specimens of this species as yet obtained within our limits are from the neighbourhood of Selanga (Junk Ceylon), and it is doubtful if it extends much further south, except perhaps along the higher hills.

GENERAL RANGE.—Central India to Assam, Tenasserim and the Northern Malay Peninsula and also Ceylon.

Digitized by Google

18. *CHALCOPHAPS INDICA*—THE BRONZE-WINGED DOVE.

Chalcophaps indica (Linn.); *Salvad. t.c.*, p. 514; *Sharpe, t.c.*, p. 84.

The Bronze-winged Ground Dove is found throughout the Peninsula in suitable localities and is equally abundant on east and west coasts. It frequents, as a rule, damp localities and gullies in old and fairly open jungle, but is occasionally found in second growth forest, and I have even seen it in the Kuala Lumpur Public Gardens. Almost exclusively a ground bird, it runs with considerable swiftness, and but rarely makes use of its wings, though its flight is powerful for a short distance. It is seldom shot, but is snared by Malays in large numbers by the use of a decoy bird and a bamboo call known as *dekok punai*.

GENERAL RANGE.—The forest tracts of India and Ceylon; throughout Indo-China, the Malay Peninsula and Archipelago, as far east as the Philippines and the west of New Guinea.

MALAY NAME.—Punai tana.

19. *GEOPELIA STRIATA*—THE BARRED GROUND-DOVE.

Geopelia striata (Linn.) *Salvad. t.c.*, p. 458; *Sharpe, t.c.*, p. 80.

The Barred Ground Dove is generally distributed throughout the Peninsula but is never found in high forest and but rarely in bluker. It is perhaps commoner on the east than on the west coast and in the coastal districts rather than the more inland ones. It is usually very common in coffee cultivation, where it is found singly or in pairs, searching the ground for seeds, etc. It is a favourite cage bird among the Malays and high prices are paid for "lucky" birds, luck or the reverse being diagnosed by counting the number of scales on the toes.

GENERAL RANGE.—From Southern Tenasserim and Siam, throughout the Malay Peninsula and Archipelago as far as Celebes, Amboina and the Philippines.

MALAY NAME.—Merbok; ketitir.

20. *TURTUR HUMILIS*—THE RED TURTLE-DOVE.

Turtur humilis (Temm.); *Salvad. t.c.*, p. 434; *Sharpe, t.c.*, p. 79.

The Red Turtle Dove is an extremely rare bird in the Malay Peninsula and, so far as I am aware, only three specimens are definitely recorded from within our limits, being one obtained by Wallace in Malacca and two by Dr. Maingay in the same locality. All three are now in the British Museum collection.

GENERAL RANGE.—From Eastern Bengal through Burma and Tenasserim to the Andamans, Malay Peninsula, Indo-China, Formosa, Philippines, China and Japan.

Digitized by Google

21. *TURTUR TIGRINUS*—THE MALAY SPOTTED DOVE.

Turtur tigrinus (Temm. and Knip); *Salvad. t.c.*, p. 440; *Sharpe, t.c.*, p. 80.

This bird is found in much the same situations as the Barred Ground Dove but is less tied to cultivation than that species. It is widely distributed throughout the Peninsula and is particularly abundant in the sandy wastes and casuarinas that fringe large portions of the east coast. It is also very common in Negri Sembilan, especially in the Linggi district, but is rarer in Selangor and Perak. In habits it is less terrestrial than *Geopelia striata* and is much shyer. It is also more gregarious and at certain time of the year is found in flocks that may number as many as thirty or forty individuals, though this is exceptional. It is a common cage bird with all classes of natives.

GENERAL RANGE.—From Burma, throughout the Malay Peninsula and Archipelago as far east as Timor and the Moluccas.

MALAY NAME.—Tekukor.

SELANGOR STATE MUSEUM, HERBERT C. ROBINSON.
KUALA LUMPUR, *17th March.*

ON A FLYING-SQUIRREL (*PTEROMYS*) FROM PERAK.

THE following is a description of a Flying Squirrel, shot at the Tea Gardens on the Larut Hills last January.

GENERAL APPEARANCE.—Some 10 or 12 inches shorter than *Pteromys petaurista* (Large Malay Flying-Squirrel); muzzle sharper; the fur profusely variegated with pure white flakes, the ground colour being red with a dusky shade giving a slightly dark grizzled appearance; the tail rounded and black. Sex male; adult.

DIMENSIONS:—

Total length—head, body and tail to end of vertebræ—28½ inches (say 724 mm.)
„ to end of hair, 30½ inches (774 mm.)
Length of tail—14½ inches (368 mm.)
„ ear—1¼ inches (30 mm.)
„ fore-paw—1¾ inches (45 mm.)
„ hind-foot—2⅛ inches (51 mm.)
Stretch of parachute—17 inches (432 mm.)
Length of supporting cartilage—3¼ inches (83 mm.)

The head is broad at the back and narrows rather suddenly at the muzzle. The fingers of the fore-paws are long, with fairly large claws. There are four digital pads, three meta-carpal pads and two carpal pads, large and small, respectively. The hind feet in comparison

Digitized by Google

with those of *petaurista* are small and have 11 pads each, distributed as follows:—five digital, five meta-tarsal, and one tarsal large, elongated and on the side. The tail, it will be noticed, forms exactly half the total length of the animal.

Colour.—Above blackish rufous with white patches which are most numerous on the fore part of the back. Underneath the fur is pale rufous with a pinky tinge including the under parts of the parachute which are dark chestnut on the upper surface, interrupted by only a few white flakes. The head is light chestnut slightly flaked. The tail ashy rufous at the root with a few dashes of white and the last two-thirds dead black.

A closer examination of the colouring brings out the following points:—Nostrils naked and flesh-coloured with a chocolate basal ring. Lips greyish white; chin black, forming a large spot. Moustaches black, eyelids black. Ears naked, with hairs (red) at the base only. Fore-paws with short deep chestnut hairs on back, black fingers and lead coloured palms. Hind-feet with rufous hair on back margined with black, and palms as in fore-paws. The parachute is margined with darker red all round. A single hair from the back shows a bluey-grey basal portion of fine texture graduating into a coarser texture of black which is ringed with red, the tip being black. The hairs constituting the white flakes are pure white throughout.

The Skull has the following measurements:—

Extreme length	...	...	$2\frac{1}{2}$ inches (64 mm.)
Basal „	...	...	$2\frac{1}{8}$ „ (55 mm.)
Zygomatic breadth	...	...	$1\frac{11}{16}$ „ (43 mm.)
Occipital „	...	...	$1\frac{3}{8}$ „ (35 mm.)

Dentition:—i. $\frac{2}{2}$; pm. $\frac{2}{1}$; m$\frac{3}{3}$.

The first pre-molar is deciduous and very small, but larger than that of *petaurista* in the two skulls compared.

A comparison of the anatomy of the skull with an adult one of *P. petaurista* shows a few possibly significant differences. The nasal bones are narrower—*i.e.*, not spread so much—and the pre-maxillæ have a pinched appearance, showing up distinctly the long alveoli of the incisors to their full length. The whole of the fore part of the skull, in fact, is proportionately narrower than that of *petaurista*, but the dorsal portion of the fronto-parietal suture is exactly the same width in both skulls—$\frac{5}{8}$ inch, or say 17 mm. The inter-orbital depression, present on the dorsal surface of the frontal, is not so deep as in *petaurista*. Posteriorly the skull is more rounded, the parallel ridges conspicuous in the parietals of *petaurista* not being so prominent. The post-orbital process is long and slender and leaves a space of $\frac{1}{4}$in. (say $6\frac{1}{2}$ mm.) to complete the circle with the zygomatic arch, the upward process of which is also distinctly larger than that of *petaurista*. Basally there is very little difference apart from that due to size.

Having carefully weighed up all these details, there stand out two facts pre-eminently important. Firstly that the new squirrel is not a variety of *P. petaurista*, and secondly that the record of its occurrence is new to Perak and, indeed, to the Federated Malay States. Whether

Digitized by Google

skins are to hand from other parts to which it can be referred I am not yet in a position to say. That just described, however, is being sent to Mr. Oldfield Thomas for identification, and we can but await his verdict.

Cantor, in a footnote to *Pteromys nitidus* (= *P. petaurista, Pallas*) says:—"In an individual from Malacca the back was very dark Indian red with a few dashes of pure white. The identity of the specimen is, however, doubtful." I take it that this specimen is likewise the one mentioned by Blanford as the original type of *Pteromys punctatus* ("Fauna of Brit. India"—Mammalia, p. 366). His description of the species is, however, brief; but it may be of interest to quote it here as I am inclined to think that the present animal if not actually determined as *punctatus* will come remarkably near it.

"Ears almost naked except towards the base.

"COLOUR.—Upper parts rich yellowish brown, darker on the head, more rufous on the parachute and limbs; back and crown with small irregular white spots, composed of hairs that are white throughout, basal portion of all other hairs on upper parts dusky. Lower parts and sides of head pale rufous, deeper towards the edge of the parachute. Tail light rufous brown throughout.

"DIMENSIONS. . . . head and body (in a dried skin) about 14 or 15 inches. Basal length of skull about 2 inches, zygomatic breadth 1.7 inch."

From this description two marked variations in the coloration from that of the Perak specimen can be drawn: the yellowish brown of the back and the light rufous brown of the tail. But taking into consideration the remarkable instances of individual variations in many of the species of the Sciuridæ it is doubtful if these differences can be counted on as specific. However, both Cantor's and Blandford's mention of the white markings hardly apply to the skin under discussion, they being neither "few" nor could they with any degree of precision be designated "small white spots." On the neck, shoulders and fore part of the back they are so large and dashy, in fact, as to present a tendency towards streakiness.

Bandford's *punctatus* was obtained from Karennee at an altitude of about 4,000 feet. The Tea Gardens on the Larut Hills are situated at just on 2,000 feet above mean sea level; and, another detail, which is perhaps worth adding, is that the individual forming the subject of this note was shot, and others have since been seen in company with, *P. petaurista*. Mr. Boomgardt, of Taiping, who is responsible for the animal, told me that he had shot a similar squirrel at Alwaye in Travancore about ten years ago: but I do not consider the information sufficiently reliable to attach much significance to.

PERAK STATE MUSEUM, FRED. W. KNOCKER.
TAIPING, *1st March, 1905.*

Digitized by Google

A RARE SQUIRREL FROM KUALA LUMPUR.

RHINOSCIURUS LATICAUDATUS—THE LONG-NOSED SQUIRREL.

AMONG some mammals recently collected on Weld's Hill, within a quarter of a mile of the Selangor Museum, was one specimen for which I was, for some time, at a loss to find a name. On investigation, however, it proves to be the above-named species, about which considerable obscurity exists, owing to its rarity and retiring habits.

First discovered in Southern Borneo and described by the Dutch naturalists Müller and Schlegel, in the first half of the last century, it was subsequently found in the Malay Peninsula by Dr. Cantor, who mentions having obtained five specimens, though he omits to state the locality, which was probably either Province Wellesley or Malacca. Other records from the Peninsula are few and far between; a specimen obtained by G. Moxon in 1851 is in the Calcutta Museum, one collected by Davison at Klang in 1879 was presented by Mr. Hume to the British Museum, and a third is recorded from Khota Glanggi, in Pahang, and is now preserved in the Raffles Museum, Singapore. The present individual completes the list of recorded specimens, the ones mentioned by Mr. Stanley Flower (*P.Z.S.* 1900, *p.* 359) as in this Museum being merely the pale form of *Ratufa bicolor*.

The species can be readily distinguished from all others inhabiting the Peninsula, except *Funambulus insignis*, by its short tail, which is less than two thirds the length of the head and body. The last mentioned squirrel, however, can be separated at a glance by its very much less elongated muzzle and by possessing a dark vertebral and two lateral stripes, which are completely absent in *Rhinosciurus laticaudatus*, which, in addition, has a much bushier tail. In habits both species are very similar, being ground forms, rarely found on trees but the long-nosed squirrel appears to be more nocturnal in its habits, which accounts for its comparative rarity.

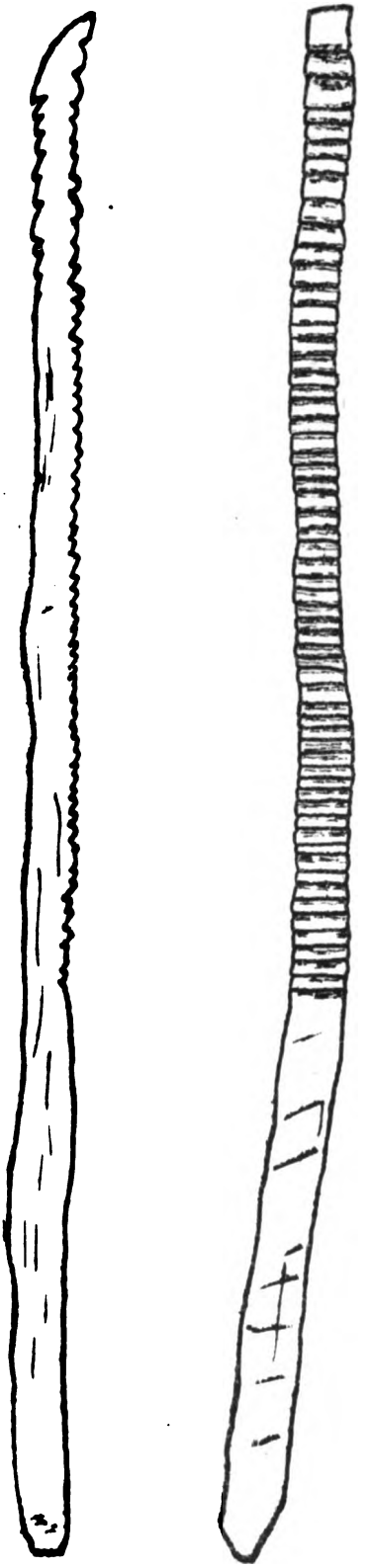
SELANGOR STATE MUSEUM, H. C. ROBINSON.
KUALA LUMPUR, *17th March, 1905.*

A SAKAI COUNTING-STICK OR TALLY.*

THE object forming the subject of this note was secured some two years ago from the Sakais of Sungei Ujong—*i.e.*, from a member of the wild tribes inhabiting the hills in the north-west corner of Negri Sembilan, which form the boundary there between that State and Selangor, and are known as the Balau Hills. It is a four-sided, carefully cut stick, though considerably out of the straight, two feet long; and on one side is a series of sixty notches, and on the opposite side a series of nine. But to explain the meaning of these it is necessary to go into a brief history of the origin of the stick.

* Tallies were used in England by the Exchequer as late as the year 1782, and in the reign of William IV. the old tallies were ordered to be destroyed. The burning of the Houses of Parliament in 1834 was caused by the stoves being over heated with these sticks. They were used privately much later. I can remember, when a boy, seeing a tally hanging up near the kitchen door for recording the milk—ED.

Digitized by Google



½ Natural size.

A SAKAI COUNTING-STICK OR TALLY.

Digitized by Google

Digitized by Google

The Sungei Ujong Sakai counts, as he speaks, in Malay. He has, however, very little counting to do and probably had less before the establishment of a British protectorate over the country. Even now he has very little retentiveness for figures. Indeed it is never advisable to make any arrangements with him for more than two days ahead—not that he is hopelessly forgetful of an engagement, but simply that after the first day he quickly loses count.

When I was a Settlement Officer in the Seremban district it was one of my duties to count the fruit trees of the Sakai *dusuns*, which from time to time fell within the area of new mining concessions, for purposes of compensation to be paid through the Government to the owners, by the miner. On these journeys I always summoned two or three of the Sakais to accompany me, not merely for their own gratification but also to point out the trees and show me the way through the jungle, for in many cases the *dusuns* were right away from any path or beaten track. It was quite clear, however, that after the fourth or fifth tree the Sakais trusted implicitly in me to do the counting fair, they themselves not being able to remember from one number to the next, though the trees may have been quite close to one another. They were usually divided up in groups, however, which were often as much as a mile apart.

On one of these occasions I was unable to keep an appointment made the day previous by messenger, owing to a sudden attack of fever. When, afterwards, I was told that my absence did not make much difference, as the trees had been counted without my aid, I was not a little surprised. Knowing the people so well, it seemed to me a matter of utter impossibility. But my surprise soon changed to amusement and interest when the stick described above was produced and my interrogations deduced the fact that the series of sixty notches represented the number of durian trees and the series of nine represented the number of mangosteen trees which, as far as the enumerators could judge, would be included in the new concession. The Sakais had, in fact, gone round the *dusun* themselves on my non-appearance and at each tree they came to a gash was made in the bark to prevent counting it twice and its number recorded on the stick by a notch. More than that they could only tell me that they *thought* there were about nine mangosteen trees. But the durian trees were too many for them and they had left it to me to total up the notches. Yet when told there were 60 they apparently grasped what that number meant.

PERAK STATE MUSEUM, FRED. W. KNOCKER.
23rd March, 1905.

NOTE ON THE MALAY SAPI UTAN.

BY R. LYDEKKER, F.Z.S.

MUCH uncertainty seems to exist with regard to the wild cattle of the Malay Peninsula. It is commonly believed that representatives of two species, the banting (*Bos sondaicus*) and the gaur (*Bos gaur*) are to be met with in that area, the former being known as the

Digitized by Google

sapi utan and the latter as the sladang. As regards the sladang or Malay gaur, a young specimen was living in the Zoological Society's menagerie in 1890 and is figured by Mr. Blanford in the Society's *Proceedings* for that year. Although very young, this bull shows the characteristic forwardly inclined crest between the horns, and is in all respects an undoubted gaur. Of the Malay banting there appears to be no specimens in English collections, but the animal is reported to have the lower part of the legs reddish instead of white. This statement is based on the description by the late Mr. W. Davison in *Proc. Zool. Soc.*, 1889, p. 448, of a bull, apparently referable to *Bos sondaicus*, from the Malay Peninsula.

Recently I have received from Mr. H. C. Robinson, Curator of the Selangor State Museum, two skulls of reputed wild oxen from the Malay Peninsula for determination. One of these, which is characterised by the very small horns (some 6 inches in length) belonged to an animal shot by Capt. J. C. Lamprey, of the Malay States Guides, in Perak. It is figured in the *Journal of the Bombay Natural History Society*, vol. xiii, p. 192 (1900). The animal was lost when fired at (in the evening) but the carcase was found two days later partially devoured by a tiger. Capt. Lamprey described its colour as rich reddish chestnut with no white rump patch and with blackish "stockings" and muzzle.

When describing this specimen in the passage cited, Mr. A. L. Butler, then Curator of the Selangor Museum, expressed the opinion that it could not belong to any known race of banting and also quoted an extract from a work published in 1858 to the effect that the Malay sapi utan has no rump patch and very short horns, although it is not unlike in other respects the domesticated banting of Bali. A cow, stated to be 6 ft. 2 in. at the shoulder (!), is described as brown in colour with dirty white feet.

If, as I think probable, Capt. Lamprey's specimen is a female, both the above descriptions refer to cows. In the description of a bull by Davison, referred to above, the general colour is said to be blackish, with reddish stockings; the horns are stated to be large and no mention is made of a white rump patch.

Accordingly all the available evidence points to the conclusion that the Malay sapi utan has no white rump patch, and "stockings" in colour from dirty white to blackish or reddish, while the females have very small horns. In that the old bulls are dark coloured while the young and cows are rufous, it accords with the Javan and Bornean rather than with the tsine or Burmese race of the banting, in which both sexes are fawn coloured.

If the foregoing data are trustworthy (and I cannot go behind them) we seem to have decisive evidence that the sapi utan is a perfectly distinct form, although apparently a race of the banting rather than a distinct species. As a skull from Perak, figured and described by Mr. Butler in the *Journal of the Bombay Natural History Society* for 1900, has been presented by Mr. Robinson to the British Museum, I propose to regard it as the type of the Malay race, which may be designated *Bos sondaicus butleri*.

If I am right in these conclusions the most interesting feature about the Malay banting is the extremely small size of the horns of the

Digitized by Google

cows, for in this respect it appears to connect the typical banting with the extinct *Bos etruscus* of the Upper Tertiary deposits of the Val d'Arno in which the cows are hornless. *Bos etruscus* was long ago regarded by the late Professor Rutimeyer as nearly related to *Bos sondaicus* and the relationship now seems to be made still closer. In fact, if my data are trustworthy, the Malay sapi utan would seem to be the primitive type of banting, connecting those races in which the cows have long horns with *B. etruscus*. This, of course, is quite in harmony with the accepted view that the Malay fauna includes several survivors of ancient types.

A word in conclusion with regard to the second skull sent from Selangor by Mr. Robinson. As already mentioned, the horns are of a gaur-like type, and quite unlike those of the banting; so that I cannot regard this specimen as representing the male of the form to which the short-horned skull belongs. From the condition of the teeth it indicates a sub-adult animal. The skull, however, shows no trace of the strongly developed intercornual crest of typical gaur.

Were it not for the fact that the young Malay gaur referred to above (which was probably younger than the animal to which the skull belonged) is represented with a strong intercornual ridge, I should have been inclined to consider that the sladang lacked this ridge. If, however, the figure of the Zoo sladang be trustworthy, this hypothesis is untenable. To suggest that there are two kinds of Malay gaur is obviously unreasonable. Unless, then, the Selangor skull indicates a gaur shading off towards the gayal (which Mr. Stuart Baker, and I am inclined to think rightly, regards as a domesticated derivation from the gaur) I am unable to come to any definite conclusion with regard to its real affinity.

[*Reprinted from the "Field," February, 1905.*]

RHINOCEROS TRAPPING.

IN and near the Dindings, the catching and exporting of rhinoceros has been, in the past, quite a regular trade. It is said by the local Malays that some fifty of these animals have been caught there altogether; and that formerly they were very plentiful, but have now become scarce and difficult to trap.

They are caught in pit-falls, made in the jungle tracks which they follow. The pits are rectangular holes 7 hasters long, 3 hasters wide and 5 hasters deep—*i.e.*, 10½ feet by 4½ feet by 8½ feet. These pits are dug out with perpendicular sides, then the sides and ends are lined with stakes of about 4 inches in diameter, driven into the bottom of the pit and of such a length that the upper ends are flush with the surface of the ground. At about one foot from the top are placed four horizontal pieces of wood, to hold the upright stakes in place. These horizontals are longer than the length and breadth of the pit and their ends are buried in the earth.

Digitized by Google

The heap or heaps of earth thrown out from the hole are carefully covered up with leaves. These heaps are thrown up on one side or on either side of the pit as may be most convenient, the length of the pit being in a line with the direction of the track which the animals are in the habit of following. The pit is covered with thin sticks, and leaves are laid on top of them. It is so well concealed that no one would notice a pit when walking through the jungle and they are most decidedly dangerous.

An animal having fallen into one, he is kept there by laying pieces of wood over the hole; these are laid lengthwise and the ends are retained by two cross pieces, which are themselves secured by eight stakes driven into the ground in a slanting direction, forming four Xs. These are lashed together with rattans where they cross and two other pieces of wood are laid on top of the crossings and also fastened down tight with rattan.

An enclosure is next built at the end of the pit where the animal's head is. It is made of wooden stakes securely lashed together with rattans and rather larger than the pit-fall. A fence on either side connects it with the pit and extends about a third of the length of the pit, so as to prevent the rhinoceros escaping sideways. There is a space left at the end of the enclosure next to the pit for the insertion of pieces of wood so as to close the open end.

All being ready, the longitudinal pieces of wood covering the mouth of the pit are withdrawn and earth is thrown into the hole at the end where the animal's head is, and he mounts on it and walks into the enclosure. Another method is to throw in pieces of wood on which he also mounts. Ropes often have to be employed to help him out. Having got him into the enclosure, the bars before mentioned are slipped into place to prevent him backing into the pit again.

A cleared track has now to be cut through the jungle from the pit-fall to the nearest river. This done, ropes are passed round the body of the rhinoceros, one just behind the shoulders and another in front of the hind legs. To each of these ropes are attached two others, two on either side of the animal. This being done, five men take hold of each of the ropes, that is, twenty men in all, while others demolish the enclosure. The rhinoceros is then made to walk along the previously cleared track to the nearest river. At night an enclosure is constructed round the animal and the men sleep in shelters close to it. It is said that they can take one a distance of ten miles in three days.

Arrived at the river, a cage is constructed of round wood poles and the animal put into it. The cage is then put on to a raft or boat. A place being chosen where a large tree can be used as a derrick to lift the cage. It can then be conveyed to a port and shipped to Penang or Singapore for sale.

The species inhabiting this district is the two-horned Sumatran rhinoceros (*Rhinoceros sumatrensis*). These notes were made in 1901, when an attempt was made to procure a specimen of *Rhinoceros sondaicus* for the British Museum. It, however, was discovered that this species did not occur near the Dindings. Three animals were caught, and as the Perak Museum was in want of a specimen, one of

Digitized by Google

them, a fine male, was taken for that Institution: another died, apparently from an old wound, and the third was shipped to Singapore.

It may be of interest to give here a brief account of how such a large, thick-skinned specimen was successfully treated in a climate which is so detrimental to this class of work. It was caught as previously described, and got out of the pit into an enclosure. It was then shot and skinned in the jungle. As it was computed to weigh about two tons, this was something of an undertaking. A medium sized tree was felled and made to fall across two other trees. These were then lashed together and used as shears, and with the aid of a pair of two-ton differential pulleys and two smaller pairs of blocks, the body was slung up and handled with ease. The animal was killed by a shot in the neck from a Police carbine, at about 8 a.m., and by the evening the skinning was completed. Some Chinese woodcutters begged for the flesh, and removed practically the whole of it. They also took other parts of the body for medicinal purposes.

The skin having been removed, it and the bones were dressed with 5 gallons of common salt, and one 2 lb tin of carbolic powder was used to keep off the flies. It was then done up in a bundle and left for the night. The next morning it was opened out and the salt well rubbed in, and then it was tied up in some old sacking, slung on a pole and carried some eight miles to the landing place, and then by boat to Sitiawan, which we reached that evening, after having spent two nights in an atap shed built in the jungle near the pit-fall.

On arrival at Sitiawan, the skin was put into a large tub with 3 gallons of water containing 2 lbs. of alum, 2 gallons of salt and 1 lb of dry alum. Three days afterwards it was put into a new solution composed of 2 gallons of water, 2 gallons of salt and 6 ounces of carbolic acid. It arrived in Taiping five days later rolled up in a bundle in sacking, and was put into a new solution of the same composition as the last. The skin was kept in this solution until it had all been thinned down and was ready for mounting, when the salt was washed out of it, by soaking for some days in constantly changed water. It was then poisoned and placed on the mannikin, which had been prepared to receive it. It may be added that the skin did not "slip" anywhere and at no time had any offensive odour. When first taken off it was fully $1\frac{1}{2}$ inches in thickness, in places.

L. WRAY.

ON A SQUIRREL NEW TO THE FAUNA OF THE MALAY PENINSULA.

SCIURUS RUFIGENIS, *BLANFORD.*

Sciurus rufigenis, *Blanford, J. A. S. B.* xlvii, pt. 2, p. 156, pls. vii, viii (1878); *Thomas, P. Z. S.* 1886, p. 71, *Blanford, Faun. Brit. Ind. Mamm.* p. 376 (1891); *Bonhote, P. Z. S.* 1900, p. 194.

A SMALL but extremely valuable collection has recently been made by the Museum staff on the Selangor mountains in the neighbourhood of Ulu Gombak at elevations of between 4,000 and 5,500 feet. The series of birds includes a species of Peacock Pheasant

Digitized by Google

(*Chalcurus inopinatus*, Rothsch.) only described a month or two previously in England from specimens obtained in Pahang by Mr. Rothschild's collector; a Bamboo Partridge, also new, but which was obtained last year in the Telôm valley; a Whistling Thrush, previously only known from the mountains of Sumatra; and a variety of Green Pigeon (*Sphenocecus korthalsi*, antea p. 51) which has been doubtfully included in the list of Peninsula species but of which no specimen has hitherto been obtained.

Three species of mammals were obtained: *Tupaia ferruginea*, *Sciurus erythraeus*, and the individual under discussion, which I have no hesitation in referring to *S. rufigenis*, though it is possible that when larger series are available for comparison it may prove to be subspecifically distinct from the typical form. The following is a general description:

Pelage soft, with a thick greyish wooly under fur on the back. Colour of the upper surface grizzled dull yellow and black. Sides of the head, up to and below the eyes, rufous. Upper surface of the tail black, the hairs long and tipped with white, the terminal sixth similar to the back in colour. Chin and muzzle pale buff, breast whitish, tinged with buff, remainder of under surface greyish white. Ventral aspect of the tail and anal region, also inner aspect of thighs, rich chestnut. A large white spot behind the ears.

Dimensions.—Head and body, 214; tail, 144; hind foot, 39; ear, 21 mm.

Locality.—Gunong Mengkuang Lebir, Selangor, 5,000 feet. April 2nd, 1905.

General Distribution.—Mooleyit mountain in Tenasserim and Karenee in Burma, apparently confined to high elevations. Also at Chingmai, Northern Siam. An allied form (*S. pernyi*) occurs in China.

Remarks.—This squirrel can be readily separated from all others at present known to inhabit the Malay Peninsula by the patch of silky white fur behind the ears, which are somewhat large for the size of the animal.

Selangor State Museum, HERBERT C. ROBINSON.
Kuala Lumpur, *25th April, 1905.*

NOTES ON PARA RUBBER SEED OIL.

LAST season some observations and experiments were made on these seeds, and it was found that, on an average, 1,000 husked and sun-dried kernels weighed 4 lbs. 8 ozs. avoirdupois. As the amount of oil present in the kernels, according to Professor Wyndham R. Dunstan, is 42.3 per cent., one thousand seeds should yield, at 40 per cent. 1 lb. 12¾ ozs. of oil.

Using the same figures, 497,777 dried kernels would weigh one ton and yield 8 cwt. of oil, or taking the specific gravity of the oil at 0.9302, 96⅓ gallons.

Digitized by Google

So far, it is impossible to estimate the yield of seed, but judging from the trees in the Museum grounds, Taiping, it may certainly be expected to average over a thousand seed per tree. The fruiting of the trees is very irregular, some of them being much more prolific than others. There is one small-leaved variety which hardly ever fruits, but it appears to occur very rarely; which is fortunate, as it yields little rubber.

It was found that if the kernels were dried, pounded and at once put into a press the resulting oil was clear and of a pale yellow colour. If, on the other hand, the meal was kept a few days before pressing, the oil was darker in colour and cloudy. The longer the time which elapsed between the pounding of the kernels and the expressing of the oil the deeper its colour. The oil was also more difficult to express as it became more viscid and required greater pressure to expel it from the cake. Some of the latest expressed oil was quite thick and so cloudy as to be opaque. It would become temporarily transparent on heating, showing that it contained, floating in suspension, a fat with a higher melting point.

These experiments were carried out with a locally-devised press, formed with some planks and a couple of carpenters' bench screws. As it was impossible with this press to get sufficient presure to expel all the oil from the meal, no determination of the comparative yield of the fresh and old meal could be attempted, but there appeared to be a considerably larger yield from the former.

Professor W. Dunstan writes in a report on the seeds of *Hevea brasiliensis*, "It will be observed that the oil extracted from the meal (which was sent to England) was solid, whereas that obtained from the freshly-ground seed was a liquid. This difference is due to the large proportion (65.6 per cent.) of free fatty acids present in the former, whilst the latter contained only 5.4 per cent. of free acids. The cause of this difference in the two oils has been investigated and it has been found that after the seed has been crushed the oil gradually undergoes decomposition, owing to the action of a hydrolytic enzyme contained in the seed." The present experiments confirm this statement and moreover show that the decomposition of the oil sets in quite rapidly after the kernels are crushed, also that the colour of the oil changes from a pale yellow, little if any darker than olive oil, to a deep brown.

The difference in the commercial value of the two oils would probably be considerable; and it would appear that to obtain the best quality and largest yield of oil, the expression should be done locally and that as short a time as possible should elapse between the grinding of the kernels and the extraction of the oil in the press.

Three samples of the above-mentioned oils are on exhibition in the Perak Museum. One from freshly-crushed seeds, one from seeds crushed about a week, and one from seeds crushed about two weeks. The contrast between the pale yellow, brown and dark brown oils is very marked.

L. WRAY.

F.M.S. Government Press.

Digitized by Google

Digitized by Google

ON A NEW SPECIES OF *MUS* FROM PULAU JARAK,

By J. LEWIS BONHOTE, M.A., F.L.S.

I HAVE recently received for identification from Mr. H. C. Robinson a single specimen of a small rat, collected on the island of Pulau Jarak, in the Straits of Malacca. It belongs apparently to an undescribed species, and I propose for it the name *Mus jarak*, sp. nov.

Size about that of a small *Mus rattus*. General colour above dark brown, grizzled with fulvous and becoming rather paler on the sides. Each hair is dark at the base with a fulvous subterminal portion and a dark tip; on the flanks the dark tips are entirely absent. Interspersed among the fur are some very soft spines and long dark bristles. The underparts are pure white, and the line of demarcation between the colour of the upper and underparts, although distinct, is not abrupt. The feet are dark and scantily clothed with dark brown hairs. The tail is unicolor, stout and rather shorter than the head and body, the whiskers are long and dark.

The skull is that of a typical *Mus*. The rostrum is of moderate length and fairly stout, the nasal bones are long and taper posteriorly. The supraorbital ridges are strong and well marked, and the parietal ridges can also be traced well back. The autorbital foramen is large and square in its upper portion, narrowing down to a mere slit below, the outer plate being thin and leaning slightly outwards. The auditory bullæ are small and lie well up in the skull, the base occipital and palate are broad and the incisive foramina long and tapering slightly at their anterior end. The zygomata do not extend laterally but have a downward tendency, the lowest point being at about two-thirds their length from the anterior root. The teeth are normal and call for no special comment.

DIMENSIONS (of type in flesh).—Head and body 180 mm., tail 160 mm., hind-foot 32 mm., ear 20 mm.

SKULL.—Greatest length 42 mm., basal length 35 mm., palatal length 19.5 mm., diastema 12 mm., length of incisive foramina 7.5 mm., length of nasals 16 mm., zygomatic breadth 19 mm., interorbital breadth 6.5 mm., greatest breadth of brain case 15 mm., length of molar series (alveoli) 7 mm.

HABITAT.—Island of Pulau Jarak, Straits of Malacca.

TYPE.—B.M., 5, 8-12-1.—Adult male, collected by Mr. H. C. Robinson on the 20th December, 1904.

This specimen, which through the kindness of Mr. Robinson has been presented to the National Collection, belongs apparently to the *Mus muelleri* group (*see* Fasciculi Malayenses, Zoology, vol. i, pp. 32, 34, 37, 1903). It agrees with the other species of that group in its dark general colour and proportions, differing only in the larger ear and very much smaller size.

The shortness of the tail and the small size of the auditory bullæ form characters which enable it to be easily identified; the latter in particular forming a marked feature by which it may be distinguished from *Mus annandalei* (loc. cit. supra, p. 30), which in colour and size it somewhat closely resembles.

Digitized by Google

REPORT ON MINYAK SURIN.

IMPERIAL INSTITUTE OF THE UNITED KINGDOM, COLONIES AND INDIA.

IMPERIAL INSTITUTE ROAD, LONDON, S.W.,
13th July, 1905.

SIR,—I have the honour to forward a report on "Minyak Surin," the vegetable fat obtained from the seeds of the Surin tree.

The sample of this product now reported upon was sent to the Imperial Institute by Mr. Leonard Wray, Director of Museums, Taiping, Perak, and I shall be glad if you will kindly cause a copy of the report to be sent for his information.

I have, etc.,
WYNDHAM R. DUNSTAN.

H.E. THE HIGH COMMISSIONER, F.M.S., SINGAPORE.

REPORT ON A SAMPLE OF "MINYAK SURIN" FROM THE FEDERATED MALAY STATES.

BY PROFESSOR WYNDHAM R. DUNSTAN, M.A., F.R.S.,
DIRECTOR, IMPERIAL INSTITUTE, SOUTH KENSINGTON, LONDON, S.W.

THE Imperial Institute received recently an enquiry from a firm of soapmakers in this country asking for information as to the possibility of obtaining commercial supplies of the seeds of *Palaquium* (*Dichopsis*) *oblongifolium*, or the oil expressed from these seeds.

In dealing with this enquiry it was found that practically nothing was known about these materials in this country, and that the information available regarding them in English and foreign literature is apparently entirely derived from a statement made by Dr. Burck (Mededelingen uit S. Lands Plantentium, vol. iii, p. 40), that the seeds yield a hard, white fat known as "Njatoh" fat, chiefly composed of stearin and olein, and which would be suitable for the manufacture of stearin candles.

It was considered unlikely that this product would prove to be of commercial interest since it is well known that this species of Palaquium only occasionally furnishes seeds, and that consequently large supplies of the seed were not likely to be obtainable, but in view of Burck's statement as to the composition of the fat and the uses to which it could be applied it appeared to be worth while to obtain a sample of the material for examination. Application was therefore made to the Superintendent of the Botanic Gardens, Singapore, and to the Director of Museums at Perak, Federated Malay States, for samples of the seeds or the expressed oil, and for any information which might be available locally regarding either of these products.

Digitized by Google

In response to this request the Superintendent of the Botanic Gardens, Singapore, in a letter dated the 6th December, 1904, stated that the seeds of *Palaquium oblongifolium* were extremely rare; that on some occasions as much as a dollar for each seed had been offered without securing any supplies, and that although during the last few years small quantities of the seeds had become available in the Straits Settlements, it was improbable that any had been used for the extraction of fat.

Similarly the Director of Museums at Perak, in a letter dated the 16th December, 1904, said that he could hold out no hopes of being able to obtain either the fat or the seeds of *Palaquium oblongifolium* as seeding trees of this species are rare, but the fat known to the Malays as "Minyak Surin," obtained from the seeds of a tree allied to *Palaquium oblongifolium*, could be secured in small quantities, and that he would send a sample of this material for examination.

The following information was given regarding Minyak Surin:

"The Surin trees grow singly in the jungle, usually at wide intervals, so that the collection of the seed is a matter of difficulty. The Malays on finding a tree shedding its seed gather them up and, after husking and sun-drying them, express the fat by means of a wedge press called "Apit Surin." The fat does not come into the local market, but is used by the makers for cooking purposes. The fat could not be obtained in quantities, nor at a price which would make it available for either soap or candle-making."

The botanical name of the Surin tree was not supplied, and in a letter dated the 2nd March the Director of Museums was asked for further information as to the relationship of the Surin tree to *Palaquium oblongifolium*.

The sample of "Minyak Surin" received weighed about two pounds, and consisted of cylindrical pieces of solid fat, which contained much dirt and foreign matter. The fat had a peculiar odour but was not rancid.

CHEMICAL EXAMINATION.

A portion of the sample was sent to Dr. J. Lewkowitsch, who had offered to investigate this material, and he has been good enough to supply to the Imperial Institute the following observations with regard to it:

"The fat was very dirty and was filtered to remove insoluble impurities. The chemical examination gave the following results:

Saponification value	...	179.5 milligrams of potash required to saponify one gram of fat
Unsaponifiable matter	...	4.54 per cent.
Free fatty acids ...	...	43.2 „
Iodine value ...	...	42.31 „
Reichert-Wollny value	...	0.55 „

Digitized by Google

The mixed fatty acids were isolated from a portion of the fat and gave the following results:

Solidifying point of mixed fatty acids	59.1	per cent.
Mean molecular weight of fatty acids	284.9	,,
Proportion of stearic acid (m.p. 67.8° C.) in total fatty acids	58.2	,,

From the foregoing numbers the conclusion may reasonably be drawn that the fatty acids consist practically entirely of stearic and oleic acids, but a more thorough investigation would be necessary before this could be asserted definitely.

The extremely high proportion of stearic acid would render this fat a most useful raw material for the candle industry were it not for the presence of considerable amounts of unsaponifiable matter, which would be equally objectionable in soap manufacture.

The commercial value of the fat would probably be from £24 to £26 per ton.

It was pointed out in the letter accompanying this sample that owing to the spare distribution of the Surin trees in the Federated Malay States this material could not be of any commercial importance since no large supplies of the seeds could be obtained, but it is interesting to note that the fat is suitable for industrial use, and that it would probably sell at fairly high prices if it could be obtained in large quantities.

The observation that "Minyak Surin" consists of stearin and olein is also interesting as showing that its composition is similar to that ascribed by Burok to the fat obtained from the seeds of *Palaquium oblongifolium*, and in this connection it would be of some interest to know the botanical name of the "Surin" tree in order that its exact botanical relationship to *Palaquium oblongifolium* might be ascertained.

WYNDHAM R. DUNSTAN.

13th July, 1905.

A SYSTEM FOR THE REGISTRATION OF THE CONTENTS OF MUSEUMS.

By L. WRAY, I.S.O.,

Director of Museums, Federated Malay States.

A GREAT deal has been written on the subject of Museum Registration, and several papers on it have already appeared in the Journal of the Association, but it is such an important matter to all those who have anything to do with the administration of Museums that probably another paper on it may be considered admissible.

Digitized by Google

It became necessary to adopt some workable system of registration in the Perak State Museum. One method had been tried some time back. There were accession books, registers and catalogues for each of the different departments, and a general index, by which it was supposed that particular entries and specimens could be found. In practice, however, it was found to be quite unmanageable. A careful study of the methods now in use in other Museums was therefore made while the writer was on leave in England in 1902 and 1903. It is unnecessary to enter into the process of selection by which the system which was finally settled on was evolved, but it will probably suffice to describe it in detail. Naturally it is a modification of other systems, principally in the direction of simplification, by the elimination of unnecessary complications.

The system is worked entirely with cards, no books of any sort being used. Others have in part discarded them, and Mr. E. E. Lowe, of the Plymouth Museum, has even gone as far as using books in conjunction with loose sheets and card catalogues, but books do not appear to have been altogether dispensed with before.

The central idea is this: a duplicate series of cards form the "Register" and the "Catalogue," the cards of the register being filed in the order of the accession numbers of the specimens, and the cards of the catalogue in the order in which the specimens are arranged in the Museum.

Now to come to details. The card selected was a form printed by the Library Supply Company, measuring 3 ins. × 5 ins., and ruled as shown:—

Accession No.	Date when Received

Place in Museum

DESCRIPTION OF SPECIMEN.

.....

.....

.....

.....

.....

WHERE PROCURED.

.....

.....

.....

.....

HOW OBTAINED.

PRESENTED BY.....

BEQUEATHED BY.....

PURCHASED FROM.....

COLLECTED BY.....

It is possible that a better allotment of space might be made, but the cards answer their purpose very well. When a specimen is received, two of these cards are filled in with the particulars concerning it, and the specimen is numbered by sticking on a ticket or

Digitized by Google

painting or writing a number on it. If it is to go into an exhibition or store case, the number of that case is written on the cards under the heading "Place in Museum." One card is then filed in the register, in the order of its accession number, and the other card is filed in the catalogue under the case number, in its proper place in relation to the arrangement of the specimens in that particular case. For this purpose each gallery has been given a letter, and each case has been numbered, the numbers running from one upwards in each room. A wall or portion of floor-space which is used for displaying exhibits is treated as a case, and given a number also. So if 17 F. is written on a card, it will mean, in the Perak Museum, case No. 17 in the comparative ethnology gallery.

One or more drawers of the catalogue cabinet are given to each gallery. The drawers, in this particular instance, hold 3,000 cards, and have two brass card-holders in front to take labels indicating the contents. The drawers are sub-divided by guide cards into sections representing the cases. This is perhaps best done by using third guides, the odd case numbers being written on the left-hand and the even numbers on the right-hand cards, while the centre guides are reserved for sub-dividing the contents of the cases. These sub-divisions may be orders, classes or genera, in the zoological or other natural history galleries, or any other divisions in which the collection is arranged in other galleries. Further sub-division is effected by the use of coloured cards, which are plain ruled or blank for this purpose. These same or different coloured cards are used for cross references. There is a limit to the use of guides, because when they are too close together they cannot be read when looking at a drawer of cards.

The accession numbers are used with a date, thus:—1,420-04 or 1,343-05, a fresh number being started each year. The actual date of receipt is written on the right-hand upper corner of the card. In the register guides at each hundred are used. There are also third guides, and the odd and even numbers are written on the left and right-hand cards respectively, a centre card being used to denote the year. This is only necessary when a change of year takes place. Let it be supposed that in 1904 the last card used was 1,235; then the last guide used would be 1,200-04, and the next guide would be 100-05. The centre guide, bearing 1905 on it, would then come between cards Nos. 1,235-04 and 1-05. It might save time to sub-divide the register further, say into fifties. In this case fourth guide cards would probably be best, as the hundreds would still come on either side and the fifties alternately in the central half, with a distance equal to the thickness of two hundred cards between each guide.

In the case of a specimen or group of specimens from one source, which have to be examined and classified, or mounted, or possibly even sent away for identification, salmon-coloured cards are used, and one card is filed in the register and the other in a drawer of the catalogue cabinet set apart for the laboratory. When the specimen is ready for exhibition, the salmon cards are destroyed and white ones filed in the ordinary way. If the salmon card is a group or lot card, then it will be necessary to use white cards for each of the specimens, and if the accession number was, say, 360-05, to give them decimal numbers, thus:—$\frac{360}{1}$-05, $\frac{360}{2}$-05, etc. As each specimen of a group or lot is worked out, it can be given a decimal number and the salmon

Digitized by Google

card retained, until all the specimens in it are worked out and find permanent resting places either in the exhibition, study, or duplicate series. Except in these cases, lot or group numbers do not appear to have anything to recommend them, and as far as possible each specimen is given a number of its own.

In starting a new system of registration in a Museum, the old collection, as well as the current acquisitions, have to be included in it, and there is a slight difficulty in the treatment of the two classes. It was decided in our case to date them with the year of registration, adding the date of acquisition, when known, on the right-hand corner, and in the case of accessions to keep a list of the numbers for use in making up the report of the year's work. It might have been better to have used, say, buff cards for all the old stock and white for all the new; but this was not thought of at the time of ordering the cards, and being in such an out-of-the-way place, was impossible to do subsequently without a delay of probably six months or more.

Should a specimen be destroyed, and such things will happen, even in the best-regulated Museums, its card in the catalogue may either be torn up, or preferably transferred to a drawer set apart for the purpose. In either case a reference must be written on the card in the register. The history of lost specimens is often of use and well worth preserving. Should this department unfortunately get large, it must be sub-divided by guide cards also, so that particular cards can be found without undue loss of time.

Loan collections can be treated by setting aside a drawer of the catalogue cabinet for them. A record can here be kept of specimens lent or of specimens received on loan. In the latter case it is probably advisable to keep a small separate register of them, as it is not convenient to put them on the main register. For this purpose the cheaper qualities of cards are good enough, and a coloured one could be used with advantage.

In practice thin, best quality, white cards have been used for the ordinary entries; thick, best quality, white cards for the guides; salmon pink cards for the undetermined specimens; blue cards for special specimens, such as those which have been figured or described, or co-types; and buff cards on which to write classification and cross reference notes.

It will be apparent that by this system it is always possible to re-arrange a case or gallery, or to insert or remove specimens anywhere in the collection. A whole line is given to "Place in Museum" on the cards, so it is easy to scratch out a case-number and write in a new one, whenever a change is necessary. Any system which does not allow of the re-arrangement of the collections is defective. Unfortunately, whenever a worker in systematic natural history studies a subject he thinks it necessary to re-name and re-arrange almost every genus and species included in it. Until a stop is put to this pernicious habit of the systematists (by, say, imposing a fine of 10/- in the case of a species and 20/- in the case of a genus, the fines to go to a benevolent fund for the benefit of prematurely-decayed Museum officials) we must allow for a constant change of classification of nearly the whole of the contents of a Museum.

Digitized by Google

It is a fairly simple matter to find any particular card, or group of cards, for it can be traced, if the number of any one of the cards in the group is known, by hunting it up in the register and finding the gallery and case number; or if the place of the group in the scientific sequence adopted in the collection is known, or if the number of the case in which the group is situated is known, by looking it up in the catalogue.

The catalogue, when arranged with its guides, can be used by anyone, for there is no elaborate system or set of symbols to learn and remember before it can be understood. This elaboration is the great drawback to some of the ingenious systems which have been proposed. In my experience of Museum administration, time is always too short to do the work which should be done, and the useful innovations are those which save time and labour. In this connection, it may be added, that, as the entries on one set of cards are exact copies of those on the other set, any clerk capable of copying can do one half of the whole work of registration.

[*Reprinted from the "Museums Journal," June, 1905.*]

A SHORT ACCOUNT OF SOME "ANCIENT REMAINS" FOUND ON GUNONG JERAI, KEDAH.

(*WITH ONE PLAN.*)

By Mr. F. W. IRBY,

of the Perak Trigonometrical Survey, February, 1894.

GUNONG JERAI, more generally known as Kedah Peak, is a mountain of about 4,020 feet in height, and is about 24 miles to the N.N.-E. of Penang. It has a very abrupt and sharp appearance as seen from the south, but on the northern and western sides it is quite easy of ascent.

The top of Jerai itself is a quartz sandstone, with a dip of about 15° to the north-west, but cut off on the south by a precipice of about 140 feet in height with a strike N. 53° east. Below this precipice boulders and intrusive granite can be seen. The crest of Jerai is evidently the result of an upheaval, the centre of action of which was immediately below. The formation, being very friable, has been denuded on the southern slopes and now forms a scarp. The sandstone on the northern and western slopes is generally uniform in its bedding, though there are indications of contortion and local metamorphism. It dips beneath the alluvial soil at the foot of the range and passing under the sea comes up again in the Bunting islands.

On these slopes there are no granitic rocks so far as I was able to ascertain, but all are schistose rocks of sedimentary formation.

The usual way to approach Gunong Jerai from Penang is by steamer to Kuala Yen, a small rivulet that rises on its western slopes. The shore is so shallow that it is not possible to approach even with a

Digitized by Google

small launch, within half a mile, and even native canoes cannot be paddled into the stream at low water. Kuala Yen is a small kampong with padi fields which stretch back from the shore line to the foot hills, perhaps a mile or more. The headman is Raja Saman, a very intelligent Malay, who is always willing to assist travellers with coolies and accommodation.

The track from Kuala Yen is through some very old "dusuns" or orchards, and after about 2 miles strikes a spur, up which is a very fair track that no doubt has been in use for centuries, as it is so well defined. At 3,100 feet the path leads into a glen known as Padang Taseh where there is always water to be found. It is the best place to camp as the top of Jerai can be easily reached in an hour from it and no water can be got higher up.

On the 1st February, Mr. Irby's Malay coolies unwittingly set fire to the peat, which being very dry burnt rapidly and could not be extinguished. On the night of the 4th February it rained sufficiently to somewhat extinguish the fire, and on the following morning his Malays reported that they had discovered a row of bricks on the top of the crest where the peat had been mostly consumed. Mr. Irby had the débris cleared away and came upon the hearth. Over the hearth several stumps of large trees were found whose roots had worked their way through the stone and displaced them to a considerable extent.

In the centre was discovered a vault, or well, which no doubt was originally circular, with a diameter of about 2 feet 6 inches, and 2 feet deep. An irregular slab of sandstone was at the side, evidently used as a cover. Careful search was made, but nothing of any interest found except a few pieces of vitrified clay bricks very similar to the ordinary Chinese ones, and a little wood charcoal.

The hearth itself is shown in accompanying sketch at the point A on plan of site. It was about 16 feet square and consisted of two courses of granite slabs, or bricks, about 14 inches long, 7 inches wide and $2\frac{3}{4}$ inches thick. By far the greater number were in their original positions, and only displaced here and there by the roots of trees. At a later period I made an examination on the spot and measured six of the slabs taken at random, with the following results:

(1)	1′	2″	×	7″	×	$2\frac{1}{2}$″	...	14″	×	7″	×	$2\frac{1}{2}$″
(2)	1′	0″	×	7″	×	3″	...	12″	×	7″	×	3″
(3)	–	10″	×	6″	×	$2\frac{3}{4}$″	...	10″	×	6″	×	$2\frac{3}{4}$″
(4)	1′	2″	×	8″	×	3″	...	14″	×	8″	×	3″
(5)	1′	1″	×	$7\frac{1}{2}$″	×	$2\frac{3}{4}$″	...	13″	×	$7\frac{1}{2}$″	×	$2\frac{3}{4}$″
(6)	1′	$2\frac{1}{2}$″	×	7″	×	$2\frac{1}{2}$″	...	$14\frac{1}{2}$″	×	7″	×	$2\frac{1}{2}$″

The interior was covered by bricks roughly hewn from laterite.

Further exploration by Mr. Irby and myself led to the discovery of another hearth at the south-west corner with the hole outside the perimeter. It had been destroyed to such an extent that it was difficult to get its outlines at first, but a little careful excavation enabled me to make a fairly accurate measurement. The dimensions were about 15 feet by 12 feet. The site is shown in red on accompanying plan of the top of Jerai. Indications of no less than nine small hearths, about 4 feet square, were found between the two

Digitized by Google

largest. The foundation of what appears to have been a rubble wall was traced in a north-easterly direction for 160 or 170 feet, it was then lost beneath the peat which the fire had not consumed.

On the undercliff, on the south-eastern side, there were many pieces of clay bricks and granite slabs found, and from their positions they would, in my opinion, point to a landslip on that side subsequent to the building of the hearths and settlement of priests or others on the top of the hill. The rubble wall would also appear to have extended to the corner of the precipice which bears round to the north, and no doubt served as a fence.

The granite slabs are fairly uniform in size and well tooled, and would appear to have been cut from boulders, as in some instances curved ends have been left in the rough which are precisely similar to the surface of a granite boulder. Samples of the granite slabs, clay bricks and laterite blocks have been deposited in the Perak State Museum.

Mr. Irby made most careful enquiries of the Malays from the neighbouring kampongs who came in scores to see the discovery. They all said they knew nothing about any ancient settlement on Jerai and that their ancestors had not handed down traditions concerning it. Later on others said there must have been a Siamese crematory on Jerai, "as the bricks were unknown in their parts and must have come from over the sea," and the bodies were placed in the holes and burnt there. But some Siamese who came up said that it was the custom to burn their dead above ground.

The Malays further said that in sailing to Acheen, Gunong Jerai is visible until a high mountain in Sumatra comes in view, which fact might suggest that signal fires had been kept burning on Jerai in former days to guide mariners, sailing from Sumatra, at night.

But it is improbable materials such as cut granite and bricks would have been carried 4,000 feet up a mountain side to form a base for a signal fire when there was any quantity of sandstone, much easier to work, ready to hand.

The Penghulu of Yen, Raja Saman, had a long story that Jerai had once been inhabited by "Gergasi," creatures of human form who devoured ordinary mortals, but that none had been known to exist for the last 200 years. His theory was that these creatures were responsible for the constructions found. Many other tales, equally improbable, were given.

There can be little doubt but that the builders must have been long antecedent to the Malays and that the latter know nothing about them.

The depth of peat on Jerai before the fire must have taken centuries to form, as it rested on the sand-stone, which was almost devoid of soil, and when burnt the little ash formed was rapidly blown away by the wind. If a landslip occurred when the top of Jerai was inhabited, as appears to have happened, those not destroyed would probably have fled immediately with the belief that it was the result of some supernatural agency and not have returned.

Digitized by Google



and in

of broke

Digitized by Google

Digitized by Google

Tradition would keep others from making the ascent for many generations perhaps, and thus the vegetation would have had an undisturbed opportunity to form soil for itself and cover the ruins so effectually that when some venturesome Malay did arrive at the summit all signs of any former settlement would be obscured.

If such a catastrophe as the landslip on Jerai had occurred since the Malay occupation some tradition would remain as to what existed on it previously, but none does. On the other hand, the Malays have a tradition that Jerai was once united to Gunong Perak, a large mountain to the north-east, to which it was married, and that subsequently it broke away and became the parent of Pulau Bunting, an island about 10 miles distant in a north-westerly direction.

This tradition may have been derived from some previous settlers with a knowledge of a great landslip on Jerai, and who with poetic license had made the most of it as a supernatural business, and omitted to lay any particular stress on the settlement which was destroyed by it. Perhaps some authority on the history of the Malay Peninsula may be able to throw light on the age of these remains, and if some further search is made and the peat remaining be carefully handled it is quite possible some utensils or implements may yet be found.

This account is accompanied by four photographs and a ground plan of the crest of Gunong Jerai which will explain themselves. For the Malay traditions I am indebted to Mr. Irby.

G. A. LEFROY,
Chief Surveyor, Perak.

TAIPING,
20th February, 1895.

THE RUINS ON GUNONG JERAI, KEDAH.

It was on the morning of 5th February that, overhearing some conversation between Penghulu Awang, of Yen, and the coolies, I went up to the highest point of Gunong Jerai, from the hut being erected close by, and found as Awang had said a row of bricks close to the eastern precipice of the peak. Over these the fire was still burning, a mass of smouldering leaves and débris from two to three, and where piled against the stumps of trees cut down by former visitors, perhaps four feet in depth.

I raked away as much of the smouldering mass as possible, still keeping the fire going, and before evening had the court fairly clear of débris; but there still remained the stumps of three trees, the largest one on the eastern and the other two, not much smaller, on the western side of the well, their roots going down into the well and others extending right across the court on either side.

These stumps, which had been cut, I should say, within a twelve month or so, were of the size and no doubt of the same age as the rest of the trees on the summit, and from the extent of the relics afterwards disclosed I believe that the whole top of the hill had been cleared at the time these were in use, and from these trees perhaps some idea of the date of abandoning the place may be obtained.

Digitized by Google

It was on the two or three days following that I noticed the many mounds and the vaults to the north, the fire still burning, the vault had another large tree stump growing over it, and this is now lying to one side, the ones over the court had to be removed to obtain clear sights for the trigonometrical work I was engaged on, and as this could not be delayed I had to extinguish the fires on the 8th, leaving a considerable patch of peat and dead leaves that may still be covering something of interest.

I had many native visitors during the time I remained on Jerai, but could get no information, their grandparents, so they said, having had no knowledge of it. Haji Maolim, the Guru of Yen, thought it was a place for the exercise of religious ceremonies, and that a subterranean passage might exist from the well in the court to some opening lower down the side of the mountain; but this is not so, as hard bottom was struck in clearing out the well.

Others thought it was a Siamese crematory, as the bricks were unknown in their part and must have come from over sea, but on two Siamese coming up I had questions put to them as to whether the custom was to place the corpse in a hole and cover it up whilst being consumed but this they said was not so, the body being *di atas tanah*; so this failed to explain the well.

I was told that in sailing for Acheen, as soon as Jerai was lost to sight, a mountain in Acheen came into view, and perhaps in olden times beacon fires may have been burned here, but these places would certainly not have been made for this purpose alone.

Another said he thought the top of the hill had been stockaded during some former war, and in such a case the wells may have been stores for treasure, food, supplies or perhaps even water, but who the people might have been or where they could have got the bricks remains a mystery; still I am inclined to think that this theory may be worth investigating, and if some idea of the age of the occupation can be obtained from the trees some interesting historical events may be revealed.

Raja Saman, of Yen, quite seriously said that it was the work of the Gergasi, which he explained were creatures having the appearance of mankind but still not of them, being also devourers of human beings, in fact the ogre of fairy tales, but of these none had been known to exist for the last 200 years. I have no doubt this is accepted by all the Malays as the true explanation, but others were afraid to tell me so for fear of being laughed at.

Other stories which I was told had reference to the mountain, but no connection with the ruins. One was that Gunong Jerai is a female and was once joined both in proximity and matrimony to Gunong Perak, a male, but for some reason I did not discover the latter hunted the former to its present position.

Another, in connection with the Padang Taseh, the lower camping place. This was given by a Raja Ibrahim to Haji Taseh as a hermitage and the holy man lived in seclusion there, afterwards it was taken up by Chinese for mining but they failed, then a Malay took another place, also for mining purposes, but kept his whereabouts and doings

Digitized by Google

secret. One day his camp was discovered by a Raja who noticed a tungku of gold on the fire, and Raja-like immediately appropriated it. For this he was struck by the owner, a Korinchi man, who then exercised his powers, turned into a tiger and patrolled Jerai for years after. What became of the Raja and the tungku I do not know.

With regard to the Korinchi I was told that there are two streams, very difficult to discover, which join, one being clear and one muddy. Water must be taken from both, the muddy on being applied to the body causes it to take the form of a tiger, while the clear restores it to its former state, the power being lost when the supply of water is exhausted.

FRED. W. IRBY.

TAIPING, *28th April, 1894.*

FOSSIL TOOTH OF *ELEPHAS NAMADICUS* FROM PERAK.

A PORTION of an elephant's tooth, which was found in Tan Ong Peng's mine, opposite the old Police Station at Salak, Kuala Kangsar, at a depth of 12 feet from the surface, and which was presented to the Perak State Museum by Mr. Tan Ong Peng per Mr. N. T. Gray, was recently sent to Dr. Charles W. Andrews, D.SC., of the Geological Department of the British Museum, for examination. In a letter dated 18th July he writes, "The tooth is a molar, probably upper of *Elephas namadicus*, Falconer and Cantley, a species found in the Nabada beds of India, and probably of Pleistocene age. This species has already been found in Burma and at Bukit Besar, Nawngchik."

Respecting the last-named specimen the following note by Dr. Andrews appears in Messrs. N. Annandale and H. C. Robinson's Fasciculi Malayenses, Zoology, Part II, page 307:

"The tooth on which Dr. Andrews has been kind enough to write the following note was found by a native on Bukit Besar, Nawngchik, and sold to us at Ban Sai Kau.

"This specimen seems to be of considerable interest on account of the locality in which it was found. It is an upper molar of *Elephas namadicus*, a species found in the Upper Siwalik beds, particularly in the Nabada valley. I have also received remains of this animal from Burma (near Mandalay) quite lately, but never from further south. Of course the Siwalik fauna is known to occur in Sumatra and Java, though I do not think that this particular species has been recorded from these islands. In any case, the occurrence of this tooth in the Peninsula helps to bridge over one of the gaps in the area over which the Siwalik fauna extended.

"The age of *E. namadicus* was probably late Pliocene or early Pleistocene."

Digitized by Google

The finding of this specimen in the State of Perak further extends the range of the species southwards, down the Malayan Peninsula. The depth at which the tooth was found would indicate that it came from the lower portion of the over-burden or the upper portion of the tin-bearing wash-dirt or *karang*. In this part of the valley the alluvium was very various in depth owing to the bed-rock, a hard bluish-grey slate, presenting an uneven surface. In some places the tin-bearing stratum was as much as 24 feet in thickness, while in others it was not more than 5 or 6 feet.

DESTRUCTION OF NOXIOUS ANIMALS.

[*Extract from the Report on the Federated Malay States Police Force for the year 1904.*]

RETURN Q is a return showing the number and description of noxious animals destroyed in the several States with the total money paid for their destruction. The following is an extract from section 20 of Mr. Sumner's report, describing how a woman lost her life through injuries inflicted by a panther:

"At or about 11 p.m. on 12th November, a Chinaman, living at Sempalit, Raub District, heard a noise at the fowl-house. He opened the door of the house, and while in the act of passing through, a black panther sprang through the door into the house and attacked a Chinese woman who was lying sleeping on a bed, biting her about the head and face. The husband pluckily ran to her assistance and was also attacked by the beast. He, however, succeeded in driving the panther off which ran under the bedstead. The man and woman ran out of the house and closed the door. A report was made at the Raub Police Station. The Lance-Corporal on duty immediately despatched two Malay police constables to the scene, armed with snider carbines and buckshot, with a view to kill the beast. On arriving at the house, P.-C. 219, Ali, opened the door, and by the glimmer of a Chinese lamp could see the panther lying down beneath the bedstead. The P.-C. fired two shots at it and then drew his kris and entered the house. On perceiving that the shots had taken effect, and being under the impression the panther was dead, he put his hand under the bedstead to drag the body out, but was suddenly attacked and wounded on the hand. He, however, quickly despatched the panther by stabbing it several times with his kris and finally causing the carcass to be conveyed to the Raub Station.

"The injured people were taken to the Raub Hospital by the Police, where their wounds were attended to, but the unfortunate woman succumbed to her injuries in spite of all the possible attention that had been shown to her."

I have heard of no other cases of deaths through wild beasts.

Digitized by Google

RETURN SHOWING THE DESTRUCTION OF NOXIOUS ANIMALS FOR WHICH REWARDS WERE PAID DURING 1904 IN THE F.M.S.

States.	Crocodiles.	Crocodiles' eggs.	Tigers.	Leopards.	Snakes.	Rewards.
						$ cts.
Perak	641	1,361	21	15	633	2,826 22
Selangor	476	343	7	11	310	1,576 61
Negri Sembilan ...	3	...	7	4	...	225 50
Pahang	10	28	10	3	46	315 70
Totals ...	1,130	1,732	45	33	989	4,944 03

H. L. TALBOT,
Commissioner of Police, F.M.S.

REPORT ON THE MUSEUMS DEPARTMENT, 1904.

THE Federal appointment of Director of Museums was made on the 17th March, 1904, and the holder of it was relieved of his duties as Curator and State Geologist, Perak, on the 9th of May, by the appointment of Mr. F. W. Knocker as Curator of the Perak Museum.

No staff was provided and, with the exception of salary, for which provision was made, money had to be taken from the Perak Museum votes to cover the travelling and other expenses of the head of the department.

PERAK STATE MUSEUM.

The casing of the new rooms was completed in the early part of the year, and on the 1st of February the work of moving the ethnological collections into them was begun. This necessitated shifting almost everything in the whole of the building, and although the new rooms were opened to the public at the latter end of the year, the process of rearrangement, both in them and in the rest of the Museum, will not be completed for a long time to come.

ETHNOLOGY.

It has been recognised that the chances of acquiring objects illustrating Malayan civilisation are rapidly passing away, owing to the altered condition of the country consequent on the introduction of Western ideas and manufactures. Therefore, as something approaching adequate accommodation was, for the first time in the history of the institution, available for the display of the ethnological collections,

Digitized by Google

special attention was paid to this branch of science and an endeavour was made to add as much as possible to the section. It is satisfactory to be able to state that the additions to it have undoubtedly been far greater than in any previous year.

Taxidermy.

Owing to the absence on long leave of Mr. Keilich, the Taxidermist, during the greater portion of the year, the taxidermic work was restricted to very narrow limits. Bad work in this line is probably worse than none—particularly when it has to be exhibited side by side with better work.

Registering and Cataloguing.

This important subject was studied by the Director while on leave in England, the systems of several Museums examined and the literature on the subject consulted. On the recommendation of the Director of the Manchester Museum, the Library Supply Company was visited and catalogues and samples obtained from it. The Curators in Perak and Selangor were consulted, the former being familiar with the systems in use in the Leicester and Bristol Museums and the latter in the Liverpool Museum.

The apparatus necessary to carry out the system which had been evolved was ordered through the Crown Agents. The indent did not arrive till the latter end of the year and the work of registering was not begun till November, but from the way in which it worked and from subsequent experience of it, there appears to be no doubt that the plan is quite satisfactory.

In this new system all the numerous books which other plans involve have been abolished and the whole thing is done by the aid of a double series of cards, one filed in numerical order and the other in the order in which the specimens are arranged in the cases. The entries being on cards, the whole or any part of the collection and register can, when desired, be rearranged, and additions inserted in their proper places.

About 12,000 cards and a cabinet capable of accommodating 22,000 were procured by way of a commencement. The work of registration will probably take several years to accomplish, and there will then only be the current accessions to enter up as they come in.

SELANGOR STATE MUSEUM.

In the early part of the year the members of the Museum Committee were relieved of their duties and the institution came under the supervision of the Director. Five visits, totalling thirty-one days, were paid by him to Kuala Lumpur during the last nine months of 1904.

Owing to the ruinous state of the old building, it was decided not to attempt any improvement of either the cases or the contents of the Museum, but to collect and pack up in tin-lined packing-cases as many specimens as possible, so as to preserve them and have them ready for transport to the new building when it is completed. This necessitated closing one of the exhibition rooms, so as to use it as a store.

Digitized by Google

Considering the state of the building and the contents, the number of visitors admitted may be considered quite satisfactory. They totalled 34,470.

As the Curator has made a full report of the work done during the year and of the progress of the new building and cases it is unnecessary to go over the same ground again here.

GENERAL.

Collecting.

A collecting expedition was made in Pahang and a very extensive collection was the result. The greater portion of it was ethnological in character, but a good many ores, minerals and fossils were also obtained. This State was previously almost unrepresented in the Perak Museum. The bulk of the specimens were deposited in that institution, but a good many went to Selangor. The time occupied in traversing the State of Pahang was 45 days.

Other shorter collecting trips were made and the total time spent away from head-quarters was 131 days.

Imperial Institute.

Exhibits for the Straits and Native States Court at the Imperial Institute were collected, prepared and sent to London. Amongst these may be mentioned a series of botanical specimens of gutta percha and india-rubber producing plants, various minerals and ores from the gold, tin and other mines of the Native States, and a set of nine slabs of marble from the Ipoh Marble Works.

Samples of corundum and of *Minyak surin* were spent for examination in the laboratories of the institution, under the arrangement entered into between the Government of the Federated Malay States and Professor Wyndham Dunston, F.R.S. The corundum has been favourably reported on in the "Bulletin of the Imperial Institute" and a larger sample has been asked for, for further trials of its suitability for the movements of clocks and watches and as an abrasive agent.

Anthropological Photographs.

At the request of Sir W. H. Treacher, K.C.M.G., the then Resident-General, a series of twenty-eight photographs of Semangs and Sakais was taken to help to illustrate Mr. W. W. Skeat's forthcoming book on the "Wild Tribes of the Malay Peninsula."

Contributions to other Museums.

A small collection of ethnological specimens, comprising about forty articles, was made and despatched to the British Museum, Bloomsbury. The Malay Peninsula is practically unrepresented in the National Collection. With very few exceptions, there are only the specimens which have been sent from the Perak Museum in former years in it.

Digitized by Google

Some Malayan tin coins were sent to the Bankfield Museum, Halifax.

Pests.

An attempt was made to exterminate the rats on the Rubana and Nova Scotia Estates in Lower Perak by infecting them with the virus of rat plague obtained from the Pasteur Institute. The Director was asked by the Hon. J. Turner to superintend the experiment. The results were entirely negative, and it would appear that the field rats are immune to the poison. A large series of skins was made of rats found on the estates and it seems that the rat which does the damage and which is present in vast numbers, is the recently described rat *Mus jalorensis*; while the rats found about the houses and mill belong to two varieties of *Mus rattus*.

A "mealy bug" which attacks sugar canes was also studied at the same time and a note on it was published in the first number of the "Journal of the Federated Malay States Museums."

Tailings Commission.

The Director was appointed a member of this body, and attended the meetings held at Batu Gajah, Kuala Lumpur and Seremban.

Protection of Wild Animals and Birds.

An Enactment, which is of considerable importance from a zoological point of view, was passed in Perak, Selangor and Negri Sembilan under the title of "The Wild Animals and Birds Protection Enactment, 1904." Although this law hardly goes far enough, in some directions, it is hoped that it will do something towards checking the indiscriminate slaughter which threatened to exterminate some of the rarer and more interesting of our wild animals and birds and seriously decrease the numbers of others.

Many people have an exaggerated idea of the quantity of animal life in the jungle, and think that protection is quite unneeded. When, however, the action of sportsmen in exterminating many once very common species of animals in Africa, America and other places is taken into account, the necessity of protective legislation becomes apparent. What is usually forgotten in considering this subject is that the balance of life in the natural state is so finely adjusted that it only requires quite a small matter to upset it.

The Journal.

In the latter part of the year the first number of the "Journal of the Federated Malay States Museums" was prepared ready for issue early in January of 1905. This part contained 37 pages of letter-press and three plates. It is proposed to issue four parts of the Journal in the year. The price has been fixed at 75 cents per part, or $2.50 per volume of four parts.

L. WRAY,
Director of Museums, F.M.S.

Digitized by Google

REPORT ON THE PERAK MUSEUM, 1904.

BUILDING.

THE four towers at the front of the building were in the contractor's hands for the greater part of the year, the scaffolding and staps being still in position at the end of December. The removal of the small domes and the substitution in their place of four pyramidal-shaped towers with galvanized iron roofing was, however, completed before the close of the year. It is to be hoped that the alteration will be permanently effective as I believe there has always been trouble with these towers. The result from an artistic stand-point can hardly be deemed a success, and it is a matter of regret that the exterior appearance of the building could not have been studied in conjunction with the absolute necessity of having water-tight roofs.

CASES.

The last instalment of the plate glass for the new ethnological wall- and table-cases arrived from the Crown Agents early in the year, and the remaining cases were accordingly glazed, being finally ready to receive the collections by the end of May.

After the removal of the ethnological specimens from the two front rooms, the interiors of all the wall-cases there received two coats of fresh white paint previous to the instalment of their new contents.

THE COLLECTIONS.

1. Zoology and Osteology.

A fair amount of work has been done in both these branches, though owing to the lamentably crowded condition of the zoological collection, it is impossible to make much progress until the completion of the original design of the building in this room by the erection of a gallery over the wall-cases. This would dispose of the greater part of the invertebrates, and thus make room for a better and more natural display of the larger mammals. The only way to meet this demand is by the erection of pier cases in the centre of the room; and a glance at such animals as the tigers, Sumatran rhinoceros, Malayan tapir and the mountain goats under their present cramped and inartistic conditions should convince anyone of the pressing necessity for this improvement. Blessed with such fine examples of the mammalian orders as Perak is, it seems more than a pity that, in addition to the poor representation of the above animals, such beasts as the sladang, the sambur stag and others have to go unrepresented in the State Museum. Invertebrate zoology is also at a standstill from the same cause, so that the comparatively small outlay necessary for the remedy would, in a way, serve two purposes. The last two orders of the mammalia have already encroached on the bird gallery, and the fine specimens of the Cetacea have had to be stowed away under one of the table cases.

The extension of the mammalia across the room led to the rearrangement and re-classification of the bird collection; and an effort was made to collect all the scattered spirit reptilian specimens into the

Digitized by Google

zoological room. These will eventually, however, fall into their scientific sequence, more or less, by exhibition in the passage which leads into the new ethnological wing.

The Sumatran rhinoceros, mentioned above, which had been set up by Mr. Keilich previous to his going on leave, was removed from the work-rooms and placed in position amongst the ungulates; though, as hinted, the beauty of the specimen and the clever taxidermic work is entirely thrown away in its present situation.

Minor additions were made during the year, but owing to adverse circumstances no systematic zoological collecting was carried out. Twenty-one skins were purchased from the Selangor State Museum, collected from Cameron's Plateau, Batang Padang, by the Dyak collector attached to that establishment; and others from the Gap were collected and presented by Mr. H. C. Robinson.

The Japanese spider crab presented to the Museum by Sir J. P. Rodger, K.C.M.G., previous to his leaving the State, was provisionally exhibited in the Economic Department, pending an allotment of a favourable position in the zoological room.

Towards the end of the year the task of cataloguing this collection was started, and it is hoped the work will be completed during the current year.

A small amount of outside taxidermic work was got through, but a good deal had to be refused owing to the pressure of Museum work.

The whole of the osteological collection was re-arranged systematically, the removal of ethnological specimens enabling three more wall-cases to be devoted to this important branch of natural science. The large mammalian skeletons standing unprotected on the top of the wall-cases were taken down, cleaned and placed inside cases; and the avian and reptilian skeletons were removed from the table-cases and placed in their proper sequence. Also the large skull of the elephant "Petra Muda," formerly exposed to the depredations of native visitors, was put away in safety amongst the other ungulate skulls.

The skeleton of a 7-ft. crocodile (*C. porosus*) was prepared and articulated, and makes a welcome addition to the collection; as does likewise the interesting series of tiger bones presented by Mr. W. G. Maxwell, including a malformed femur, arising from an old bullet wound.

2. Botany.

Two hundred and ninety-four botanical specimens were received in August from the Royal Botanical Gardens, Calcutta, and a few minor additions were obtained from various sources.

Ten thousand Para rubber seeds, from the trees in the Museum grounds, were collected and sold.

Considerable trouble was caused during the year by the sudden and ruinous attacks of white ants, which made their way through the floor of the building, from time to time, into the cases containing the botanical collection. It became painfully obvious that the contents of the Herbarium were never safe; and to meet this difficulty long zinc

Digitized by Google

baths have been made to take both front and back feet of the cases. These are kept supplied with a mixture of kerosene and earth oils, but, as the plan was only put into effect at the end of the year, it is too early to judge of the results of the experiment. Anyhow, it is most important that every effort should be made to preserve this valuable and comprehensive collection of Malayan plants from destruction or damage.

3. Geology and Mineralogy.

Very little was done in either of these departments, as during 1905 both will undergo entire re-arrangement, and substantial additions will be made by the inclusion of a collection, presented by the Trustees of the British Museum (Natural History); and another brought from England by Mr. Leonard Wray early in 1904. This important work had to be postponed, pending the clearance of the economic exhibits into the adjoining room.

Both collections were enriched by the Director of Museums' collecting trip through Pahang in June; and in November a generous offer was received from Mr. J. W. D. Marshall, of Bristol, England, of a donation of Jurassic fossils, which needless to say was accepted, and when received should greatly enhance the value of our geological collection.

A portion of coal from Upper Perak, presented by Mr. D. Pasley, and exhibited in one of the table-cases, proved a great attraction to European visitors.

4. Economics.

Although this collection has been in embryonic existence for years past no particular prominence has been given to it, owing to the lack of accommodation. The clearing out of the ethnological collection, however, placed the room on the north wing of the building at command. It will now be possible to extend and advance this branch of scientific research, the usefulness of which will be apparent to everybody. With the kindly help of Planters, Miners, District Officers and others in a position to assist, a collection of considerable interest and value, illustrative of Perak products, industries and manufactures, should eventually be formed.

Experiments with Para rubber seeds, collected in the grounds, were carried out in the Museum laboratory, with a view to collecting data on the quality and economic value of the oil to be obtained from them. A sample of this oil was placed in the collections, and seeds and plaster models of the entire pod, previous to bursting, were also added. Plaster models of typical Malayan fruits cast from the originals have added to the attraction of those already on exhibition, conspicuous amongst which now is a section of a durian. A series of sugar-canes from the Rubana Estate, Lower Perak, was treated in the same way, though the finished models were not ready for exhibition by the end of the year.

Three wall-cases have been allotted to agricultural implements, many of which were crowded out of the Ethnological Department; and one bay is devoted to rotans.

Digitized by Google

5. Ethnology.

It was in this department that the attention of the staff was principally concentrated throughout the year. Not only have the ethnological collections been bodily removed and re-arranged, but large additions have been made. In June a prolonged tour through Pahang was made by the Director of Museums, and an extensive collection of Malayan objects from that State, previously unrepresented in the State Museum, was the result. Further augmentations were made through the medium of the Agri-Horticultural Show, held at Kuala Lumpur in August; from various trips made by the Director of Museums, and from native collectors, who from time to time brought things in to the Museum.

The new ethnological wing was thrown open to the public on the 21st December, and a casual inspection of the two rooms will give a fuller appreciation of the actual work done during the year than can be conveyed in this report by written details. The annexe is entered from the farther end of the zoological room, where a marble paved passage, $33\frac{1}{3}$ ft. × 11 ft., leads into the lower or general ethnological room. The exhibits in the passage were not definitely arranged, but the wall-cases here will eventually hold certain orders crowded out of the zoological room. The general ethnological room is divided up amongst: India, Arabia, Japan, China, Fiji, Papua, Siam, Borneo, Java, Nias (principally the Cerruti Collection) and Sumatra. The main portion of the collections are contained in wall-cases, and the smaller objects in table-cases. Space has also been found in this room for what may be called Malayan archæology, two of the wall-cases being devoted to antiquities, one to history, and one each to weights and measures. In addition, one tier of table-cases has been allotted to history and one to antiquities, incorporated in the latter being the Hale collection of Peninsula stone implements and the Wray collection of British flint implements.

A single bay of the wall-cases has an exhibition space of 6 ft. 5 ins. high × 8 ft. 8 ins. wide × 2 ft. 7 ins. deep, each divided into two sheets of plate glass, 3 ft. 10 ins. × 6 ft., which gives an uninterrupted view of the interior, there being no cross bar as in the old cases. There is a total length of 87 ft. of table-cases divided into four tiers, and glazed with sheets of plate glass, 2 ft. × 3 ft. 2 ins. The centre of the room is occupied by Malay cannons, and all the available wall space has been used to the best advantage, that at the staircase end for the display of Malayan paddles and oars and the series of photographic enlargements of Asiatic races.

A good wide staircase leads up to the upper or local ethnological room, the walls along the stairs having been partially covered with exhibits (mostly spears), to be augmented later by other specimens and photographs. At the top of the stairs is a small landing which at one end opens directly into the upper room: thanks principally to the untiring energy and perseverance of the late Curator, Mr. Leonard Wray, it is not too much to assert that Perak has here the finest and most comprehensive collection illustrative of Malayan ethnology extant.

Digitized by Google

The wall-cases in this room are identical with those below, there being nine a-side and four at the top end. The first four bays have been given over to the aboriginal tribes of the Peninsula—viz., two for Semangs and two for Sakais. The other 18 bays have been entirely devoted to Malayan objects, and are divided up under the following heads:—Domestic, Fishing, Traps, Transport, Pottery, Mat and Basket Work, Weaving, Spinning, Metal and Wood Work, Toys, Games, Music, Plays, Customs, Religion and Magic. The table-cases are similarly apportioned and are arranged in seven tiers, running the breadth of the room, each tier 24 ft. long. The plate glass is larger than that in the lower room, each sheet having a length of 3 ft. 10 ins. In these table-cases, as well, have been re-arranged the collections of Malayan weapons ($2\frac{1}{2}$ tiers) and Malayan silver work ($1\frac{1}{2}$ tiers), the latter looking well mounted on a dark sage green baize. Also half a tier has been given to Malayan art work. The large wall space at the entrance end has been used for a portion of the collection of spears, it having been found impossible to concentrate these weapons in one place.

An innovation in both of these rooms has been made in the general labelling of the contents of each case which, I think, will be found at once effective and pleasing to the eye. Over each bay has been fixed a glazed title, mounted in an enamelled zinc frame, and which can be slipped in and out and changed *ad. lib.* The same principle has been adopted with the table-cases, the frame holding the titles being made in the shape of a triangular stand, which shows a name each side. By this arrangement, in addition to serving the purpose of clearly notifying the contents of each case, any particular class of exhibits can be located on entering the room, the names being in black on white and easily decipherable at a distance.

A valuable historical gift was received from Mr. Eric Maxwell, of Ipoh, in the second (and larger) instalment of the Old Dutch engravings of the Temple of Boro Boedoer, Java, the first lot having been presented to the Museum in 1902.

Cataloguing was also commenced in this department, as in the Zoological Department, before the end of the year.

THE LIBRARY.

Twenty-four additions were made during the year, exclusive of periodicals, reports and pamphlets, 12 volumes purchased out of the Book vote, and 12 volumes presented. 39 volumes were lent to qualified applicants, which is a slight decrease on that of the previous year. It would appear, however, that it is not generally known that the Museum possesses a reference and loan library.

The same trouble of attacks by white ants was experienced here as with the herbarium, and has been met in the same way. In something less than three days these pests made their way through the floor of the building into one of the book-cases and utterly destroyed a large pile of pamphlets and catalogues. Fortunately there was nothing of any great value, though in one or two instances the loss is beyond replacing.

Digitized by Google

List of Donations to the Library, 1904.

Hanitsch, Dr. R.:
"On a collection of Coins from Malacca."

Imperial Institute:
"Technical Reports and Scientific Papers, 1903" (2 copies.)
"Bulletin of the Imperial Institute," vol. 1.

King, Sir George:
"Materials for a Flora of the Malay Peninsula," parts 14 and 15.

Morris, Sir Daniel:
"The West Indian Bulletin," 5 numbers.

Robinson, Mr. H. C.:
"Some Preliminary Results of an Expedition to the Malay Peninsula" (2 copies), "*Man*," August No.

Secretary to Resident, Perak:
"Abstracts of Proceedings of the Linnean Society, of New South Wales," complete for 1904.
"Agricultural Bulletin of the Straits and Federated Malay States, 1904," vol. III. complete.
"Le Bulletin Société de Geographique Commercial."
"La Caoutchoue et la Gutta Percha," May to October Nos.

Secretary to Resident, Perak —(*cont.*)
"Fasciculi Malayenses."
Anthropology, Parts I & II.
Zoology, Parts I & II.
Supplement, Map and Itinerary.
"Hikaiat Misa Perbu Jaia."

Smithsonian Institute, U.S.A.
Bulletin (No. 52) and Proceedings (vol. 25) of the U.S. National Museum.

Viloonchevitch, Mr. J.:
"Journal d'Agriculture Tropicale," No. 29.

Reports, Pamphlets, Papers, etc., from the—

Gizeh Zoological Gardens, Egypt.
Indian Museum, Calcutta.
"*Louisiana Planter.*"
Montevideo National Museum.
Otago University Museum.
"*Perak Pioneer.*"
Philippine Museum.
Plymouth Museum and Art Gallery.
Raffles Library and Museum, Singapore.
Royal Botanic Gardens, Calcutta.
Royal Botanic Gardens, Ceylon.
Royal Botanic Gardens, Kew.
Sarawak Museum.
"*Singapore Free Press.*"
"*Times of Malaya.*"

REGISTRATION.

Two newspapers were registered under the "Book Registration Order in Council, 1895."

(1) "The Times of Malaya and Commercial Advertiser of the Federated Malay States and Straits Settlements," No. 1, published at Ipoh, on 9th March.

(2) A Weekly Mail Edition of the same paper, issued for the first time on 3rd November.

Four petitions for Grants of Exclusive Privileges were registered in accordance with the "Inventions Order in Council, 1896," and the Meteorological Returns for all Perak Stations were received monthly from the State Surgeon.

Digitized by Google

ACCESSIONS.

The list of donations for 1904 is neither extensive nor of great importance, and needless to say I should very much like to see an improvement in this direction during the current year; more so as I feel certain that such improvement is quite within the bounds of possibility if the European community of the State would only remember that a Government Museum actually existed, and that the welfare and ultimate success and utility of such an institution depends almost as much on the united help and active interest taken in it by the populace at large as it does upon its chief officer and staff.

LIST OF DONATIONS TO THE MUSEUM FOR 1904.

AHAMAT ZIN:

Rock Lobster (*Palinurus sp.*)

ALLEN, MR. M. A. V.:

Specimens of Tin-ore from Heawood Estate.

BARNARD, MR. B. H. F.:

Snake (*Trimesesurus gramineus*).

BARNARD, MR. H. C.:

Praying Mantis (*Mantis sp.*)

BRYANT, MR. F. J.:

Specimen of Scheelite from Kinta.

CORNWELL, MR. J.:

River Tortoise from Trolah (not yet identified).

CUSCADEN, MR. G. P.:

Green Pigeon (*Osmotreron olax.*)

DUXBURY, MR. E. L.:

Hammer Oyster (*Malleus sp.*)

GOW, MR. A.:

Minerals from Ipoh Marble Quarry.

HAJI ISMAIL:

Seal of the Muntri of Larut.

HANITSCH, DR. R.:

Four Clay Images of Buddah from Islands off Trang, Western Siam.

KEILICH, MR. E.:

10-cent Hong Kong coin.

Turkish coin.

Brazilian Opal.

Malayan Bamboo Tobacco Box.

MAXWELL, MR. ERIC:

Engravings and Plans of the Temple of Boro Boedoer.

MAXWELL, MR. W. GEO.:

Bones of Tiger (*F. tigris*) including a femur malformed from old bullet wound.

PASLEY, MR. D. Q. W.:

Specimen of Coal from Upper Perak.

PLANT, MR.:

Malay "back-board."

PUBLIC WORKS DEPARTMENT

Portion of Chengai beam from District Surgeon's Quarters, Taiping, destroyed by white ants.

RABE, DR. JNO.:

Three cones of the Californian Big Tree (*Sequoia giganteus.*)

Three specimens of Moss Agate from Nevada, U.S.A.

Three land shells from Normandy Islands, British New Guinea.

ROBILLIARD, MR. H. P.:

Six young Crocodiles (*C. porosus*).

ROBINSON, MR. H. C.:

Collection of bird-skins from the Gap.

Night-jar (*Batrachostomus stellatus*).

Digitized by Google

LIST OF DONATIONS TO THE MUSEUM FOR 1904—(*cont.*)

ROWE, MR. J.:
Minerals from Tronoh.

ROWLEY, MR. T. W.:
Rostrum of Saw Fish (*Pristis perrotteti*) (two specimens previously on loan).

RUBANA ESTATE, TELOK ANSON:
Five specimens of Sugar Canes.

SAYERS, MR. W.:
Cocoa Pod (*Theobroma cocoa.*)
One unused 1-cent Straits stamp.

SELANGOR MUSEUM:
Three old Iron Implements (? Malay).
One specimen of Mineral from Ampang Mine, Selangor.
One specimen of Rock and three specimens of Minerals from Rhin Valley, Jelebu, Negri Sembilan.
Series of Tin coins from Malacca.
White Snake (*Coluber taeniurus*).
Toad (*Nectes subasper*).

SELANGOR MUSEUM—(*cont.*)
Collection of Papuan weapons.
Japanese Swords.
Dyak Swords.

SHAW, MR. G. E.:
Old Land Title, Krian District.

SIBBALD, MR. S. K.:
Burrowing Snake (*Cylindrophis rufus*).

VENNING, MR. F. E. W.:
Two Snakes (*Calliophis bivirgatus* and sp.)
Toad (*Bufo asper*).

WATSON, MR. E. L.:
Large Malayan Squirrel (*Ratufa bicolor*, var.)

WRAY, MR. CECIL:
Forty-six Minerals from Kinta

WRAY, MR. LEONARD:
Minerals and Fossils from England.

YONG FOOK, MR.:
Bale Fruit (*Aegle mamelos*).

Owing principally to the inadequacy of the Personal Allowance and Transport vote, and secondly to the pressure of work in the Museum itself, I was unable to make any collecting trips; but, as hinted above, the collections were considerably enriched from the various trips made by the Director of Museums. $860.54 was spent in acquisition of specimens from the Museum Expenses vote, the greater number being ethnological objects.

ATTENDANCE.

The attendance for the year was extremely good, and the keen interest shown by the individuals of the various Asiatic races in the exhibits is distinctly encouraging. Notices of the hours of opening, generously printed by the Government Printer in three different languages—Malay, Chinese and Tamil—before that department was finally transferred to Kuala Lumpur, were placed at the entrance of the Museum in September.

The total number of visitors for the year reached 52,854—the largest yearly aggregate yet recorded in the history of the Perak Museum. The institution was opened to the public 292 days, making a daily average of 181. An experiment was made in keeping the

Digitized by Google

Museum open the whole of the Taiping Race Week—*i.e.*, not closing on the afternoons of the races as is the case in Government offices. The venture met with a surprising result, the first day the turnstile registering 1,760 visitors—the largest daily attendance on record. On 1st February (Hindoo festival of Tai Pusum) the turnstile again registered over the thousand, the exact number being 1,110. The minimum attendance was reached on 28th July, when only 36 visitors passed in; this total, I am glad to say, being exceptionally low.

The annual attendances for the present century are:-

1901.		1902.		1903.		1904.
40,644	...	40,022	...	46,685	...	52,854

The Museum was closed on the 20th December to permit of the final arrangements being made for the opening of the new ethnological wing.

On the 22nd July, H.E. the Governor of the Straits Settlements and High Commissioner of the Federated Malay States, Sir John Anderson, K.C.M.G., paid an official visit to the Museum and expressed himself well pleased with all he saw.

STAFF.

Mr. Leonard Wray, Curator and State Geologist, returned from long leave on the 8th January, and took over from Mr. Keilich who had been acting for him.

On the 21st March Mr. E. Keilich, Taxidermist, left for three months' vacation leave and 12 months' on half pay, and Mr. Yong Fook, Assistant Taxidermist, was appointed to act for him.

In March, Mr. Leonard Wray, I.S.O., was made Director of Museums, Federated Malay States; and shortly after Mr. Fred. W. Knocker, Settlement Officer, Negri Sembilan, was appointed to the Curatorship and assumed duties on the 8th May.

On the 6th October, Mr. N. Bappoo, Clerk and Caretaker, proceeded to India on two months' leave, which was afterwards extended by one month on no pay. He reported his return to duties, however, on 19th December.

FINANCIAL.

$1,721.89 of the vote for Museum expenses was defrayed on the building, cases, materials and general stores, there being a saving of $17.57 for the year, the balance of the vote, as noted previously, being spent on purchase of specimens.

The laboratory vote of $250 was spent in full; and out of the $100 for purchase of books, $88.27 was utilised.

The revenue collected amounted to $150.85; $100 of this being for Para rubber seeds.

Digitized by Google

NOTES AND OBSERVATIONS.

Considerable time and thought was spent during the year in devising a practical working scheme for recording and cataloguing, not only recent accessions, but all specimens contained in the collections and laboratory; and it was decided that a card catalogue would best meet the peculiar demands and circumstances of the case. Accordingly an oak cabinet was obtained from England through the Crown Agents, with cards formulated to contain all information connected with a specimen necessary for preservation, and the serious task of cataloguing was commenced towards the end of the year. The scheme briefly is divided into two separate catalogues: (1) according to the order of acquisition, a fresh set of serial numbers to be started with each year; (2) according to location in the Museum, this latter series being more or less a departmental catalogue. The cards of each catalogue are duplicates—*i.e.*, the description of a single specimen is identically the same on the cards of both catalogues. For the purpose, each room in the Museum has been given a letter and each case a number, a complete set of numbers being used for each room.

Thus it can be easily understood that any single specimen, or any particular group of specimens, can at any time be expeditiously hunted up and their history examined.

The difficult and important question of effective labelling has yet to be dealt with. A few new hand printed labels were attached to new specimens during the year, and the advantage of these over the old type-written labels is at once perceptible. But the time alone that these labels take to print makes their extensive use prohibitive—unless indeed a number of expert ticket printers were exclusively employed at the work, which, however, in this country, is practicably impossible. It is hoped to deal finally with the problem during the current year.

In concluding this report, I should like to draw the Government's attention to the educational value of its Museum, which up to the present seems to have been overlooked, or at any rate under-estimated; thus, one of the principal aims of a Museum is lost. The time has now gone by when Museums were looked upon as mere store-houses for an unintelligible array of so-called "curios," or as the hobby-horses of a few eccentric men. Great Britain has followed in the footsteps of the Continent and America in this direction, and attendance at the local Museum has for years past been included in the curriculum of many London and Provincial schools. I have myself seen the practical results derivable from this method of instructing the young; and from past personal experience, and after mature consideration, I see no reason why Taiping should not avail itself of the great advantage placed at its command. Even in the present conditions of the Museum collections practical demonstrations could be made towards an elementary acquaintance with the fundamental laws that govern nature and the animal kingdom, or a rudimentary knowledge of anatomy; and the scope of the economic and geological sections, when in order, will be invaluable in a country such as this. It is intended, moreover, to further improve certain collections with this end in view. Such instruction gives the pupil food for thought, teaching

Digitized by Google

him to exercise his mental capacity in a free and independent way; and this appears to me to be highly desirable amongst the class of scholars aspiring to an English education in this country.

MEAN DAILY AVERAGE OF VISITORS TO PERAK MUSEUM DURING 1904.

Month.	Days open.	Maximum.	Minimum.	Total.	Daily average.
January	24	247	102	4074	169.75
February	22	1110	88	5677	258.05
March	27	899	84	5955	220.55
April	22	273	97	3803	172.86
May	24	256	100	4432	184.66
June	23	360	96	4281	186.13
July	26	263	36	4225	162.50
August	25	1760	86	6153	246.12
September	26	334	49	3140	120.77
October	26	289	74	3460	133.07
November	25	295	46	3774	150.96
December	22	336	53	3880	176.36
	24.33	535.16	75.91	4404.50	181.81

FRED. W. KNOCKER,
Curator, Perak State Museum.

REPORT ON THE SELANGOR MUSEUM, 1904.

COMMITTEE.—The Committee at the commencement of the year consisted of the following gentlemen—viz.,

Mr. B. E. Shaw (*Chairman*)

Mr. H. M. Burn-Murdoch
Mr. E. V. Carey
Dr. C. W. Daniels
Mr. H. C. E. Zacharias was added to the Committee on 5th February
Dr. G. F. Leicester
Mr. J. H. Pye
Mr. H. C. Robinson (*Curator*)

One meeting was held on 29th January, but Mr. L. Wray, I.S.O., having been appointed Director of Museums, F.M.S., on 17th March, the members were relieved of their duties on 6th May, and the thanks of the Selangor Government conveyed to them for the time and energy they had expended in the past in the interests of the Museum.

Digitized by Google

EXPENDITURE.

I. On the vote of $4,183 for "Personal Emoluments" there was a saving of $356.26.

II. $3,500 was voted for "Other Charges," which was expended as follows:

(i)	Collecting Trips and Transport ...	$982.94*
(ii)	Specimens	639.55
(iii)	Apparatus (including Camera and accessories and Hammond Typewriter	901.53†
(iv)	Books and Periodicals	283.64
(v)	Furniture, Fittings and Repairs ...	365.90
(vi)	Preservatives, Collecting and Cleansing Materials	158.37
(vii)	Freight, Postage and Sundries ...	102.59
(viii)	Uniforms for Watchmen	30.00
(ix)	Local Transport	14.06
	Total ...	$3,478.58

III. A sum of $6,000 was placed in the 1903 Estimates to provide cases and fittings for the new Museum. After much consideration it was decided to follow substantially the pattern used in the recent additions to the Perak Museum, and floor plans were prepared embodying these designs.

The frames of the cases are to be of chengai, and the tops, bottoms and sides meranti. The fronts are of $\frac{1}{4}$" polished plate glass, each door containing one piece only.

Sufficient timber for the bulk of cases was purchased in September and stacked in the Museum grounds to season, towards the middle of November work was commenced.

The following charges were incurred on account of this vote:

(i)	Timber	$931.37
(ii)	Freight and Handling Charges... ...	245.98
(iii)	Work-shed	130.00
(iv)	Case Fittings, Hinges, Bolts and Locks	378.72
(v)	Sample Tins for Economic Products ...	36.00
(vi)	Carpentering	75.00
	Total ...	$1,797.07

IV. $250 was granted for the investigation of the "Life History of the White Ant (*Termes gestroi*) as affecting Para Rubber," and of this sum $140.43 remained unexpended at the end of the year.

* Of this amount $127.59 is properly chargeable to 1903 expenditure.

† Including $98.41 Crown Agents' bills on account of 1903 services.

Digitized by Google

REVENUE.

Charges for work done for private persons and sale of surplus specimens realised $206.91, excluding a sum of £4 not yet collected. Of this amount, however, $134.46 represents specimens purchased on account of other Museums and is only entered here for purposes of book-keeping.

Authority was obtained to expend this revenue in additions to the Museum collections, and the money was principally devoted to the purchase of ethnographical specimens, $192.45 having been thus spent.

VISITORS.

The number of visitors during the year 1904 amounted to 34,470, about a thousand more than in 1903 and about equal to the attendance for 1901. Account should be taken of the fact that the number of hours during which the Museum was open to the public was about 10 per cent. less than in previous years. Of the total number of visitors, the percentage distribution according to race was as follows:

	1902. %	1903. %	1904. %
Europeans	1.2	1.3	1.9
Eurasians	2.8	2.5	4.7
Bengalis	4.1	3.9	5.1
Tamils	19.7	16.7	17.9
Malays	27.2	22.7	20.4
Chinese	45.0	53.1	50.0
	100.0	100.0	100.0

Assuming that the relative proportion of the various races comprising the population of Kuala Lumpur have not altered appreciably during the last two years, these figures point to a considerable increase of interest in the Museum among the European and Eurasian inhabitants, others remaining practically stationary.

LIBRARY.

The Trustees of the British Museum presented eighteen volumes of their publications and the Perak Museum seventeen volumes of miscellaneous works. Nineteen others were purchased from the vote provided for the purpose, not including several numbers of scientific periodicals.

APPARATUS.

A. Dallmeyer 1/1 plate camera and accessories were purchased and also a Hammond typewriter; this form of instrument being the only one adapted for writing Museum labels.

Digitized by Google

EXCHANGES.

Correspondence has been carried on and exchanges effected with the following Museums:—

The British Museum.

The Imperial Indian Museum, Calcutta.

The Pitt Rivers Museum, Oxford.

The Hope Department, University Museum, Oxford.

The Raffles Museum and Library, Singapore.

The Royal Museum of Zoology and Ethnography, Dresden.

An arrangment has been made with Prof. Ray Lankester, Director of the British Museum (Natural History), whereby unique specimens are to be deposited in the British Museum, while in return the staff of that institution will as far as possible identify collections of insects and other animals which may become of economic importance.

A small collection of insects, illustrating certain problems connected with protective and warming coloration and mimicry, was sent to Prof. Poulton, the leading authority on this branch of natural science.

PUBLICATIONS.

In conjunction with the Perak Museum, and under the editorship of the Director of Museums, F.M.S., a periodical has been started which will contain articles dealing with zoology and ethnology and other matters connected with the F.M.S Museums. The first number, consisting of thirty-seven pages with three plates, was passed for press during 1904 and published in January of this year.

A short article on certain zoological subjects was contributed to the "Journal of the Straits Branch of the Royal Asiatic Society," and another to the "Ibis," the leading Ornithological Journal.

ECONOMIC ZOOLOGY.

The Curator served as a member of the Fisheries Committee, whose report was published in August. Investigations were carried out on the White Ant (*Termes gestroi*) as affecting para rubber and the conclusions arrived at published in the *Gazette*. The life history of a moth (*Rhodoneura myrsusalis*), which does considerable damage to getah taban, was also the subject of enquiry.

ADDITIONS.

I. ZOOLOGICAL.

A large number of collecting expeditions were undertaken during 1904, both by the Curator and collectors, and by the latter alone. The results were very satisfactory, and numbers of very rare species hitherto known by two or three examples only, were secured, the total number of additions falling not far short of four thousand. The following species may be mentioned as specially worthy of note, those marked with an asterisk being new to the Museum collections.

Digitized by Google

(*a*) *Mammalia.*

1. Hylobates syndactylus*
2. Semnopithiens obscurus*
3. „ miratus*
4. „ albocinereus*
5. Hipposiderus larvatus*
6. Tupaia malaccana*
7. Ratufa bicolor and vars
8. Sciurus erythræus
9. Mus surifer*
10. „ validus*
11. „ ciliatus*
12. „ jarak*

No. 11, which is an extraordinarily large species, was obtained on the summit of Bukit Kutu, while No 12 was trapped on Pulau Jarak. The latter is certainly new to science.

(*b*) *Aves.*

The bird collection has always been a strong feature of the Selangor Museum, and with the additions noted below the collection becomes almost equal to that of Perak and far superior to that of the Singapore Museum, at least as far as the Peninsula fauna is concerned. The following are some of the more important additions:

1. Arboricola campbelli*
2. Osmotreron bicincta*
3. Calænas nicobarica*
4. Ardea cinerea*
5. Sula sula*
6. Glaucidium brodiei*
7. Chrysophlegma wrayi*
8. Lepocestes pyrrhotis*
9. „ porphyromelas*
10. Geocichla davisoni*
11. Campephaga neglecta*
12. Dicrurus annectans*
13. Hemipus picatus*
14. Minla soror*
15. Niltava decipiens*
16. Pteruthius æralatus*
17. Tephrodornis gularis*
18. Corythocichla leucosticta*
19. Turdinulus humei*
20. Muscicapula hyperythra*
21. „ westermanni*
22. Cyanoderma erythropterum*
23. Zosterops aureiventer*
24. Phyllornis hardwic kiik*
25. Digenea malayana*
26. Cryptolopha davisoni*
27. Collocalia linchii*

Many of these species are specimens of extreme rarity. No. 1 is a new species of hill partridge very distinct from any other hitherto known; of *Turdinulus humei* only two specimens are known to exist, one in the British Museum and the other in the Hon. W. Rothschild's collection at Tring. The definite occurrence of *Calænas nicobarica*, the Nicobar ground pigeon at Pulau Jarak, settles a long disputed point as to its occurrence in the Malay Peninsula.

(*c*) *Reptilia.*

Numerous specimens of lizards were collected, several being of considerable interest. Worthy of special notice are a large collection of flying lizards, including *Draco tæniopterus*, previously known from Siam and Tenasserim only, specimens of *Gymnodactylus consobrinus*, a Bornean species new to this fauna, and of *Gonyocephalus grandis*, originally described from Penang, but so rare that only one other specimen has been recorded in over fifty years, were also captured

Digitized by Google

(*d*) *Amphibia.*

Considerable collections of frogs were made, principally in the hills, amongst them may be mentioned the following rare species:

1. Rana nicobariensis
2. ,, nigrovittata
3. Ixalus asper
4. ,, pictus
5. ,, castanomerus
6. Rana jerboa
7. Bufo jerboa
8. Nectophyrne guentheri
9. Megalophrys longepes
10. Rhacophorus leprosus
11. Microhyla annectens

Ixalus castanomerus is a species new to science, which will shortly be described and figured in the "Museums Journal," while several others are either new to the Peninsula or only known from the Larut Hills.

It is impossible to go into detail concerning other groups of the animal kingdom.

A large collection of butterflies was made in the Batang Padang district, and of other orders of insects on Bukit Kutu, but these have not yet been worked out and identified.

II. ETHNOLOGY.

The additions in this department are numerous and important. Advantage was taken of the Agri-Horticultural Show held in August, and numerous purchases were made thereat, including several rare and obsolete specimens. Amongst them may be mentioned a fire syringe (gobi api) and a set of moulds for casting "Jalor" chains in one piece. During a journey through Negri Sembilan a large collection of the pottery of that State was made, and a few good examples of krises and native silver purchased, including a type of bracelet peculiar to the district.

Special attention has been devoted during the year to the subject of Malay carving, and the Museum now possesses a fine collection of panels mostly from Linggi and Rembau.

Amongst donations the Museum is indebted to the Acting Resident Councillor of Malacca for a most valuable gift consisting of a set of the tin tokens, struck at Malacca shortly after its conquest by Albuquerque and later Portuguese Viceroys, and which have lately been described and figured by Dr. Hanitsch in the Journal of the Straits Branch of the Royal Asiatic Society.

Four boat-shaped ingots of tin, found in the foreshore at Pulau Pinto Geding, and probably of Malay origin, should also be mentioned.

III. MINERALOGY.

The additions in this department are mainly derived from collections made by the Director of Museums, but a few samples of tin ore have been obtained from the Kuala Lumpur district and from Jelebu.

Digitized by Google

The Straits Trading Co. presented a large mass of tin ore from Sungei Besi, weighing over three pikuls.

IV. ECONOMIC PRODUCTS.

Various sample tins containing agricultural products were presented by the Perak Museum, and a series of named rice samples purchased at the Agri-Horticultural Show are being prepared and sterilized at that institution, this Museum not yet possessing the requisite apparatus.

DONATIONS.

The following gentlemen and institutions have presented specimens to the Museum:

Mr. R. N. Bland
Mr. A. B. Cross
Mr. A. Von. Geyzel
Mr. C. W. Harrison
Dr. Johnstone
Mr. A. M. Burn-Murdoch
Mr. O. V. O'Hara
Mr. P. W. Parkinson
The Perak Museum
Mr. N. W. Reid
The Singapore Museum
The Straits Trading Co.
Dr. Travers
The Revd. F. Swindell
Sir W. H. Treacher, K.C.M.G.

CONSERVATION.

The collection of stuffed birds has been cleaned, repaired and re-labelled, and is now in excellent condition, the series of bird skins has been stored in glass topped boxes, each species in a separate box, which facilitates reference and obviates damage caused by careless handling. The fish, reptiles and amphibians have had the preservative fluid renewed, the only vertebrates yet requiring attention being the mammals.

The collections of insects, etc., made during the year, have mostly not been mounted, as it has been found hopeless to protect them from the attacks of mites and mould under existing conditions.

As regards the ethnographical collections it has been deemed expedient to place the valuable silver exhibits in the Treasury as it was discovered that during the period the Museum was without a Curator five valuable pindings with gold centres had been abstracted from the collections.

Nearly two months was spent in thoroughly cleaning the krises, spears and other weapons, which were in a dirty and rusty condition. They have now been coated with a preparation of paraffin wax, which prevents the access of air, and will it is hoped preserve them from rusting indefinitely. Other articles which admit of such treatment were immersed in a solution of corrosive sublimate, and so rendered immune to further insect damage.

The bulk of the acquisitions during the year have been packed in tin lined cases pending the completion of the new buildings.

Digitized by Google

The Dyak collectors worked hard and their conduct was most satisfactory. It was found possible to send them into the jungle without supervision and with satisfactory results. The type of Malay whom it is possible to engage in Kuala Lumpur is not accustomed to the jungle, and by the time he has been trained to be of any use whatever he has probably tired of his employment.

H. C. ROBINSON,
Curator, Selangor Museum.

ON A NEW SPECIES OF WHISTLING-THRUSH FROM SELANGOR.

By W. R. OGILVIE-GRANT,

British Museum of Natural History.

MYIOPHONEUS ROBINSONI, *sp. nov.*

ADULT MALE.—Most nearly allied to *M. cyaneus*, from which it differs in having the greater part of the bill yellow, only the ridge and the tip of the culmen being blackish, and the basal portion of the feathers of the under parts pure white. General colour above and below, black slightly glossed with purple, the feathers of the chest with shining tips; lesser wing coverts purplish blue, forming a conspicuous patch.

Total length about 10 inches, culmen 1.2, wing 5.4, tail 3.9, tarsus 1.8.

Habitat.—Gunung Mengkuang Lebah, 5,200', Selangor, 1st February, 1905.

[The Whistling-Thrushes comprise about fourteen or fifteen species ranging from Turkestan to China and found also in the islands of Ceylon, Sumatra, Java, Borneo and Formosa. They are all very much alike, their plumage being usually some shade of dark blue, often with glistening points to some of the feathers and the bill is either yellow or black. One species, however (*M. castaneus*), from Sumatra, has the under parts chestnut. They frequent the deepest recesses of the jungles, usually at some considerable elevation in the mountains, and generally in the neighbourhood of rocky streams. They are extremely shy and therefore very rarely seen, though their clear whistling note is often heard in neighbourhoods frequented by them. One species, *Myiophoneus eugenei*, is quite common in the vicinity of the Batu Caves and occurs also near Taiping. Elsewhere it is found in Burma, Tenasserim, Siam and Yunnan.—Herbert C. Robinson.]

Digitized by Google

[*From "The Ibis," for April, 1905.*]

ON A NEW SPECIES OF TREE-PARTRIDGE FROM THE MOUNTAINS OF THE MALAY PENINSULA.

By HERBERT C. ROBINSON, M.B.O.U.,
Curator of the Selangor State Museum.

WITH NOTES

By W. R. OGILVIE-GRANT.

THIS very distinct and interesting species of Tree-Partridge, of which a brief diagnosis has already been published in the "Bulletin of the British Ornithologists' Club," is not an unexpected addition to the Peninsular fauna. It differs from all described members of the genus, except *Arboricola rubrirostris* of Sumatra, in having the crown of the head black, but from that species it is readily distinguished by the colour of the bill and by many striking differences in the plumage. Its nearest ally is undoubtedly *A. atrigularis*, which ranges from Assam southwards to Upper Burma. The type-specimen has been deposited in the National Collection. A male and female were obtained by my native collectors, who also observed, but did not secure, *Caloperdix oculea* and the recently described *Rheinhardtius ocellatus nigrescens*, Rothsch., as well as a Silver-Pheasant, probably undescribed, which I myself have met with in the same district.

The new species may be fully described as follows:

ARBORICOLA CAMPBELLI.

Arboricola campbelli, Robinson, Bull. B. O. C. xv. p. 28 (1904).

ADULT MALE.—Top of the head, nape, lores, and periocular region jet-black; a broad white supra-loral stripe ending immediately above the eye, the feathers with black shaft-stripes; a white stripe from the base of the lower mandible, broadening posteriorly until it reaches the ear-coverts, which are greyish black. Sides of the neck black; a somewhat ill-defined black-and-white stripe from each side of the occiput to the nape, the bases and margins of the feathers being white. Chin and upper throat black; feathers of the lower throat with their bases white, forming an ill-defined collar. Chest and upper abdomen dark grey; lower abdomen paler, whitish in the middle with a brownish tinge; flank-feathers greyish, shading into olive-brown near the extremity, with a subterminal rufous-buff shaft-spot and a terminal black band; concealed patch of downy feathers under the wing grey. Feathers of the thighs greyish olive, obscurely barred with orange-buff and tipped with black; under tail-coverts with their bases black, their tips greyish olive; mantle, back, and upper tail-coverts golden olive-brown, each feather with three narrow bars of black; tail-feathers above blackish, vermiculated with olive-brown, beneath greyish olive. Primaries brownish black; outer primary-coverts and secondaries black, their outer webs broadly margined with chestnut; remaining wing-coverts greyish olive, their concealed portions black. Tertiaries and scapularies greyish olive, with a broad oblique subterminal bar of black and a terminal one of chestnut. Quill-lining greyish, the inner wing-coverts whitish, grey at the base, the outer series sooty black;

Digitized by Google

axillaries greyish white. Iris brown; bill black; gular and orbital skin brick-red; tarsi and claws bright sealing-wax red. Total length 246 mm., wing 143, tail 61, tarsus 43, culmen 21.

Adult Female.—Similar to the male. Total length 223 mm., wing 137, tail 61, tarsus 41, culmen 19.

Habitat.—Telom Valley (3,500′–4,500′), borders of Perak and Pahang, Malay Peninsula.

Since the publication of the twenty-second volume of the "Catalogue of Birds" in 1893 several new species of Tree-Partridge have been described, and Mr. W. R. Ogilvie-Grant has kindly supplied me with the following amended key to the known species of *Arboricola* including *Tropicoperdix*:

A. Concealed patch of downy feathers under the wing grey. (Arboricola.)

a. Feathers of the sides and flanks grey or grey edged with chestnut, usually with a white spot or shaft-stripe on each.

a′. Upper back olive-brown, barred and fringed with black.

a″. Top of the head bright chestnut; chin and throat black, in some specimens each feather narrowly margined with white ... *torqueola, male.*

b″. Top of the head brownish or olive-brown, each feather tipped with black.

a‴. Chin, throat, and front of neck rufous, the two latter spotted all over with black, or sometimes on the sides only ... ... *torqueola, female.*

b‴. Chin and throat black; front of neck black, each feather edged with white ... ... *atrigularis, male, female.*

c‴. Chin and throat black; front of neck orange-scarlet ... *ardens, male, female.*

d‴. Chin, upper part of throat, and front of neck white; lower part of throat black *crudigularis, male, female.*

b′. Upper back uniform olive-brown, not barred with black; some of the feathers sometimes slightly fringed with black at their extremities.

c″. Chest grey; top of the head olive-brown, each feather edged with blackish brown.

Digitized by Google

e'''. Front of the neck bright rufous.

*a*⁴. Chin and throat black ... *intermedia, male, female.*

*b*⁴. Chin and throat rufous, thickly spotted with black *rufogularis, male, female.*

f'''. Front of neck black, separated from the breast by a narrower white and a wider dark chestnut band.

*c*⁴. Forehead dark, like the crown ... ... *gingica.*

*d*⁴. Forehead white ... ... *ricketti, male, female.*

d''. Chest and top of head chestnut; chin and throat bright rufous; front of neck white, divided from the chest by a narrow black band ... ... *mandellii, male, female.*

b. Feathers of the sides and flanks grey, shading into olive-brown near the extremity, with a subterminal rufous-buff spot and a black terminal band ... ... *campbelli, male, female.*

c. Feathers of the sides and flanks uniform chestnut ... ... *javanica, male, female.*

d. Feathers of the sides and flanks black with narrow wide-set white bars ... ... *rubrirostris, male, female.*

e. Feathers of the sides and flanks each with a large subterminal white spot partially or wholly bordered with black.

c'. Chest brownish red, brownish ochre, or olive-brown; scapulars chestnut at the extremity.

e''. Wide superciliary stripe pale buff, extending down the sides of the neck ... ... *brunneipectus, male, female.*

f''. Superciliary stripe absent ... *henrici, male, female.*

d'. Chest bright rust-red or reddish chestnut; scapulars olive-brown at the extremity.

g''. Superciliary stripe grey ... *hyperythra.*

h''. Superciliary stripe rust-red ... *erythrophrys, male, female.*

f. Feathers of the sides and flanks greyish, widely barred with white and black at the extremity.

e'. Feathers of the back dark earthy-brown faintly margined with blackish ... ... *orientalis.*

Digitized by Google

f'. Feathers of the back golden-brown fringed and barred with black ... *sumatrana*.

B. Concealed patch of downy feathers under the wing snow-white. (TROPICOPERDIX.)

g. Sides and flanks marked and mottled with black and buff; chest olive-brown with wavy bars of black ... *chloropus, male, female.*

h. Sides and flanks barred with black and buff; upper half of chest chestnut ... ... *charltoni, male, female.*

Mr. Ogilvie-Grant has also furnished me with the following remarks upon two of the recently discovered species:

(1) ARBORICOLA RICKETTI.

Arboricola ricketti, Grant, Bull. B. O. C. viii. p. xlviii (1899).

Thanks to the generosity of Mr. C. B. Rickett, there is now a series of this fine species in the National Collection. All of the examples have the white forehead and superciliary stripe well developed, and in this respect differ from the nearly allied *A. gingica*, Temm., the type of which is preserved in the Leyden Museum.

HABITAT.—Foh-kien, China.

(2) ARBORICOLA HENRICI.

Arboricola henrici, Oustalet, Bull. Mus. Paris, ii. p. 317 (1896); *id.* Arch. Mus. Paris, (4) i. pl. ix. (1899).

This species appears to be closely allied to *A. brunneipectus*, Tick. In describing the type M. Oustalet compares it with *A. torqueola*, but it evidently belongs to quite a different section of the genus, having the feathers of the sides and flanks ornamented with a large subterminal white spot and terminal black band, as in *A. brunneipectus*. From the latter species it appears to differ only in having the forehead chestnut instead of whitish buff and in lacking the pale buff superciliary stripes. In the description the wings are said to resemble those of *A. torqueola*, but the figure (*op. cit.*) represents the wing-coverts as being pale blue tipped with chestnut and with a subterminal black spot. If the figure correctly represents the colouring of this bird's wing, it is unlike that of any other member of the genus.

HABITAT.—Tonkin and Annam.

F.M.S. Government Press.

Digitized by Google

ON A COLLECTION OF *LONGICORN COLEOPTERA* FROM SELANGOR AND PERAK.

By CHARLES J. GAHAN, M.A.

IN giving the results of my work on this small but interesting collection of Longicorn beetles, I have thought it well to prefix a complete list of the species contained in it, since many of these species had not previously been recorded from the Malay Peninsula. This list is followed by descriptions of those species which I consider to be new, and remarks on such others as seemed to call for them. I have added also the descriptions of one or two species collected by the late Mr. W. Doherty in Perak, or by Mr. Robinson himself in the Siamese Malay States. The collection of Longicorn beetles made by Doherty in Perak was a pretty considerable one, and several new species in it yet remain to be described.

I.—LIST OF THE SPECIES.

CERAMBYCIDÆ.

Æolesthes holosericea, Fabr.	...	South Perak: Batang Padang, 1,000-2,500′
Pachyteria equestris, Newm.	...	Selangor: Rantau Panjang
Chloridolum cinnyris, Pasc.	...	„ Bukit Kutu, 3,500′
Chloridolum thomsoni, Pasc.	...	„ „ „
Prothema humeralis, Pasc.	...	„ Dusun Tua
Xylotrechus affinis, Gahan, *sp. nov.*		„ Bukit Kutu, 3,500′
Xylotrechus discors, Gahan.	...	„ „ „
Xylotrechus gestroi, Gahan.	...	„ „ „
Chlorophorus annularis, Fabr.	...	„ Semangko Pass and South Perak: Batang Padang Valley
Chlorophorus sumatrensis, Lap. & Gory.		„ Dusun Tua
Arcyphorus histrio, Chevr.	...	„ „
Arcyphorus conformis, Gahan, *sp. nov.*		„ „
Psilomerus gracilis, Gahan, *sp. nov.*		„ „
Demonax cumulosus, Pasc.	...	„ Bukit Kutu, 3,500′
Demonax ventralis, Gahan, *sp. nov.*		„ Batu Tiga, near Kuala Lumpur
Polyphida modesta, Gahan, *sp. nov.*		„ Bukit Kutu, 3,500′
Mimistena biplagiata, Gahan, *sp. nov.*		„ Dusun Tua
Typodryas chalybeatus, Pasc.	...	„ Bukit Kutu, 3,500′
Noëmia flavicornis, Pasc.	...	„ „ „

LAMIIDÆ.

Obages palparis, Pasc.	...	Selangor: Bukit Kutu, 3,500′
Epicedia maculatrix, Perty.	...	South Perak: Batang Padang Valley
Leprodera equestris, Pasc.	...	„ „ „

Digitized by Google

Leprodera fimbriata, Chevr. ...	Selangor: Batu Tiga near Kuala Lumpur
Leprodera epicedioides, Pasc. ...	„ Bukut Kutu, 3,500′
Anhammus conspersus, Thoms. ...	„ Rantau Panjang
Epepeotes luscus, Fabr.	„ Bukit Kutu, 3,500′
Epepeotes vestigialis, Pasc. ...	South Perak: Batang Padang Valley
Macrochenus melanospilus, Gahan, *sp. nov.*	Selangor: Bukit Kutu, 3,500′
Gnoma subfasciata, Thoms. ...	„ „ „
Sarathrocera lowei, White ...	„ Kuala Lumpur, 1,900′
Monohammus serratus, Gahan, *sp. nov.*	Perak
Haplohammus granulatus, Gahan, *sp. nov.*	Selangor: Bukit Kutu, 3,000′
Haplohommus fistulator, Germ. ...	Pulau Rumpia, Sembilan Ids., off the mouth of Perak River
Orsidis dispar, Pasc.	Selangor: Bukit Kutu, 3,500′
Amechana nobilis, Thoms. ...	„ „ „
Combe brianus, White	„ Rantau Panjang
Cycos subgemmatus, Thoms. ...	„ Bukit Kutu, 3,500′
Pharsalia ferruginea, Gahan, *sp. nov.*	„ „ „
Pharsalia supposita, Pasc. ...	„ „ „
Syrrhopens substrigosa Pasc. ...	„ „ „
Anancylus basalis, Gahan, *sp. nov.*	„ „ „
Demodes vittata, Gahan, *sp. nov.*...	„ „ „
Atossa spilota, Gahan, *sp. nov.* ...	„ „ „
Grammœchus polygrammus, Thoms.	„ „ „
Chœromorpha robinsoni, Gahan, *sp. nov.*	„ „ „
Iphiothe criopsioides, Pasc. ...	„ „ „
Pterolophia subtincta, Pasc. ...	„ „ and Semangko
Pterolophia robinsoni, Gahan, *sp. nov.*	
Sthenias franciscanus, Thoms. ...	„ Bukit Kutu, 3,500′
Dystasia affinis, Gahan	„ „ „
Nicomia castelnaudi, Thoms. ...	„ „ „
Cyphoscyla lacordairei, Thoms. ...	„ „ „
Thysia wallichi, Hope	„ Semangko Pass
Glenea hebe, Thoms.	„ Bukit Kutu, 3,500′
Glenea voluptuosa, Thoms. ...	„ Rantau Panjang
Glenea honora, Pasc.	„ „
Glenea funerula, Thoms.	„ Semangko Pass
Glenea tenuilineata, Thoms. ...	„ Bukit Kutu, 3,500′
Glenea obsoletepunctata, Thoms....	„ „ „
Glenea elate, Pasc.	„ „ „
Glenea robinsoni, Gahan, *sp. nov.*	„ „ „
Glenea virgata, Gahan, *sp. nov.* ...	„ „ „
Glenea saperdoides, Thoms. ...	„ „ „
Glenea citrina, Thoms.	„ „ „
Oberea limbata, Pasc.	„ „ „
Astathes terminata, Pasc. ...	„ „ „

Digitized by Google

II.—DESCRIPTIONS OF NEW SPECIES AND REMARKS ON SOME SPECIES PREVIOUSLY DESCRIBED.

XYLOTRECHUS CONSOCIUS, *sp. nov.*

(Pl. VI. Fig. 3.)

Black or dark-brown; with grey pubescence covering the head and most of the prothorax and forming bands on the elytra; body underneath covered with ashy-white pubescence except over the middle of the metasternum and the epimera of the mesosternum, these parts being dark-brown. Front of head constricted between the eyes; furnished with four carinæ, the two intermediate ones united below and divergent above; vertex with a single median very fine carina, which sometimes is obsolete. Prothorax slightly longer than its greatest width, the disc finely asperate, and having three nude black or dark-brown spots, one near the base and one at each side of the middle, the basal spot sometimes being prolonged anteriorly to form a median band. The grey bands are usually disposed as shown in the figure, but the anterior sutural band is often widened out to a greater extent behind becoming more triangular, and the post-median triangular band occasionally spreads out anteriorly so as almost to reach up to the band in front of it.

This species appears to be most nearly allied to *X. pedestris*, Pasc., which greatly resembles it in colour, but differs in the direction taken by the anterior bands on the elytra.

Length 9.15, breadth 2.4 millim.

Habitat.—Perak (*Doherty*), Penang (*Lamb*); and Bukit Besar in the Siamese Malay States (*Annandale* and *Robinson*).

XYLOTRECHUS AFFINIS, *sp. nov.*

(Pl. VI. Fig. 1.)

Black; head and prothorax covered with grey pubescence, the prothorax having, however, a nude round spot on each side of the disc; elytra with four bands of ashy-grey pubescence disposed as shown in the figure; body underneath covered with ashy-grey pubescence, the episterna of both the meso- and metathorax being more densely covered with whitish pubescence; legs black, with a faint grey pubescence: antennæ reaching a little past the middle of the elytra, the proximal six joints black, veiled with grey pubescence, the remaining joints pale fulvous. Front of head parallel-sided, not constricted between the eyes, furnished with three feeble carinæ, one median, the others midway between this and the lateral borders. Prothorax distinctly longer than broad, very slightly rounded at the sides, and rather finely asperate on the disc.

This species resembles *X. fluctuosus*, Pasc. (*Perissus*), but is relatively somewhat longer and narrower, with the prothorax less rounded at the sides. In the latter species the second grey band of the elytra has a straight hind border, and the third band is dilated posteriorly as well as anteriorly at the suture.

Length 9, breadth 2 millim.

Habitat.—Selangor: Bukit Kutu, 3,500 ft. (*H. C. Robinson*).

Digitized by Google

XYLOTRECHUS DISCORS, Gahan.

(Pl. VI. Fig. 2.)

One slightly damaged specimen of this species (the description of which, based chiefly on Sumatran specimens, appears in vol. xlii. of the Ann. Mus. Civ. Genova) was obtained by Mr. Robinson at Bukit Kutu in Selangor. The pubescence in this specimen, which is the one figured here, differs slightly in colour from that of the specimens from Sumatra, being of a greenish-grey instead of a leaden-grey or ashy-grey tint. The species is very nearly allied to the preceding one, and it is quite possible that with a large series of specimens for examination, the two forms may be shown to belong to one very variable species.

ARCYPHORUS CONFORMIS, *sp. nov.*

(Pl. VI. Fig. 5.)

Female.—Head and prothorax black, rather faintly covered with grey pubescence, a large oval spot on the disc of the prothorax and a rounded spot on each side being quite bare of pubescence; elytra dark-brown, with bands of grey pubescence arranged as follows: a narrow transverse band at the base, from each end of which a short longitudinal band runs back, a short sutural band between these two, a slightly arcuate transverse band crossing the whole width of the elytra at about one-third of their length from the base, a triangular band with its base a little way behind the middle and its apex touching the transverse band in front, a large oblong spot at the apex; body underneath grey, with a pale-yellow band at each side of the metathorax and pale-yellow spots along each side of the abdomen. Prothorax entirely covered with shallow punctures, the edges of which form a fine reticulation. Middle femora carinate on each side near the ventral border. First joint of the hind tarsus a trifle longer than the remaining joints together.

Length 9.5 millim.

Habitat.—Selangor: Dusun Tua (*H. C. Robinson*).

PSILOMERUS GRACILIS, *sp. nov.*

(Pl. VI. Fig. 4.)

Head and prothorax black, the head sparsely covered with ashy-white pubescence, a similar pubescence covering the prothorax at the base and on the lower part of each side; elytra dark-brown, with a testaceous spot on each near the base, the sides bare of pubescence, and the disc covered, in the form of a broad band extending its whole length, with a not very dense ashy-white pubescence; legs and antennæ dark-brown; body underneath black, covered with ashy-grey pubescence. Third joint of the antennæ scarcely more than one-third of the length of the fourth joint, armed at the apex with a long slender spine, which has a slightly thickened and rather blunt extremity. Prothorax and elytra finely and very densely punctate.

This species differs from *P. angustus*, Chevr., in having a black head and thorax, and the elytra covered above with a single broad longitudinal band of ashy-white pubescence; the third joint of the antennæ is relatively even shorter than in *P. angustus*, where it is nearly half the length of the fourth.

Length 7, breadth 1.5 millim.

Habitat.—Selangor: Dusun Tua (*H. C. Robinson*).

Digitized by Google

DEMONAX VENTRALIS, *sp. nov.*

Black; the head and prothorax covered with grey pubescence, but with two spots or a transverse band on the disc of the prothorax, dark-brown or black: elytra with four transverse ashy-grey bands, the first, which is at the extreme base, being united with the second by means of a short sutural band: body underneath ashy-grey, with the last three segments brownish-black. Antennæ not quite so long as the body in the male, and somewhat shorter in the female; black faintly veiled with grey pubescence, the eighth and ninth joints usually being testaceous or fulvous; third and fourth joints furnished each with a rather long spine at the apex, the fourth shorter than the third. Prothorax ovate-cylindrical. First joint of the hind tarsus twice as long as the remaining joints together.

This species is extremely like *D. tipularius*, Pasc., in form, colour and markings, presenting a difference, however, in the colour of the abdomen, the first two segments being ashy-grey in sharp contrast with the dark-brown of the last three segments. The chief difference is in the length of the antennæ, these being one-third longer than the body in the male of *tipularius* and a little longer than the body in the female.

Length 8–10 millim.

HABITAT.—Perak (*Doherty*); Selangor: Kuala Lumpur (*H. C. Robinson*), and Borneo (*Wallace*).

POLYPHIDA MODESTA, *sp. nov.*

(Pl. VI. Fig. 6.)

Head and prothorax black, with a rather dense covering of silver-grey pubescence; prothorax with a very narrow glabrous-black band along the middle not quite reaching to the base or apex; elytra metallic-green, becoming steel-blue in places, rather faintly covered with grey pubescence, but having each a denser band of golden or silvery pubescence extending from the base along the middle of the disc up to or beyond the middle; body underneath brownish or black, rather densely covered with silver-grey pubescence; legs brownish-black, faintly veiled with grey pubescence, the middle and hind femora testaceous at the base. Antennæ black or dark-brown, with the seventh and eighth joints, to a greater or less extent, and some of the other joints, at the base, testaceous. Vertex of head and sides of prothorax marked with a few sparse punctures. Elytra strongly, but not very densely, punctured in more or less definite longitudinal rows.

This species is allied to *P. feæ*, Gahan, from Burma, but differs from it and from other species of the genus in having no transverse bands or spots on the elytra, each of these showing only a single longitudinal band of golden pubescence.

Length 9–11.5 millim.

HABITAT.—Selangor: Bukit Kutu, 3,500 ft. (*H. C. Robinson*), Perak (*Doherty*), and Borneo: Kuching (*Shelford*).

MIMISTENA BIPLAGIATA, *sp. nov.*

(Pl. VI. Fig. 7.)

FEMALE.—Black and glossy: the elytra slightly tinged with metallic-green; and marked each with an elongate spot of a yellowish-white

Digitized by Google

colour between the middle and the base. Head sparsely covered with ashy-grey pubescence in front; rugulose-punctate above. Antennæ a little longer than the body, dark-brown, with the eighth and ninth joints and basal half of the tenth fulvous. Prothorax strongly but sparsely punctured; furnished at the edge of the disc on each side with an oblique tubercle; marked with a narrow transverse-band of silver-grey pubescence near the base and another, interrupted in the middle, on the constructed part near the apex. Scutellum covered densely with white pubescence. Elytra sparsely punctured and slightly rugulose alongside the suture, almost impunctate elsewhere; each sub-acute, but not spined nor toothed, at the apex. Body underneath glossy-black; with transverse bands of silver-white pubescence at the sides of the abdomen, and a curved or oblique band on the hind breast; the prosternum and mesosternum being less densely covered with greyish-white pubescence. Legs brownish-black, with the clubs of the femora reddish-brown; first joint of hind tarsus longer than the remaining joints together.

Length 7.3 millim.

HABITAT.—Selangor: Dusun Tua (*H. C. Robinson*).

This species differs from *M. femorata*, Pasc., in having the elytra less strongly and less thickly punctured alongside the suture, unarmed at the apex, and marked each with a yellowish-white spot in front of the middle.

ANHAMMUS CONSPERSUS, THOMS.

One example of this species was obtained by Mr. Robinson at Rantau Panjang in Selangor, another at Nawngchik: Bukit Besar in the Siamese Malay States. The species was taken in Perak by Mr. Doherty, and occurs also in Java and Sumatra.

Nephelotus licheneus, Pasc.—a species from Borneo, and the type of the genus *Nephelotus*, Pasc.—is hardly distinct from *A. conspersus*, Thoms. *Nephelotus* may conveniently be retained as a sub-genus of *Anhammus* to include *A. marcipor*, Newm., and *A. conspersus*, Thoms., together with the local form *A. licheneus*, Pasc.

MACROCHENUS MELANOSPILUS, *sp. nov.*

(Pl. VI. Fig. 8.)

Black; head and prothorax faintly covered above with grey pubescence and marked each with three longitudinal white bands; scutellum ashy-white: elytra clothed with ashy-white pubescence interrupted by numerous black spots which are irregularly disposed and somewhat variable in size; head with the front, except in the middle, and the cheeks covered with whitish pubescence; prothorax with a rather broad white band along each side; the sides of the breast and abdomen covered with white pubescence enclosing black spots. Prothorax of the male nearly twice as long as its width across the base, that of the female being scarcely or not at all longer than its width at the base.

Length 22–31 millim.

HABITAT.—Bukit Kutu in Selangor (*H. C. Robinson*), Perak (*Doherty*), Penang (*Lamb*), and Mt. Kina Balu in North Borneo (*Whitehead*).

Digitized by Google

This species agrees closely in structural characters with others of the genus, and is chiefly distinguishable by the form and disposition of the black spots on the elytra: these spots are irregular in size and shape, some smaller and some larger, with a tendency to coalesce in places. In the male specimen from Selangor which is figured the black spots are somewhat smaller than usual. Pascoe wrongly identified the species as *Mecotagus tigrinus*, Oliv., and under that name has recorded it from Penang (Proc. Zool. Soc., 1866, p. 253). In *M. tigrinus*, which is a Ceylonese species, the black spots of the elytra are less numerous, larger in size and more or less oblong in shape; and the median white band on the pronotum is usually much narrower than either of the other two.

MONOHAMMUS SERRATUS, (Pasc. in litt.) *sp. nov.*

(Pl. VI. Fig. 9.)

Black; densely covered above with a fuliginous brown tomentum, which becomes somewhat greyish on the disc of the elytra; the latter marked each with two large irregular, velvety-black spots one just before and the other a little way behind the middle. Head finely and somewhat densely punctate; eyes rather small, the lower lobes not extending more than half-way down the cheeks. Antennæ from twice to twice and a half as long as the body in the male, barely longer than the body in the female. Prothorax finely and rather thickly punctate, the disc with three small feebly raised tubercles. Scutellum fulvous at the sides, black in the middle. Elytra sparsely punctured above and densely and rather strongly at the sides, especially in the anterior half; each furnished with three or four rows of small tubercles, one row extending from the base about half-way to the middle along the middle of the disc, the others placed close to, and on the side, and extending quite up to or beyond the middle, with large deep punctures alternating with the tubercles in each row. The presence of these tubercles, causing the elytra to appear somewhat serrated on each side, is very characteristic of the species and distinguishes it from all others included in the genus.

Length 15–20 millim.

Habitat.—Penang (*Lamb*), Perak (*Doherty*), and Nawngchik: Bukit Besar, 2,500 ft. (*H. C. Robinson*).

HAPLOHAMMUS GRANULATUS, *sp. nov.*

(Pl. VI. Fig. 10.)

Female.—Reddish-brown; the head clothed on top, at the sides and over patches in front, with pale fulvous pubescence; the prothorax covered with brown pubescence mixed with patches of pale fulvous; scutellum fulvous; elytra covered with brown pubescence varied with patches of an ashy-grey colour; body underneath covered with greyish or tawny-grey pubescence; legs grey, the femora having each a dark-brown band at the middle, and the tibiæ being more or less brown towards the apex. Head distinctly, but rather sparsely punctured; eyes moderately large, the lower lobes extending downwards more than half-way towards the genal edge. Antennæ one-third longer than the body, pale grey, with the apical half of the third and following joints dark-brown; first joint subcylindrical, the apical cicatrix narrow and indistinct, being covered by pubescence, and its presence indicated

Digitized by Google

only by the limiting carina. Prothorax distinctly but not densely punctured. Elytra sparsely punctured posteriorly and somewhat more densely near the base especially on the sides; some of these punctures forming rows which, setting out near the shoulders, approach nearer to the suture as they pass backwards, while at the front edge of each puncture there is a rounded polished granule, these granules becoming gradually smaller as they recede from the base; each elytron slightly truncate at the apex, but not angulated.

Length 16, breadth 5 millim.

HABITAT.—Bukit Kutu in Selangor, 3,500 ft. (*H. C. Robinson*).

PHARSALIA FERRUGINEA, *sp. nov.*

(Pl. VI. Fig. 11.)

Black; covered for the most part with pubescence of a rust-red colour, which is varied on the elytra with velvety-black patches, and with a yellowish-white band crossing each a little before the middle from the outer margin almost up to the suture; body underneath with rust-red pubescence changing in part to grey, the abdomen with a row of large transverse glabrous black spots along the middle, and a row of smaller quadrate spots on each side; legs covered entirely with rust-brown pubescence through which short white setæ are scattered. Antenniferous tubercles contiguous or very nearly so; antennæ of the male three to four times as long as the body. Elytra rounded at the apex, furnished each with a basal tubercle, the front face of which rises almost perpendicularly from the basal margin.

This species is closely allied to *P. pulchra*, Gahan, and somewhat resembles it in markings, but is distinguishable from it at once by the ferruginous red colour of most of the pubescence covering it, the corresponding pubescence in *P. pulchra* being of an ashy-grey colour.

Length, 14–20 millim.

HABITAT.—Bukit Kutu in Selangor, 3,500 ft. (*H. C. Robinson*); Nawngchik in the Siamese Malay States (*Annandale and Robinson*).

ANANCYLUS BASALIS, *sp. nov.*

(Pl. VI. Fig. 12.)

Black; densely covered with pubescence of a prevailing fulvous grey or greenish-grey tint varied with darker-brown spots and bands. Antennæ with the first joint greenish grey, tipped with dark-brown at the apex, the third and following joints brownish-black, narrowly ringed with ashy-grey at the base; prothorax marked above with four small more or less distinct dark-brown spots—two in front and two, more widely separated, near the base; scutellum grey in the middle, dark-brown at the sides; elytra with a dark-brown angulated band crossing them between the middle and the base, and several less distinctly limited dark-brown spots scattered over the posterior two-thirds. Body underneath covered with grey pubescence along the middle and fulvous grey pubescence at the sides; legs grey, the femora ringed with blackish-brown near the apex, the tibiæ at the apex, and an outer spot on each near the base blackish-brown; first two joints of the tarsi ashy-white above, the others black. Elytra distinctly but not very densely punctured; each with a short narrow dorsal ridge or crest

Digitized by Google

extending about one-third of its length from the base and furnished along the top with small, shining, black granules. The presence of this ridge constitutes a distinctive character since all the other known species of the genus have, instead of a narrow ridge, a rather broad obtuse swelling near the base of each elytron.

Length, 10–13 millim.

Habitat.—Perak (*Doherty*), and Bukit Kutu in Selangor (*H. C. Robinson*).

* CHŒROMORPHA ROBINSONI, *sp. nov.*

(Pl. VI. Fig. 15.)

Female.—Densely covered with brownish-red pubescence varied with dark-brown spots and bands. Head distinctly but sparsely punctured in front, marked with two dark-brown bands extending along the front and vertex, and with a short band or spot behind the upper lobe of each eye; prothorax with some small dark-brown spots above and a larger one on the anterior part of each side; elytra with a very dark brown, slightly curved, band crossing them between the middle and the base and becoming slightly narrower as it approaches the suture, and with a zig-zag band of the same colour a little way behind the middle, marked also with a few dark-brown spots, of which the most conspicuous are two on each elytron a little before the apex; body underneath covered for the most part with reddish pubescence, the last ventral segment and a large spot on the fore-part of each of the metathoracic episterna being dark-brown; legs reddish, with the apices of the tibiæ and the first two joints of the tarsi, black; front tibiæ with a distinct brush of black hairs along the distal third of the outer face. Antennæ about as long as the body, with the third joint almost equal in length to the first and a little longer than the fourth. Prothorax with a small but distinct tubercle on each side near the front border. Elytra strongly but very sparsely punctured, each carinate near the suture, the carina beginning a little before the middle and ending a little in front of the apex.

This species strongly resembles *Chœromorpha balteata*, Pasc. (*Agelasta*), in colour and markings, but is easily distinguishable from it by the presence of the anterior tubercle at each side of the prothorax, and in having the third joint of the antennæ longer than the fourth. In *balteata* the tarsi are entirely black, and the front tibiæ without a brush of hairs.

Length 12, breadth 5 millim.

Habitat.—Bukit Kutu in Selangor, 3,500 ft. (*H. C. Robinson*).

DEMODES VITTATA, *sp. nov.*

(Pl. VI. Fig. 14.)

Female.—Rather densely covered with fulvous-brown pubescence, varied with bands and a few small spots of a luteous-white colour. Prothorax with four dorsal bands, the two intermediate ones being in

* Chœromorpha, *Chevr. in D'Orbigny's Dict. Univ. d'Hist. Nat. III.* p. 613 (1849). This genus, briefly characterised by Chevrolat, will include most of the species placed under *Agelasta* in the catalogue of Gemminger and Harold. The characters given by Lacordaire for the genus *Agelasta* apply to the genus *Chœromorpha*, Chev., but not to the type of *Agelasta*.

Digitized by Google

line with two short bands on the vertex of the head; elytra each with a marginal and dorsal band, an interrupted line of small spots near the suture and a few spots scattered elsewhere. Body underneath pubescent like the upper side, the sides of the prothorax in their lower part, the side pieces of the mesosternum, and two narrow bands at each side of the metasternum, being luteous white; legs fulvous-grey, with the tarsi dark-brown. Antennæ about equal in length to the body; fourth joint slightly thickened, dark-brown in colour, the other joints greyish-tawny or brown. Prothorax feebly and very sparsely punctate, the elytra a little more strongly and less sparsely punctured.

Length 14, breadth 5 millim.

HABITAT.—Selangor: Bukit Kutu, 3,500 ft. (*H. C. Robinson*).

The genus *Demodes*, Newm., is omitted from Lacordaire's "Genera," and is wrongly placed near *Navomorpha* in the catalogue of Gemminger and von Harold. It belongs to the group *Mesosinæ*, and is nearly allied to *Phemone*, Pasc. *Grammœchus*, Thoms, and *Atossa*, Thoms., two genera for which Lacordaire formed a special group—the *Atossides*, are also closely related to it, differing only in having the head narrower and more concave between the antennæ, and the scape of the antennæ usually destitute of an apical cicatrix or carina. The cicatrix is, however, present, though very small and ill-defined, in *Atossa atomaria*, Pasc., and in one or two other species.

ATOSSA SPILOTA, *sp. nov.*

(Pl. VI. Fig. 13.)

Head, prothorax, body underneath and legs densely covered with greyish pubescence of a somewhat dark shade, becoming lighter in places, notably on the front and sides of the head, and the outer borders of the tibiæ; head and prothorax marked with two diverging white bands beginning between the antennal supports and extending to the base of the pronotum, whence each is continued as a short band passing obliquely above the shoulder of the elytron; elytra covered less densely with brown pubescence, thickly dotted with small irregular white spots from the base to a little past the middle, this dotted area being limited behind by a narrow broken white band or line of spots; each elytron marked also with a strongly oblique and slightly curved white band between the middle and the apex, with some scattered white specks behind the band, and some, forming longitudinal lines, in front of it. Antennæ about equal in length to the body in the female, and longer by the last three or four joints in the male; first joint dark-brown underneath pale-grey above; second and third and base of fourth pale-grey, the rest of the fourth which is slightly-thickened, being of a brownish-black colour; fifth grey at base, dark-brown at apex, remaining joints reddish-brown. Prothorax slightly rugose and very sparsely punctate. Elytra strongly but not very densely punctate over the whole of the anterior spotted area, and less strongly and more sparsely behind it.

Length 11–12, breadth 3–5 millim.

HABITAT.—Perak (*Doherty*); Selangor: Bukit Kutu, 3,500 ft. (*H. C. Robinson*).

This species closely resembles *Atossa ligata*, Pasc. (Grammœchus), in markings and differs very little from it in structure. In *ligata* the

Digitized by Google

general tint of the upperside is rather brown than grey, the dorsal bands of the head and prothorax diverge less widely behind and are continued to a greater extent along the elytra; the prothorax has on each side a white band which is continued along the side of the meso- and meta-sternum, the presence of this band serving at once to distinguish *ligata* from the present species.

IPHIOTHE CRIOPSIOIDES, Pasc.

This species was described originally from a specimen from Borneo. Mr. Robinson obtained a specimen at Bukit Kutu in Selangor, and the species has also been taken by Doherty at Merang in Sumatra.

PTEROLOPHIA ROBINSONI, *sp. nov.*

Brownish-black, rather densely covered with fulvous-brown pubescence; vertex of head and disc of prothorax marked with three narrow longitudinal bands of greyish or fulvous-grey pubescence, the middle band of the prothorax narrower than the other two and separated from each by a narrow dark-brown band; elytra more distinctly brown over a broad oblique plaga on each side; marked with a few small whitish or fulvous spots placed transversely near the top of the posterior declivity. Head sparsely punctate. Prothorax rather densely punctate. Elytra densely and strongly punctate and somewhat granulate near the base, more finely and sparsely punctate posteriorly; each with a very distinct tubercle on the disc a little behind the base, and a carina beginning near the middle and extending on to the upper part of the strong posterior declivity; external to the carina are one or two slightly raised lines. Antennæ of the male not longer than the body; the last six joints ringed with grey at the base. This species is allied to *P. camura*, Newm. (=*posticalis*, Pasc.) which it much resembles in form.

Length 8–12 millim.

Habitat.—Perak (*Doherty*); Selangor: Bukit Kutu, 3,500 ft. (*H. C. Robinson*), and Nawngchik: Bukit Besar (*Annandale* and *Robinson*).

PTEROLOPHIA SUBTINCTA, Pasc.

Praonetha subtincta, Pasc., Tr. Ent. Soc., Lond. (3) iii. p. 170.

To this species I refer, with doubt, three specimens collected by Mr. Robinson in Selangor, two at Bukit Kutu the third at Semangko. They agree with the type from Java in being covered for the most part with a rust-red pubescence, in having each of the small basal tubercles of the elytra capped with a short tuft of blackish hairs, with other still smaller tufts of black hairs scattered over the middle and posterior parts of the elytra. In two of the specimens there are, as in the type, two vaguely limited ashy-white bands crossing the elytra—a broader one before, and a narrower one behind, the middle; but in addition there is a third narrow zig-zag band of the same colour, nearer to the apex, while the sides of the breast also are more or less ashy-white. The third specimen is almost entirely of a rusty-red colour. The species appears to be nearly allied to *P. melanura*, Pasc. (=*P. montana*, Pasc. =*P. quadraticollis*, Pasc.) resembling it in form and puncturation, but differing by the presence of the small scattered tufts of hair on the elytra, and in not having the last ventral segment black. In one respect Pascoe's description of the species is quite mis-

Digitized by Google

leading. The prothorax is described as "very transverse and remarkable for the angular emargination of the anterior border." Though this, unfortunately, is true of the type specimen described, it is not true of the species. The type is a specimen which obviously had been injured and in which the prothorax had not properly developed, the pronotum being split down the middle, contracted from before backwards, and pushed out at the sides.

DYSTASIA AFFINIS, Gahan, Ann. Mus. Civ. Gen. xlii. (ined.).

Blackish-brown, covered in part with ashy-grey, in part with tawny and brown, pubescence. Vertex of head, basal joints of antennæ, and six bands along the prothorax, tawny; front of head, sides of prothorax, basal part of elytra, and the body underneath, excepting the abdomen, rather sparsely covered with ashy-grey pubescence; a somewhat ill-defined band of denser ashy-grey pubescence crosses each elytron obliquely just before the middle, the pubescence covering all that part of the elytron which lies behind this band, being mostly of a brownish or tawny-brown colour, mixed here and there with small patches of ashy-grey. Head somewhat rugose punctate in front; prothorax sparsely punctured. Elytra strongly and rather densely punctured, and, near the base, somewhat granulate; each furnished with a small sharp tubercle close to the basal margin, and with a somewhat larger but more obtuse tubercle at a short distance from the base, this tubercle not being tufted with hairs as in most of the other species of the genus. Antennæ of the male not longer than the body, the third and following joints dark-brown at the apex, greyish or fulvous-grey at the base.

Length 12, breadth 5 millim.

Habitat.—Selangor: Bukit Kutu, 3,500 ft. (*H. C. Robinson*), and Sumatra (*Modigliani*).

GLENEA ROBINSONI, *sp. nov.*

(Pl. VI. Fig. 16.)

Female.—Covered above with a deep-black tomentum; the pronotum with a median longitudinal pale-yellow band which widens out somewhat abruptly near the base; scutellum yellowish-white; elytra each with a transverse spot or band at the middle and another at the apex, yellowish-white; body underneath ferruginous-brown, densely covered with luteous-white pubescence, the sides of the prothorax and the sides and greater part of the front of the head being covered with similar white pubescence: legs testaceous-yellow, very faintly pubescent. Antennæ black, longer than the body by about the last two joints; first joint relatively short, finely punctulate, not carinate; third much longer than the first and a little longer than the fourth; elytra acute at the shoulders, bicarinate along each side, with a row of punctures between the carinæ and another between the lower carina and the outer margin; the disc strongly and rather densely punctured from the base up to the median band; apex of each elytron spined at the outer angle, feebly denticulate at the suture.

Length 12, breadth 3.25 millim.

Habitat.—Selangor: Bukit Kutu, 3,500 ft. (*H. C. Robinson*).

Digitized by Google

GLENEA VIRGATA, *sp. nov.*

FEMALE.—Black, marked above with ashy-white lines, and almost entirely covered underneath with ashy-white pubescence. Head sparsely punctured, marked with a band of white pubescence on each side of the front, another on each cheek, and two lines on the vertex. Antennæ black, a little longer than the body; third joint much longer than the first or fourth. Prothorax rather thickly punctured, marked above with three narrow bands or lines of bluish-white pubescence; the basal edge, a band on the upper part of each side, and the whole of the lower part, being also bluish-white. Elytra broad in front with the shoulders acute, gradually narrowing posteriorly; the suture, two lines along the disc of each and a short obliquely transverse line just a little before the apex, bluish-white, two lines of the same colour along each side; disc strongly and rather densely but somewhat irregularly punctured, the sides each with two rows of punctures separated by a feeble rather obtuse carina which does not reach base or apex; apex of each elytron armed with a strong outer and shorter sutural spine, the sharp superior lateral carina of the elytron being continued on to the outer spine.

Length 15–17, breadth 4.5–5 millim.

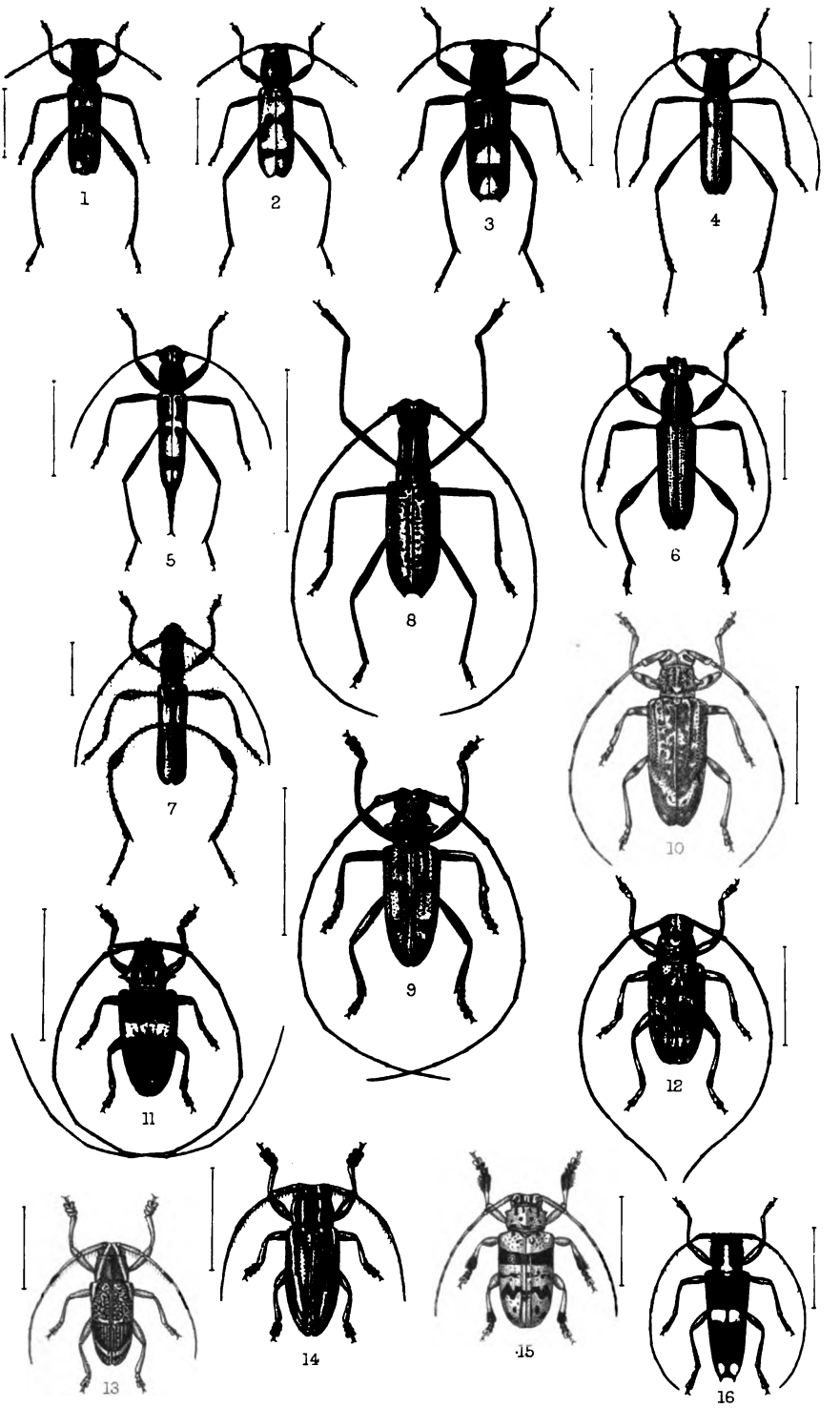
HABITAT.—Perak (*Doherty*), and Selangor: Bukit Kutu, 3,500 ft. (*H. C. Robinson*).

Digitized by Google

EXPLANATION OF PLATE.

No.	1.	Xylotrechus affinis, Gahan, *sp. nov.*	(p. 111)
,,	2.	Xylotrechus discors, Gahan, *sp. nov.*	(p. 112)
,,	3.	Xylotrechus consocius, Gahan, *sp. nov.*	(p. 111)
,,	4.	Psilomerus gracilis, Gahan, *sp. nov.*	(p. 112)
,,	5.	Arcyphorus conformis, Gahan, *sp. nov.*	(p. 112)
,,	6.	Polyphida modesta, Gahan, *sp. nov.*	(p. 113)
,,	7.	Mimistena biplagiata, Gahan, *sp. nov.*	(p. 113)
,,	8.	Macrochenus melanospilus, Gahan, *sp. nov.*	(p. 114)
,,	9.	Monohammus serratus, Gahan, *sp. nov.*	(p. 115)
,,	10.	Haplohammus granulatus, Gahan, *sp. nov.*	(p. 115)
,,	11.	Pharsalia ferruginea, Gahan, *sp. nov.*	(p. 116)
,,	12.	Anancylus basalis, Gahan, *sp. nov.*	(p. 116)
,,	13.	Atossa spilota, Gahan, *sp. nov.*	(p. 118)
,,	14.	Demodes vittata, Gahan, *sp. nov.*	(p. 117)
,,	15.	Chœromorpha robinsoni, Gahan, *sp. nov.*	(p. 117)
,,	16.	Glenea robinsoni, Gahan, *sp. nov.*	(p. 120)

Digitized by Google



Horace Knight ad nat. lith. West, Newman imp.

NEW LONGICORNIA FROM SELANGOR.

Digitized by Google

Digitized by Google

NOTES ON THE PETROLOGY OF STONE IMPLEMENTS FROM THE FEDERATED MALAY STATES.

By J. B. SCRIVENOR, F.G.S.

1. TEMBELING VALLEY, PAHANG.—A very fine grained siliceous rock with schistose structure well marked by dark, elongated bodies which cannot be determined. The base of the rock is quartz in minute grains. There are also, however, larger, angular fragments of quartz throughout. In the base there has been a large development of biotite in minute flakes. Only a few of these are big enough to give the pleochroism clearly under a one sixth objective.

2. REMBAU, E. 113-05.—Specific gravity 2.75.—A fine grained siliceous rock rendered very dark in section by an abundance of black dust. As in No. 1, biotite is well developed, but after occurs in nests composed of minute flakes of the mica and equally minute grains of quartz. Schistose structure is well marked. The nests of biotite and quartz are elongated along the planes of schistosity.

3. TEMBELING VALLEY, PAHANG.—Specific gravity 2.74.—This again is a very fine grained siliceous rock with larger angular fragments of quartz. The colour of the section is pale chestnut-brown, occasioned by the abundance of biotite in minute flakes. A black dust is distributed irregularly throughout the section, giving it a mottled appearance; and there is also a colourless mineral, apparently isotropic, with a high refractive index, in granules too small for determination.

4. TEMBELING VALLEY, PAHANG.—Specific gravity 2.77.—A fine grained siliceous rock with abundant biotite which is of a dull green colour, probably owing to weathering. It is noteworthy that this alone of all the implements examined shows marked weathering externally. Under a high power a minutely granular mineral with high refractive index is also seen. There is no trace of schistosity.

5. REMBAU, E. 112-05 —A fine grained siliceous rock with angular fragments of quartz in a fine quartzose ground mass. Schistosity is well marked. Biotite in minute flakes is abundant throughout, and one or two small zircons can be seen. Nests of opaque material occur, and associated with one of them is a colourless mineral with high refractive index. It is not sufficiently abundant or in large enough grains to be determined.

6 AND 7. TEMBELING VALLEY, PAHANG.—No. 6 Specific gravity 2.75. No. 7 Specific gravity 2.73.

All these specimens of stone implements are composed of a metamorphosed, fine grained siliceous sediment, characterised by the abundance of biotite in minute flakes. The white appearance of the exterior of No. 4 is due, I believe, to the removal by solution of some of the siliceous material. This results in a pitted, irregular surface that reflects back a great deal of the light that falls on it. The compact, comparatively unweathered interior, on the other hand, presents a smoother surface and absorbs most of the light received.

Digitized by Google

A SYNOPSIS OF THE BIRDS AT PRESENT KNOWN TO INHABIT THE MALAY PENINSULA, SOUTH OF THE ISTHMUS OF KRA.

By HERBERT C. ROBINSON, C.M.Z.S., M.B.O.U.,

Curator, Selangor State Museum.

PART II.—THE GALLINACEOUS BIRDS.

I HAVE not considered it necessary to give any definition of the family of Gamebirds, their general appearance needing no description, but have contented myself with supplying a key to the species. It should be noted, however, that the characters employed are purely artificial and arbitrary and that the key will therefore apply only to the species that are found within our limits.

Three forms, *Arboricola campbelli*, *Rheinardius nigrescens*, and *Chalcurus inopinatus* are peculiar to the central mountain masses of the Peninsula, but the remainder have a more or less wide range, either northwards, to Burma and beyond, or through the islands of the Indian Archipelago and Indo-China.

As in the previous section of this paper, species represented in the Perak Museum have an asterisk * attached to their names, while those of which the Selangor Museum possesses specimens are marked with a dagger †.

KEY TO THE SPECIES.

A. With three toes only ... ... *Turnix taigoor* p. 132

B. With four toes.

1. Large birds, wing always over 12 inches.

a. Upper tail-coverts greatly elongated in the male forming a "train"; both sexes crested, the feathers of the crest broadened at the tips *Pavo muticus* p. 131

a'. Both sexes with a large crest of hair like white feathers at the back of the head; central pair of tail feathers enormously elongated in the male ... ... *Rheinardius nigrescens* p. 130

a''. Head not conspicuously crested ... *Argusianus argus* p. 131

2. Smaller birds; wing never more than 10 inches.

b. Tail longer than wing; with metallic ocelli on the plumage.

c. Sides of the head bare, top of head markedly crested ... ... *Polyplectron malaccense* p. 129

c'. Sides of the head feathered, top of head only slightly crested ... *Chalcurus inopinatus* p. 130

Digitized by Google

b'. Tail shorter than wing; without metallic ocelli in the plumage.

d. Wing nine inches or over in the male.

e. Head uncrested, with no wattle or comb.

f. Uniform black in colour ... *Acomus crythrophthalmus, female* p. 128

f'. Tail pale-buff; lower back bronzy-gold ... ... *Acomus crythrophthalmus, male* p. 128

e'. Head uncrested with wattles and comb ... ... *Gallus gallus* p. 129

e''. Head crested with wattles and no comb ... ... *Lophura rufa* p. 129

d'. Wing under eight inches.

g. Crested.

h. Basal half of bill crimson ... *Rollulus roulroul, male* p. 127

h'. Bill uniform black ... ... *Rollulus roulroul, female* p. 127

g'. Not crested.

i. Legs of the male armed with spurs.

j. Bill decidedly elongated ... *Rhizothera longirostris* p. 125

j'. Bill stout and thick ... ... *Caloperdix oculea* p. 126

i'. Legs of the male without spurs.

k. Tail with 14 feathers.

l. Breast dark-grey ... ... *Arboricola campbelli* p. 126

l'. Breast chestnut ... ... *Tropicoperclix charltoni* p. 126

k'. Tail with 10–12 feathers more than half the length of the wing ... ... *Melanoperdix negra* p. 127

k''. Tail with eight feathers very short band soft, concealed the tail coverts by... ... *Excalfactoria chinensis* p. 128

*† 22. *RHIZOTHERA LONGIROSTRIS*—THE LONG-BILLED PARTRIDGE.

Rhizothera longirostris (Temm.); *Ogilvie-Grant, Cat. Birds Brit. Mus.* xxii. p. 183 (1893); *Sharpe, Hand-list of Birds*, i. p. 26 (1899).

Not much is known of the habits of this species though it is common in certain districts throughout the Peninsula, being usually found in hilly, but not mountain, jungle, wherever bamboo is abundant. It is exceedingly shy and rarely takes to flight, trusting rather to its running powers, which are very considerable and to the protection afforded by the tints of its plumage, which harmonize in a wonderful way with the dead leaves etc., of the jungle. Its note is a shrill whistle, harsher and less sustained on one note than that of *Rollulus roulroul*, and is usually heard shortly before or after dusk and dawn,

Digitized by Google

though occasionally in the middle of the night. The species lends itself readily to domestication and is often captured and tamed by Malays and Sakais and may be seen running with their domestic poultry.

LOCALITIES IN THE PENINSULA.—Perlis (*Cantor*); Perak: New Territory (*Annandale*); Kuala Kangsar (*Kelham*); Larut (*Wray*); Selangor: Serendah (*Robinson*); Kuala Lumpur (*Butler*); Ulu Langat (*Robinson*); Klang (*Davison*); Pahang: Gunong Tahan (*Waterstradt*); Malacca (*Maingay, Davison*); Johore (*Davisan, Boden Kloss*).

GENERAL RANGE.—From slightly north of the latitude of Penang to the southern extremity of the Malay Peninsula, Borneo, Sumatra. In the elevated districts of Borneo its place is taken by a slightly differentiated form, *Rhizothera dulitensis*, Grant.

MALAY NAME.—Selantin.

* 23. *TROPICOPERDIX CHARLTONI*—THE RED-LEGGED HILL-PARTRIDGE.

Arboricola charltoni (Eyt.); *Ogilvie-Grant, t.c.*, p. 221.

Tropicoperdix charltoni, *Sharpe, t.c.*, p. 30.

In habits and in the localities affected this bird closely resembles the preceeding species. It is however, much rarer and shyer and is but seldom seen, those specimens that have been obtained, having mostly been snared. It is readily distinguished from all allied species by having a small concealed patch of downy, snow-white feathers on the flanks, beneath the wings.

LOCALITIES IN THE PENINSULA.—Penang (*Cantor*); Perak: Piah Valley (*Wray*); Northern Pahang (*Waterstradt*); Malacca (*Charltoni*).

The locality Penang is such open to doubt and the specimens probably came from Kedah or Province Wellesley.

GENERAL RANGE.—Throughout the Malay Peninsula to Siam and possibly Southern Tenasserim, Sumatra and North Borneo.

MALAY NAME.—Sang serok.

† 24. *ARBORICOLA CAMPBELLI*—CAMPBELL'S TREE PARTRIDGE.

Arboricola campbelli, *Ibis*, 1905, p. 165, pl. IV; *antea* p. 105.

The three specimens of this species that have been obtained were found among dense rotan jungle and ran with extreme swiftness when disturbed; they were never seen to use their wings.

LOCALITIES IN THE PENINSULA.—Perak: Telom Valley on the borders of Pahang, 3,500 ft. (*Robinson*).

Readily separated from all other species by the black head striped with white in the facial region and by the dark-grey undersurface.

25. *CALOPERDIX OCULEA*—THE FERRUGINOUS WOOD-PARTRIDGE.

Caloperdix oculea (Temm.); *Ogilvie-Grant, t.c.*, p. 222 *Sharpe, t.c.*, p. 30.

Digitized by Google

Nothing is known of the habits of this species; it is not represented in any of the local museums and no specimens have to my knowledge been obtained of late years; in the territory of Malacca, where at one time it appeared to be not uncommon it is now very probably extinct owing to the destruction of the forests for tapioca plantations, while in the native states north of Penang the extension of the pepper industry similarily threatens the existence of the species.

LOCALITIES IN THE PENINSULA.—Kodoh (*Darling*); Perlis (*Cantor*); Kedah (*Cantor*); Malacca (*Maingay, Pinwill*).

GENERAL RANGE.—From Southern Tenasserim, down the Western side of the Peninsula to Malacca. Not recorded from the Eastern side of from any of the Federated Malay States. Closely allied species are found in Sumatra, Java and Borneo where they occur in hill forest.

*†26. *ROLLULUS ROULROUL*—THE CRESTED GREEN WOOD QUAIL.

Rollulus roulroul (Scop.); *Ogilvie-Grant, t.c.*, p. 225; *Sharpe, t.c.*, p. 30.

This handsome little game bird is quite the commonest jungle species in the Malay Peninsula and is widely distributed in suitable localities on both sides of the main range, frequenting all types of forest, except the swampy tracts near the coast and the very highest mountains. Usually it is found in pairs but at certain times of the year it congregates in conveys of eight or nine individuals and on one occasion at Kuala Tembeling in Pahang I obtained four specimens at one shot. Its diet is mixed and those birda that I have examined had been feeding on seeds insects and small mollusca. The note is a low clear whistle and the bird is sometimes snared by imitating its call on the same decoy pipe as that employed for catching the ground dove *Chalcophaps indica*.

GENERAL RANGE.—From Southern Tenasserim and Siam, through the Malay Peninsula to Sumatra, Borneo and Java.

MALAY NAME.—Burong siul.

*†27. *MELANOPERDIX NIGRA*—THE BLACK WOOD PARTRIDGE.

Melanoperdix nigra (Vig.); *Ogilvie-Grant, t.c.*, p. 228; *Sharpe, t.c.*, p. 30.

In the Black Wood Partridge the sexes differ considerably in colour, the male being uniform glossy-black, while the female is dull chestnut with a transverse-black band on the shoulders.

In habits it is very similar to the preceding species but is usually met with solitary or in pairs. It does not ascend the hills to any great elevation and is met with most frequently in lowlying forest near the coast and in jungle where the prevailing under growth is the bertam palm (*Eugeissona tristis*) whence the bird derives its Malay name.

GENERAL RANGE.—From about the latitude of Penang southwards through the Malay peninsula to Sumatra and Borneo.

MALAY NAME.—Burong bertam.

Digitized by Google

*†28. *EXCALFACTORIA CHINENSIS*—THE BLUE BREASTED BUTTON QUAIL.

Excalfactoria chinensis (Linn.); *Ogilvie-Grant, t.c.*, p. 250; *Sharpe, t.c.*, p. 32.

The Blue-breasted Button Quail is common in settled districts throughout the Peninsula. It is found principally in stretches of abandoned cultivation and mining land that have been overgrown with lalang grass (*Imperatoria koenigi*) and in paddy fields that are lying fallow or have just been reaped. It is especially abundant in the "tana tenggala" or plough land along the banks of the Jelei and lower Tembeling rivers in Pahang. Usually it is met with, singly or in pairs, but towards the end of the year in coveys of six or seven that lie very close. The breeding season is in July or August and the nest consists merely of a few wisps of withered grass placed in a hollow among low bushes or high lalang grass. The eggs are six or seven in number, dull greenish olive, faintly speckled with black.

General Range.—From the Peninsula of India, throughout the southern part of Asia to Formosa, Celebes and the Moluccas. A closely allied race inhabits the other islands of the Malay Archipelago, the Philippines and Australia.

Malay Name.—Pikau.

*†29. *ACOMUS ERYTHROPHTHALMUS*—THE BUFF-TAILED FIREBACK PHEASANT.

Acomus erythrophthalmus (Raffles); *Ogilvie-Grant, t.c.*, p. 283; *Sharpe, t.c.*, p. 34.

Very little indeed is known of the habits of this Fireback which is by no means a common bird in the central portions of the Malay Peninsula, though at one time it must have been very abundant in the territory of Malacca and the northern parts of Johore, judging from the numbers of Malacca trade skins that are to be found in European Museums.

As a rule it is met with in low country jungle, not ascending the hills, but inhabiting much the same type of country as is affected by *Melanoperdix nigra*. In some districts it is not uncommon in old second growth jungle or "blukar" in the vicinity of small native villages. Like its near allies it is polygamous and the females appear to be very much more numerous than the males.

Localities in the Peninsula.—Kedah (*Cantor*); Penang (*Cantor*); Province Wellesley (*Cantor*); Perak: Kuala Kangsar (*Kelham*); Selangor: Kuala Lumpur (*Sel. Mus.*); Malacca; Johore (*Boden Kloss*); Singapore.

The localities Penang and Singapore, which rest on old specimens in the British Museum, are open to very considerable doubt. The species does not now, if it ever did, occur in either of the islands.

General Range.—Throughout the Malay Peninsula, south of Kedah, Sumatra and possibly Java.

Malay Name.—Kuang bertam or Mata merah.

Digitized by Google

*†30. *LOPHURA RUFA*—VIEILLOT'S FIREBACK-PHEASANT.

Lophura rufa (Raffles); *Ogilvie-Grant, t.c.*, p. 286; *Sharpe, t.c.*, p. 34.

This bird frequents precisely similar localities to the preceding species, but is perhaps somewhat commoner. It is readily domesticated and specimens are frequently seen in captivity, which is very rarely the case with Acomus erythrophthalmus.

LOCALITIES IN THE PENINSULA.—Generally distributed but especially common in the neighbourhood of Kuala Kangsar, Perak (*Kelham*); and Kuala Tembeling, Pahang (*Robinson*).

GENERAL RANGE.—From Southern Tenasserim and Siam to the southern extremity of the Malay Peninsula, Sumatra.

MALAY NAME.—Pegar.

*†31. *GALLUS GALLUS*—THE JUNGLE-FOWL.

Gallus gallus (Linn.); *Ogilvie-Grant, t.c.*, p. 344; *Sharpe, t.c.*, p. 39.

The Jungle-fowl is universally distributed throughout the Peninsula, mainly frequenting second growth jungle near villages and patches of bamboo forest. On the east coast they are especially common in the thick bush scrub surrounding the buffalo grazing ground into which they emerge in the early mornings and evenings, affording excellent shooting; elsewhere they keep to cover too close to afford much sport. The breeding months are from February to June, according to district and season, and about seven or eight pale *café au lait* eggs are laid in a hollow in the ground, usually among clumps of bamboo. The true Malayan domestic breed is practically identical with the wild form, with which crosses frequently take place.[1]

GENERAL RANGE.—Throughout Southern Asia from Peninsular India to Cochin-China and Hainan, including most of the larger islands of the Indian Archipelago except Borneo.

MALAY NAME.—Ayam utan; Ayam borga; Ayam dĕnak.

*†32. *POLYPLECTRON MALACCENSIS*—THE PEACOCK-PHEASANT.

Polyplectron malaccensis (Scop.); *Hartert, Nov. Zool.*, ix., p. 538 (1902).

Polyplectron bicalcaratum (Linn.); *Ogilvie-Grant, t.c.*, p. 357; *Sharpe, t.c.*, p. 39.

Widely distributed throughout the lower foot hills of the Malay Peninsula, its place being taken in the higher ranges by the succeeding species. It is, if possible, an even shyer bird than the Argus-pheasant, though its note, which may be represented by the syllables *wok-wok*, three or four times repeated at various intervals, is often heard.

[1] *Gallus varius*, a Javan species that may be recognised by possessing a long median wattle on the throat, is said to have been obtained in Singapore and Southern Johore. The evidence for the occurrence of this species in a wild state in the Peninsula is however insufficient, the specimens in question being either domesticated varieties or aviary birds imported by Chinamen.

Digitized by Google

Nothing appears to be known about the nidification of the Malayan species, but the closely allied Burmese form is said to lay two eggs only, an unusually small number for a game-bird.

GENERAL RANGE.—The Malay Peninsula and Sumatra. The alleged occurrence in Tenasserim is decidedly doubtful, and authenticated specimens have not been obtained from further north than Salanga or Junk Ceylon.

MALAY NAME.—Kuang chermin.

† 33. *CHALCURUS INOPINATUS*, ROTHSCH.

Chalcurus inopinatus (Rothsch); *Bull., B.O.C.*, p. 42 (1904).

The present species is somewhat closely allied to the preceding, from which it may be distinguished by having the sides of the head feathered, not naked, and only slightly crested, by its relatively longer tail and by the ground colour of the plumage above being chestnut, not greyish.

In habits it ressembles most of the other species of game-birds inhabiting dense jungle, running with extreme swiftness, and never taking wing until very hard pressed. It frequents dark and damp ravines above 3,000 ft., and appears to feed principally on small insects and millipedes and the fruit of a creeping rotan, very common in the mountains.

LOCALITIES IN THE PENINSULA.—Pahang: Ulu Dong (*Waterstradt*); Gunong Tahan, 3,000 ft. (*Wray* and *Robinson*); Selangor: Gunong Mengkuang Lebah, 4,000-5,800 ft. (*Robinson*).

GENERAL RANGE.—Mountains of the Malay Peninsula. The only other species of the genus *Chalcurus chalcurus* (Less.) inhabits the mountains on the west coast of Sumatra.

34. *RHEINARDIUS NIGRESCENS*—THE MOUNTAIN ARGUS-PHEASANT.

Rheinardius ocellatus nigrescens (Rothsch); *Bull., B.O.C.*, xii., p. 55 (1902); *Hartert, Nov. Zool.*, ix., p. 538.

This magnificent bird is very closely allied to a species found in the mountains of Annam, French Indo-China, which has hitherto been considered to be one of the rarest of all game-birds.

The three original specimens, which formed the basis of Mr. Rothschild's description, were secured, according to information obtained by me, by Mr. Waterstradt's native hunters on the Ulu Dong, a river takes its rise on Gunong Benom. Mr. Wray and myself found it to be by no means uncommon on the lower spurs of Gunong Tahan, apparently being found in the same situations as the common Argus, though perhaps it ranges somewhat higher up the hills. Tail feathers of both species were found on the same showing-off ground. Despite our utmost efforts, which included the manufacture of a fence trap, two miles long, with snares every fifty yards, we only succeeded in catching two specimens, of which one was utterly spoilt by a musang before the trap was visited, but dozens of the common variety were secured, which formed a very welcome addition to our commissariat. The single perfect specimen was shot by one of our Dyaks, who had a singular gift for securing rare and shy ground birds.

Digitized by Google

The species does not ascend to any great elevation, certainly not above 4,000 ft., and is not, so far as my experience goes, found on the Selangor ranges, though certainly occurring on the high mountains of Batang Padang in Southern Perak. The call is very different to that of the common species, and is readily recognised when once heard, though it is hard to put the difference into words.

LOCALITIES IN THE PENINSULA.—Pahang: Ulu Dong (*Waterstradt*); Gunong Tahan, 1,500-3,000, ft. (*Wray* and *Robinson*).

*† 35. *ARGUSIANUS ARGUS*—THE ARGUS-PHEASANT.

Argusianus argus (Linn.); *Ogilvie-Grant, t.c.*, p. 363; *Sharpe, t.c.*, p. 40.

The Argus-Pheasant is common everywhere in old jungle, throughout the Peninsula up to about 3,500 ft., but is not found in the swampy coastal districts. The bird is, however, so exceedingly shy that it is only very rarely indeed that it is possible to catch sight of one, and I myself, with a fairly extensive experience of jungle life, have only actually seen the wild bird once. Nevertheless, they are very easily trapped, and the Sakais of certain districts often capture the chicks and rear them with their domestic poultry. They are solitary in their habits, the males keeping apart from the females except at the breeding season, and the former has the curious habit of clearing a playing- or showing-off ground for himself by removing every leaf or fallen twig from a circular patch, sometimes four or five yards in diameter. These playing grounds are usually situated on a steep ridge, and by running a long low fence, slightly below the crest, with openings every thirty or forty yards, set with snares, one is generally able to catch a considerable proportion of the birds in the vicinity.

GENERAL RANGE.—From South Tenasserim throughout the Malay Peninsula to Sumatra, and also in Siam.

MALAY NAME.—Burong kuang.

*† 36. *PAVO MUTICUS*—THE JAVAN PEAFOWL.

Pavo muticus (Linn.); *Ogilvie-Grant, t.c.*, p. 371; *Sharpe, t.c.*, p. 40.

The Peafowl has a somewhat peculiar distribution in the Malay Peninsula, being commoner on the eastern side and to the north than on the west and south. On the upper reaches of the Perak River it is abundant, but becomes very rare south of Kuala Kangsar. From Selangor, Negri Sembilan and Johore, it has not, so far as I am aware, ever been recorded, though it probably exists in Jelebu. Though at one time common in Malacca, it is now extinct there. It has been obtained in Trengganu by Dr. Abbott and Mr. Boden Kloss, and is very numerous on the Pahang River and its larger tributaries. It is locally abundant in certain districts of Kelantan and at Mabek, on the borders of Jalor and Rhamaan, near the headwaters of the Patani River. I obtained numerous specimens, though on the lower reaches of that river which are thickly populated, it is not to be found.

It does not occur, as a rule, in deep jungle, but frequents by preference sandy river banks, where it is to be seen in parties of four or five in the early morning, retiring to thick scrub in the heat of the day and roosting in high trees at night. The note is harsh and strident, the

Digitized by Google

Malay name for the bird being a rendering thereof, and can be heard for great distances. The nesting season in Pahang appears to be about April, and males are in their finest plumage in that and the two succeeding months.

GENERAL RANGE.—From Assam through the Indo-Chinese countries and the Malay Peninsula to Java, but not in Borneo or Sumatra.

MALAY NAME.—Burong merah.

*† 37. *TURNIX TAIGOOR*—THE BUSTARD QUAIL.

Turnix taigoor (Sykes); *Ogilvie-Grant, t.c.*, p. 530.

Turnix pugnax, *Sharpe, t.c.*, p. 48.

The Bustard Quail is common throughout the Peninsula, in situations similar to those affected by the Blue-breasted Button Quail, but unlike that species is rarely if ever found in coveys. Females are larger and more brightly coloured than the males, and in this genus a reversal of the ordinary rules takes place; the females courting the males, while the latter perform the duties of incubation.

Hens are very pugnacious, and the Malays take advantage of this fact by using a decoy cage, which closes as soon as the wild bird enters to attack its inmates. The birds so captured are pitted against each others, and large sums are often staked on a specially proficent bird.

The eggs are usually four in number, somewhat pointed at one end, and are pale-greyish olive, thickly spotted with brownish olive and brown, the markings being often more densely congregated at one end, forming a zone. The nest is little more than a slight depression among long grass, but is sometimes lined with a few dead leaves. In Selangor, the breeding season appears to be the months of June and July.

GENERAL RANGE.—Throughout Southern Asia, from India to China and Formosa, as well as in Northern Ceylon. In Southern Ceylon, Java and Sumatra, its place is taken by a slightly different form.

MALAY NAME.—Puyok.

Digitized by Google

RETURN OF THERMOMETER READINGS AT TRIG. STATIONS IN THE FEDERATED MALAY STATES IN ORDER OF ALTITUDE.*

Name of Station.	Height.	Distance from sea coast.	Date.	Maximum.		Minimum.		Mean.	Range.
				Mean.	Greatest recorded.	Mean.	Least recorded.		
	Feet.	Miles.		°	°	°	°	°	°
Gunong Kerbau	7,160	50	1895, July 11–19 ...	68.9	74.0	52.9	51.5	60·9	16.0
„ Batu Putch ...	6,985	57	1898, September 9–24	66.9	72.0	51.6	49.7	59.2	15.3
„ Grah	6,900	63	1905, Aug. 4–Sept. 9 ...	74.2	86.0	51.6	48.0	62.9	22.6
„ Lyang	6,335	40	1900, Jan. 31–Mar. 20	79.9	93.0	53.3	48.5	66.6	26.6
„ Bintang	6,103	35	1895, April 17–28 ...	71.2	77.5	57.1	54.7	64.1	14.1
„ „	6,103	35	1901, January 17–25 ...	69.8	75.5	52.9	46.0	61.3	16.9
„ Berumban (Phg.)	6,050	50	1899, February 19–24	67.3	88.0	54.2	52.0	60.7	13·1
„ Bintang, South ...	5,911	34	1895, April 30–May 3...	75.7	77.3	60.7	60.0	68.2	15.0
„ Ulu Kali (Sel.) ...	5,812	36	1901, February 3–20 ...	70.1	78.5	54.5	47.0	62.3	15 6
„ Besar (Perak) ...	5,725	57	1902, July 20–Aug. 7...	72.6	82.0	56.2	53.5	64.4	16.4
„ Chabang	5,610	45	1896, March 14–25 ...	70.3	72.7	58.2	56.0	64.2	12.1
„ Bubu	5,433	17	1895, Oct. 31–Dec. 19	69.8	73.8	59.5	55.0	64.6	10.3
„ Bar Gading ...	5,372	56	1898, July 24–Aug. 8...	72.9	79.0	57.5	56.7	65.2	15.4
„ Lebah	4,989	45	1899, May 28–June 17	74.7	79.4	58.7	54.0	66.7	16.0
„ Besar (Sel.) ...	4,799	48	1901, May 17–26 ...	74.9	79.5	60.6	59.0	67.7	14.3
„ „ ...	4,799	48	1902, July 27–Aug. 5 ..	76.4	80.0	58.6	57.0	67.5	17.8
„ Hijau Larut ...	4,750	19	1895, February 20–28	71.7	75.0	58.8	57.3	65.2	12.9
„ „ ...	4,750	19	1898, December 14–23	70.4	72.5	57.7	56.5	64.0	12 7
„ „ ...	4,750	19	1905, December 16–23	74.8	81.5	57.5	55.0	66.1	17.3
„ Bunga Buah (Sel.)	4,650	31	1900, April 17–20 ...	75.7	76.0	61.2	60.2	68.4	14.5
„ Chingkai	4,620	48	1905, November20–29	79.8	85.0	58.0	55 2	68.9	21.8
„ „ „	4,620	48	1905, Oct. 18–Nov. 4 ...	75.8	79.0	60.6	57.5	68.2	15.2
„ Ulu Semangko ...	4,576	43	1900, December 2–12...	74.4	79.5	59 9	57.0	67.1	14.5
Mount Ophir (N. S.) ...	4,186	20	1901, Feb. 15–Mar. 9...	68.5	72.7	59.3	56.5	63.9	9.2
„ „	4,186	20	1904, Jan. 25–Mar. 10	73.9	85.0	59.6	56.0	66.8	14.3
Water-Shed, Ulu Bernam Pass into Pahang ...	4,140	54	1896, June 17–28 ...	81.8	87.0	63.7	62.5	72.7	18.1
Gunong Bujang Melaka ...	4,070	44	1895, August 12–27 ..	72.5	76.5	61.3	59.0	66.9	11.2
„ „ ...	4,070	44	1898, July 12–21 ...	75.6	78.5	60.3	56.8	67.9	15.3
„ Kendrong ...	4,020	48	1903, Jan. 2–Feb. 6 ...	82.1	91.5	59.0	54.5	70.5	23.1
„ Biong	3,992	31	1893, July 22–31 ...	73.1	75.8	63.0	61.2	68.0	10.1
„ Jerei (Kedah) ...	3,986	6	1894, Mar. 19–April 11	78.8	83.0	63.0	57.5	70.9	15.8
„ Telapa Burok (N. S.)	3,915	27	1900, Sept. 12–23 ...	88 0	92.3	62.7	58.5	75.3	25.3
„ „ ...	3,915	27	1902, November 11–29	76.8	79.0	61.8	59.0	69.3	15.0
„ Berumbun (N. S.)	3,295	24	1899, July 17–20 ...	74.5	78.2	67.3	66.5	70.9	7.2
„ „ „	3,295	24	1900, September 25–28	72.5	75.3	62.8	62.5	67.6	9.7
„ „ „	3,295	24	1902, December 4–5 ...	86.0	86.0	64.0	64.0	75.0	22.0
„ Rembau	2,899	15	1903, Feb. 12–Mar. 3...	78.4	84 0	64.0	61.0	71.2	14.4
„ Chante (Perak) ...	2,890	39	1903, Oct. 29–Nov. 14	81.6	91.0	66.0	62.0	73.8	15.6
„ Angsi (N. S.) ...	2,659	20	1899, October 17–28 ...	76.4	79.5	66.3	64.8	71.4	10.1
„ „ ...	2,659	20	1900, November 18–23	80.3	83.5	65.1	64.0	72.7	15.2
„ „ ...	2,659	20	1903, August 17–19 ...	85.5	87.0	64.0	62.0	74.7	21.5
„ Ulu Beranang (N. S.)	2,655	29	1900, Oct. 28–Nov. 1...	82.7	85.7	67.0	66.5	74.8	15.7
„ Krengga (Perak)	2,650	33	1905, Nov. 22–Dec. 8...	89.2	92.5	61.9	62.0	75.5	27.3
„ Kledang „ ...	2,646	28	1903, November 21–22	82.5	84.0	62.5	62.0	72.5	20.0
„ Tampin (N. S.) ...	2,507	16	1899, December 8–13...	78.0	85.5	65.2	64.5	71.6	12.8
„ „ „ ...	2,507	16	1903, April 12–24 ...	88.2	91.0	68.6	66.0	78.4	19.6

* Extract from the Report on the Trigonometrical and General Survey Department for the year 1905.

Digitized by Google

Name of Station.	Height.	Distance from sea coast.	Date.	Maximum.		Minimum.		Mean.	Range.
				Mean.	Greatest recorded.	Mean.	Least recorded.		
	Feet.	Miles.		°	°	°	°	°	°
Gunong Tampin South (N.S.)	2,413	15	1903, Mar. 18–April 11	84.2	88.0	66.8	65.0	75.5	17.4
Bukit Unyang (Sel.) ...	2,393	23	1899, November 1–11	83.5	87.6	66.5	64.8	75.0	17.0
„ „ „ ...	2,393	23	1900, August 23–30 ...	83.1	88.0	67.7	66.0	75.4	15.4
„ Chondong	2,315	35	1899, April 3–23 ...	89.6	94.0	67.8	65.8	78.7	21.8
„ Batu Angus (N. S.)	2,290	38	1902, April 29–May 10	88.1	92.0	67.3	65.5	77.7	20.8
„ Batu Bruas „ ...	2,082	52	1904, May 23–29 ...	88.5	94.0	67.8	67.0	78.2	20.7
„ Sekamat	2,200	31	1899, October 24–28 ...	80.8	82.3	65.2	64.0	73.0	15.6
„ „	2,200	31	1900, May 17–20 ...	88.6	93.0	68.0	67.0	77.8	21.6
„ Buaian (N. S.) ...	2,125	33	1902, July 3–16 ...	84.3	89.0	67.9	67.0	76.1	16.4
„ Palong „ ...	2,100	48	1902, Aug. 23–Sept. 1	84.7	88.0	67.2	65.0	75.9	17.5
„ Galla (N. S.) ...	2,014	15	1900, January 22–25 ...	84.2	85.5	67.6	66 8	75.9	16.6
„ „ „ ...	2,014	15	1900, October 17–22 ...	85.5	87.3	69.5	67.5	77.5	16.0
„ Lagong (Sel.) ...	1,886	21	1899, October 12–15 ...	88.7	90.0	67.6	67.0	78.1	21.1
„ „ „ ...	1,886	21	1900, September 15–26	81.8	87.0	69.7	65.0	75.7	12.1
„ Madei	1,697	29	1904, July 22–25 ...	91.0	99.0	67.3	67.0	79.2	23.7
„ Sigari (Dindings) ...	1,615	3	1896, July 24–Aug. 8...	84.0	85.0	71.9	68.5	77.9	12.1
„ Berakih (Perak) ...	1,490	42	1905, Oct. 27–Nov. 4...	90.5	95.5	70.4	68.5	80.4	20.1
„ Batang Malaka (N. S.)...	1,420	22	1901, August 3–7 ...	87.4	90.0	68.3	64.3	77.8	19.1
„ „ „ ...	1,420	22	1904, March 14–19 ...	87.2	91.0	68.4	66.0	77.8	18.8
„ Snaling (N. S.) ...	1,384	28	1899, November 20–26	79.8	81.0	68.7	68.0	74.2	11.1
„ „ „ ...	1,384	28	1901, August 20–24 ...	92.1	100.0	69.4	68.0	80.7	22.7
„ „ „ ...	1,384	28	1903, July 3–8 ...	84.0	85.0	72.3	70.0	78.1	11.7
Changkat Besout	1,368	28	1899, February 19–27	90.0	95.5	69.2	66.0	79.6	20.8
Gunong Semanggol (Perak)	1,279	10	1901, August 7–10 ...	93.2	93.5	73.0	73.0	83.1	20.2
Bukit Jeram Padang (N. S.)	1,170	40	1903, November 11–22	90.5	100.0	65.8	66.0	78.1	24.7
„ Prabong (Sel.) ...	1,163	28	1900, January 16–20 ...	90.9	92.0	70.5	69.9	80.7	20.4
„ „ „ ...	1,163	28	1900, July 17–24 ...	89.1	91.0	70.7	69.0	79.9	18.4
„ Champaral (N. S.) ...	1,159	27	1903, June 23–28 ...	87.8	90.0	68.7	67.0	78.2	19.1
„ Narran	1,157	31	1899, July 12–23 ...	95.1	97.5	69.4	65.8	82.2	25.7
„ Tunggal (Sel.) ...	1,144	21	1899, September 18–27	90.0	94.8	71.6	69.6	81.2	19.3
„ „ „ ...	1,144	21	1900, June 24–29 ...	91.3	93.0	72.7	70.5	82.0	18.6
„ Besar (Jerei) N. S.	1,121	37	1903, Nov. 30–Dec. 11	82.1	94.0	70.2	64.0	76.1	11.9
„ Ungka Busuk (Dindings)	1,084	2	1896, July 2–10 ...	83.7	87.0	73.0	70.0	78.3	27.2
„ Senorang	1,032	57	1904, May 2–5 ...	99.7	103.0	86.1	71.0	86.1	10.7
„ Sungei Besi (Sel.) ...	972	22	1900, Aug. 30–Sept. 7	93.5	97.5	70.5	69.0	82.0	23.0
„ Srigala	936	28	1896, July 28–Aug. 5...	91.1	92.8	72.1	69.3	81.6	19.0
„ „	936	28	1900, June 1–7 ...	88.0	92.0	72.7	70.0	85.0	21.9
„ Lembah	929	29	1899, November 26–29	90.7	94.0	70.1	69.0	80.4	20.6
„ Rasa (Sel.)	925	28	1901, August 3–4 ...	96.5	96.5	73.1	73.0	84.8	23.4
„ Tunggu (Sel.) ...	910	20	1900, August 7–12 ...	90.5	92.8	71.3	70.0	80.4	19.2
„ Asa (Sel.)	874	28	1899, August 14–18 ...	94.5	96.5	69.8	69.0	82.1	24.7
„ South Hummock (N. S.)	837	6	1900, April 14–17 ...	88.4	89.5	73.6	72.0	81.0	14.8
„ „ „ ...	837	6	1902, March 18–19 ...	98.0	98.0	71.0	71.0	84.5	27.0
„ Jugra (Parcellar Hill)	791	3	1900, Sept. 25–Nov. 16	89.3	97.5	71.2	69.0	80.2	18.1
„ North Hummock (Sel.)	741	10	1900, July 21–25 ...	93.9	96.3	70.4	70.0	82.1	23.5
„ Batu Tiga (S. E. Dindings) ...	690	1	1896, July 14–18 ...	93.5	94.0	74.4	72.0	83.9	19.1
Changkat Rembian ...	668	44	1895, Nov. 30–Dec. 9...	87.3	90.3	70.9	69.5	79.1	16.4
Bukit Tunggal (Perak) ...	651	24	1896, June 14–17 ...	92.8	95.0	72.0	71.0	82.4	20.8

Digitized by Google

Name of Station.	Height.	Distance from sea coast.	Date.	Maximum.		Minimum.		Mean.	Range.
				Mean.	Greatest recorded.	Mean.	Least recorded.		
	Feet.	Miles.		°	°	°	°	°	°
Bukit Tunggal (N. S.) ...	533	12	1899, September 4–14	87.6	91.2	72.0	71.0	79.8	15.6
„ Bharu	426	30	1899, December 8–13...	89.8	94.0	71.0	69.2	80.4	18.8
„ Tambun Tulong (N. S.	398	14	1900, June 22–24 ...	92.5	93.0	73.5	72.7	83.0	19.0
Cape Rachado L. H. ...	376	...	1900, July 10–19 ...	83.2	83.7	79.6	77.0	81.4	3.6
„ „ ...	376	...	1903, January 16–28 ...	87.3	89.5	75.4	71.0	81.4	11.9
Bukit Bantan (N. S.) ...	275	35	1902, February 19–23	91.0	91.7	66.2	65.0	78.6	24.8
„ Jeram (Sel.) ...	219	1	1900, March 6–9 ...	94.2	95.3	72.3	72.0	83.3	21.9
„ „ „ ...	219	1	1900, June 2–5 ...	91.6	95.2	74.1	72.9	82.8	17.5
„ Lipat Kajang (Sel.)	209	9	1900, July 5–12 ...	96.3	99.0	72.7	71.8	84.5	23.6
Changkat Jong	193	28	1896, January 17–27 ...	92.7	95.0	71.0	69.0	81.8	21.7
P. Angsa L. House (Sel.)...	80	...	1900, June 7–11 ...	97.9	102.5	81.4	78.0	89.6	16.5
Kuala Selangor Fort ...	74	...	1900, May 24–31 ...	96.0	100.5	74.1	68.0	85.0	21.9
Taiping	70	8	1894–1903	86.8	97.3	74.0	64.3	80.4	12.8
Pulau Arang (N. S.) ...	53	...	1902, March 11–16 ...	98.5	99.5	73.4	73.0	85.9	25.1
Rantau Panjang (Bernam R.)	40	16	1900, July 10–29 ...	91.3	93.3	70.5	68.8	80.9	20.8
Kampong Datoh Khalipa (Bernam R.)	20	8	1900, July 5–27 ...	90.7	94.0	71.7	68.9	81.2	19.0

F.M.S. Government Press.

Digitized by Google

Digitized by Google

JOURNAL OF THE F.M.S. MUSEUMS.

Digitized by Google

NOTICE.

This Journal takes the place of the "Perak Museum Notes"; the first number of which was issued in 1893.

Digitized by Google

JOURNAL

OF THE

FEDERATED MALAY STATES

MUSEUMS.

VOL. II.

DECEMBER, 1906, TO MARCH, 1909.

KUALA LUMPUR:

PRINTED AT THE F.M.S. GOVERNMENT PRINTING OFFICE.

1909.

275/8-09.

Digitized by Google

Digitized by Google

CONTENTS.

No. 1.

	Page.
Notes on the New Anti-opium Drug, by L. Wray	1
A Visit to the Aroa Islands, with a List of Birds found there, by Herbert C. Robinson	8
"Kain Pelangi," by L. Wray	17
Reports on Corundum from Perak, F.M.S., by Prof. Wyndham R. Dunstan	19
Report by Director of Museums, F.M.S., 1905...	26
Report on the Perak Museum, 1905	27
Report on the Selangor Museum, 1905...	44

No. 2.

The Malay Varnish called "Getah Luli," by L. Wray	49
"Biak:" An Opium Substitute, by L. Wray	53
"Suji Timba," by L. Wray	56
Two Rubber Pests, by L. Wray	59
Die Inlandstämme der Malayischen Halbinsel, by Dr. Rudolf Martin ...	61
The Food of the Hamadryad, by L. Wray	64
Report on *Erythroxylon Coca* Leaves from Perak, by Prof. Wyndham R. Dunstan	65
A Hand-List of the Birds of the Malay Peninsula, South of the Isthmus of Kra, by Herbert C. Robinson	66
Report on a Sample of Lead Ore from Pahang, by L. Wray...	83
Report by Director of Museums, F.M.S., 1906	84
Report on the Perak Museum, 1906	87
Report on the Selangor Museum, 1906	97

No. 3.

On Mammals collected by Mr. H. C. Robinson on Tioman and Aor Islands, S. China Sea, by Oldfield Thomas	101
On a Collection of Plants made by H. C. Robinson and L. Wray from Gunong Tahan, Pahang, by H. N. Ridley and other Botanists... ...	107
New Mammals from the Malay Peninsula Region, by C. Boden Kloss ...	143

Digitized by Google

Page.

A Provisional List of the Mammals of the Peninsular Region, by C. Boden Kloss 147

A List of the Bats occurring in the Peninsular Region with a Key to the Genera, by C. Boden Kloss 151

No. 4.

On a New Species of *Cyornis* from the Mountains of the Malay Peninsula, by Herbert C. Robinson 163

The Birds at present known from the Mountains of the Malay Peninsula, by Herbert C. Robinson 164

Digitized by Google

NOTES ON THE NEW ANTI-OPIUM DRUG.

By L. WRAY, I.S.O.

A PARTY of Chinese wood-cutters, working in the jungle near Seremban in Negri Sembilan, ran out of tea, and to supply its place took the leaves of a jungle climber, dried them and made an infusion in the ordinary way. This, however, was not successful, as the beverage made the men ill with *sakit pĕrut*—*i.e.*, bowel complaint. The leaves were then roasted and a fair substitute for tea was obtained, which had no ill effects. Then, for some obscure reason, *tengko*, opium dross, or the refuse opium after being smoked, was mixed with it, and the men continued drinking the mixture for a week or more in place of tea. After this time it was found that all desire for opium smoking had been lost. Friends of the men were told of the discovery, and so the news was spread and others were induced to try the remedy.

The above is the history of the way in which the properties of the plant, which is now quite extensively used as a cure for the opium-smoking habit, was discovered. It was told to the writer by two of the men now in charge of the factory of the Selangor Anti-opium Society in Weld Road, Kuala Lumpur, where the drug is being prepared and distributed.

The plant which was thus used by these wood-cutters is a large climber with a long woody stem, attaining in old specimens a diameter of 6 to 7 inches and a length of a hundred or more feet. It grows in the jungle and climbs up to the tops of the trees, so that in the forest itself it would be very difficult to collect, as the branches and leaves are far up out of reach. A very fine example of this great climber is to be seen in the town of Kuala Lumpur, near the railway station, growing on the river bank and climbing up a large tree which has escaped the destruction which has befallen its fellows when the jungle was felled. In secondary forest, or *bluka*, it only attains small altitudes and is easy of collection. The plant appears to be quite common in and around Kuala Lumpur. It was collected in 1894 on Waterfall Hill, Taiping, and the specimen is in the Herbarium of the Perak Museum. Botanical specimens of the plant in use at Kuala Lumpur were kindly obtained for identification by

Digitized by Google

Mr. Choo Cheng Khay, of the Blondin Mine, Sungei Krayong. An examination of these proves that the plant belongs to the order Combretaceae and is *Combretum sundiacum*. It is thus described in the "Materials for a Flora of the Malayan Peninsula," by Lieut.-Colonel Sir George King, K.C.I.E., F.R.S., page 337:

"3. COMBRETUM SUNDIACUM (*Miq. Fl. Ind. Bat., Suppl. 327*).—A very powerful climber; young branches closely covered with deciduous scales. Leaves opposite, thinly coriaceous, broadly elliptic to elliptic-orbicular, abruptly and very shortly acuminate; the base rounded, rarely slightly cuneate, sometimes unequal-sided; both surfaces glabrous, the upper punctate and with very sparse scales, the lower with the scales more numerous and white with dark centres; main nerves about six pairs, oblique, curving slightly, not prominent on the upper surface, but slightly so on the lower when dry; length 2.75 to 4 inches, breadth 1.8 to 2.75 inches, petiole .4 to .8 inches. Panicles axillary and terminal, umbellate, longer than the leaves, the branches ending in dense glodose, minutely bracteolate spikes. Calyx-tube about .35 inches long, minutely pubescent, not scaly, four-ridged along the ovary, above it cylindric, expanding upwards into a funnel-shaped mouth with four narrowly triangular-acuminate reflexed lobes; calyx inside with a ring of hairs at its base, but not filled with long coarse hair, narrowly ovate and very acute in bud. Petals much shorter than the calyx-lobes, oval, not clawed, glabrous. Stamens exserted. Fruit about 1 inch long and nearly as broad, with four coriaceous horizontally-striate shining wings, and with a few minute scattered scales. Clarke in Hooker, *fil., Fl. Br. Ind. I, 458.*

"Malacca; Maingay, 648. Singapore; Hullett, 89; Ridley, 4668. Perak; Scortechini, 1016. King's Collector, 4360, 4452, 5864, 7827; Wray, 4272.

"Readily recognised by its panicled inflorescence, the branches being umbellate and each ending in a globose spike of flowers with very acute buds which are not scaly."

Its Malay name is given by Messrs. N. Ridley and C. Curtis in "Malay Plant Names" in the "Journal of the Straits Branch of the Royal Asiatic Society," No. 38, p. 58, as *akar gegambar*. Two species of the genus, *Combretum decandrum* and *C. nanum*, are mentioned by Sir George Watt in "A Dictionary of the Economic Products of India" as being used in native Indian medicine, but without any details as to their properties or the diseases for which they are prescribed.

The method of preparing the drug for use is as follows: The branches of the plant are collected in the jungles around Kuala Lumpur and brought in. It at first fetched $4 per pikul (133⅓ lbs.)

Digitized by Google

in the green state, but the price subsequently fell to $2. About 120 pikuls (7 tons 3 cwts.) have been used during the three weeks that the society has been in operation. On arrival it is coarsely chopped up—twigs, leaves and all—into pieces about an inch to an inch and a half in length. This is done either with an axe or a Chinese chopping knife on a block of wood or by means of a pair of large shears, such as are used by Chinese apothecaries, resembling the instrument employed to cut cardboard. That is, there is a steel straight-edge fixed horizontally to a block of wood and a movable knife-blade, pivoted at one end and furnished with a handle at its free extremity, by which it can be brought down scissor-wise against the fixed blade.

The chopped stuff is allowed to dry for three or more days and is then put on large circular bamboo trays of about $2\frac{1}{2}$ feet in diameter, and by the same winnowing action as is applied to padi after husking the woody portions are separated from the leaves. The latter being light are thrown off the tray, and the stalks by reason of their greater weight remain on it. The two qualities into which it is thus divided are put into separate sacks or baskets.

The next process is roasting. This is done on a large plate of sheet iron, set in brickwork, over a charcoal fire. The iron measures about 9 feet by 3 feet and has a low brick wall of about 1 foot in height around three sides of it. The remaining side, a short one, being left open to enable the roasted leaf to be easily scraped off into baskets at the completion of the operation. The object of separating the material is that the leaves are not roasted quite so much as the sticks, though in both cases the process is carried so far that a very considerable proportion of the whole is reduced to charcoal. According to the latest practice the roasting is not pushed quite as far as formerly. While roasting, the charge is kept in motion by two men armed with wooden hoe-like implements. When sufficiently roasted the drug is removed from the roasting furnace and the two portions, the leaf and the stick, are mixed together again.

The infusion is prepared by taking from 6 to 8 tahil of the roasted drug and putting it into a kerosene oil tin filled with water. That is, 8 to $10\frac{2}{3}$ ozs. avoirdupois to nearly 4 gallons of water. The tins are set in a double row on four square-sectioned parallel, horizontal iron bars supported on brickwork at about 9 inches from the floor level and are heated by charcoal fires kindled beneath the supporting bars on a grate composed of closely placed round iron rods. The tins are kept boiling for about three hours, being covered during that time by loose-fitting squares of tin-plate. The liquid is then poured through a fine rattan sieve, having meshes of about one-eighth of an inch square, into large wooden barrels. The sieve retains all the grosser portions of the spent drug, which is then thrown away. The infusion is next ladled up, by means of bucket-shaped ladles made of tin-plate

Digitized by Google

and fixed on to the end of long wooden handles, and is then strained through a piece of white cloth into other barrels. This completes the process, and the infusion is bottled by dipping it out with the before mentioned ladles and pouring it through a tin funnel into square gin or other bottles which are brought by the patients. It is a brown, rather turbid, tea-like fluid as thus prepared.

A complete series of specimens, illustrating the preparation of the drug, have been collected and prepared for exhibition in the Perak Museum.

This decoction is prescribed as follows: Whatever the amount of opium a man habitually smokes, that amount is to be mixed with the infusion. It may be mentioned here that the average opium smoker takes from 2 to 3 chi (116⅔ grains to 175 grains) of chandu per diem. This quantity is often exceeded and in one case 1½ tahil (875 grains.) is stated to be the daily allowance of a particular smoker. Chandu, which is the opium as prepared by the Chinese for the use of smokers, is less potent that the official B. P. Extract of Opium. In the act of smoking a considerable quantity of the alkaloids contained in the chandu is certainly destroyed and only a mere fraction is absorbed into the system of the smoker. To proceed, if, for instance, a man has been in the habit of smoking 2 chi of chandu per day, then two reputed quart bottles (*a*) and (*b*) of the infusion are taken, and into one (*a*) is put 2 chi of burnt chandu, roasted on an iron skewer-like instrument in the same way as it would be if being prepared for smoking. Then a Chinese tea-cup is half filled from bottle (*a*) and taken by the patient, and half a tea-cup from bottle (*b*), the one which does not contain any opium, is put into (*a*). This is repeated each time a dose is taken, so that the liquid in (*a*), while maintaining its bulk, continually decreases in its opium contents, until bottle (*b*) is exhausted. The dose is to be taken as many times a day as the patient has been in the habit of smoking, usually three or four times, until the two bottles are finished; when the man should, it is stated, be cured of all wish to smoke. If this is not the case, then the treatment is to be repeated, but with a smaller initial proportion of burnt opium in bottle (*a*), the amount being again decreased if a third course is necessary. It is stated that sometimes two courses are sufficient, but generally three are required.

It will probably be of interest to go more fully into the curious system of dilution and dosage adopted in this instance. A Chinese tea-cup holds about three fluid ounces and a reputed quart bottle approximately 25 ounces, so that each bottle would contain some 16 doses. The decrease in the amount of opium would be $\frac{1}{16}$th of the total amount after the first dose and $\frac{1}{16}$th of the remainder for the next, and so on for each succeeding one, up to the 17th dose, when the dilution would remain constant to the 32nd dose. At 2 chi of

Digitized by Google

opium, and three doses per day, the strength of the first 21 doses would be as under—

Days.	Doses.	Amount of opium per dose.	Amount per day.	Daily decrease.
	1	7.291 grains		
	2	6.830 „		
1	3	6.419 „	20.540 grains	
	4	6.008 „	...	3.690 grains
	5	5.633 „	...	
2	6	5.209 „	16.850 „	
	7	4.950 „	...	2.908 „
	8	4.641 „	...	
3	9	4.351 „	13.942 „	
	10	4.079 „	...	2.488 „
	11	3.824 „	...	
4	12	3.585 „	11.488 „	
	13	3.361 „	...	2.022 „
	14	3.151 „	...	
5	15	2.954 „	9 466 „	
	16	2.769 „	...	1.505 „
	17	2.596 „	...	
6	18	2.596 „	7.961 „	
	19	2.596 „	...	0.183 „
	20	2.596 „		
7	21	2.596 „	7.778 „	

This last strength would continue till the two bottles were exhausted on the 11th day, when the whole of the 2 chi, equal to 116.666 grains would have been taken. In the above computation, figures beyond the third place of decimals were discarded, so that it is only approximately correct. If anyone takes the trouble to check it, it will be found that only 116.604 grains of opium are accounted for.

As the infusion contains no preservative, it is very subject to fermentative and other changes, so that it often becomes putrescent and has to be thrown away before the end of a course. A fresh supply then has to be obtained. This is stated to be of frequent occurrence, consequently only a portion of each supply is taken by the patient in many cases.

About 130 gallons of infusion are being made and distributed to the Chinese per day and the number of patients being treated is now (24th Nov.) from 260 to 270. The society began work on the 3rd November and from that date to the 23rd November 6,130 people applied for and were given the infusion. This is equal to a daily average of 292 patients. Accurate records appear to have been kept by the society, and there would seem to be no reason to doubt the correctness of these figures. The whole work is most methodically carried out. Each applicant receives a printed slip of paper containing the directions in Chinese as to the use of the drug and a wooden check, at the office; the latter he presents at the factory and receives in exchange two

Digitized by Google

bottles of the infusion. The checks are subsequently returned to the office and are used in preparing the records.

From the 16th to the 23rd of November about 396 patients had reported that they were completely cured of the habit. Previous to the former date no records on the subject were kept. Many patients naturally do not trouble to return and make a report.

Besides the Weld Road Establishment of the Selangor Anti-opium Society in Kuala Lumpur, to which the above figures alone relate, branches of the society have been opened at Kepong, Rawang, Serendah, Sungei Besi and Kajang.

It is also being prepared and distributed at the Methodist Episcopal Mission Hall in Sultan Street, Kuala Lumpur, and at an independent place in Kuala Kubu. In Penang, Seremban, Malacca and Singapore it is in use. The drug is sent from Seremban to Malacca and from Kuala Lumpur to Penang and Singapore.

The Rev. W. E. Horley writes, under date the 6th December, that "about 8,000 people have applied for the medicine at our Mission Hall" in Sultan Street, Kuala Lumpur; and "over 7,000" in Ipoh, Perak, "within the last few weeks."

The official opium returns for the State of Selangor show a very considerable reduction during the months of November and December. The figures for the period from June to December are as follows:

Month.	Chests of opium.	Total duty and handling charges.
June	141.00	... $79,365.00
July	153.00	... 86,090.00
August	146.00	... 82,155.00
September	136.00	... 76,382.50
October	145.00	... 81,590.00
November	106.00	... 59,667.50
December	122.03	... 68,840.50
	949.03	... 534,090.50

Taking the average of the five first months, as a standard, the consumption during November shows a decrease of 38 chests and the revenue collected during the same period a decrease of $21,449. The figures for December show a decrease of 22 chests, which is 16 chests more than the November total. This increase is probably due to a return of a certain number of the patients to their opium pipes.

It is assumed by those interested in the matter that this large falling off is directly due to the effects of the anti-opium drug which

Digitized by Google

has been distributed. It is undoubtedly difficult to put forward any other cause which would satisfactorily account for such an extensive decline; for there has been no change to speak of in the mining industry, the price of tin has been well maintained, there has not been any labour trouble and no exodus of Chinese from the State. It appears, therefore, that the cause is attributable to there being less opium smoked, not of necessity, but from choice.

The details above given appear to go far towards proving that there is some efficacy in the treatment, and further, that it is not merely the substitution of one drug habit for another. Whether the active ingredient is the anti-opium plant or the burnt opium administered internally in gradually decreasing doses, is a subject worthy of investigation. The latter is possibly the true cause and the anti-opium plant may only act as an astringent, preventing the distressing intestinal troubles which usually supervene on a stoppage of a customary supply of opium. The amount and nature of the alkaloids present in burnt opium is also a promising field of enquiry. The charred state of the anti-opium drug, which was in use up to quite recently, suggests that any alkaloidal principle which it might possess had been destroyed in the process of roasting, or rather charring, to which it had been subjected. Should the above surmise prove correct, it is possible that gambier or some other astringent might, with advantage, be substituted for the anti-opium plant.

The favourable results so far attained appear to warrant the experimental trial of the treatment on the opium smokers who, from time to time, find their way into the various lock-ups and prisons of the Federated Malay States. These wretched people, as all those who have either seen or heard them must be aware, suffer very severely during the first few days of their incarceration from the compulsory cessation of the supply of opium. It might be argued that pity was thrown away on them, but it should be remembered that the innocent suffer as well as the wrong-doers; for it is by no means everyone who is detained in custody who is either guilty or is subsequently convicted of the charge brought against him. Besides these humane considerations, it would be a most favourable opportunity of testing the efficacy of the treatment under circumstances where the results could be watched and recorded.

The writer wishes to gratefully acknowledge the kind assistance which was given to him by Mr. H. C. Ridges, Protector of Chinese, Selangor; the Rev. W. E. Horley, of the Methodist Episcopal Mission; Mr. Choo Cheng Khay; and the representatives of the Selangor Anti-opium Society at Weld Road, by furnishing information, supplying specimens and affording opportunities for personally investigating the process of the preparation and distribution of the drug.

Digitized by Google

A VISIT TO THE AROA ISLANDS, WITH A LIST OF THE BIRDS FOUND THERE.

By HERBERT C. ROBINSON, M.B.O.U., C.M.Z.S.

THE Aroa Islands, as they are called on the British Admiralty charts, though the name is not known to the local Malays, are a small group of islets in the Straits of Malacca some twenty-five miles to the east of the Sumatran Coast, south of Asahan and about the same distance due west of One Fathom Bank, the well-known light-house on the fairway for large shipping between Penang and Singapore.

The majority of the islands are of metamorphic formation, sand-stones, shales and schists, though there is reason to believe that the southernmost islet, Pulau Tokong, which rises abruptly from the sea and on which I was unable to land owing to heavy surf, is of granite. The elevation of no one of the group exceeds eighty feet and most of them are much less than that, some of them being mere half-tide rocks.

Navigation in the Archipelago is difficult even for small launches, owing to the very strong tides and to the large quantity of mud from the Sungei Rokan estuary hiding the position of sunken rocks, which are numerous. There are only two anchorages which are at all safe: one to the north of Pulau Jemor in four to six fathoms of water, which can be used in the south-east monsoon; and another in deeper water to the west of the same island, which is safer during the north-east monsoon, though in both the holding ground is somewhat foul.

Pulau Jemor, or Long Aroa, is the only island we visited and is the only one which has permanent water, though this is uncertain in quantity and indifferent in quality. In shape, the island is long and narrow about half a mile in length by a quarter in maximum breadth, and contains perhaps a hundred acres. Near the centre it is cleft, almost to sea level, by a narrow gully, which connects two sandy beaches on which large numbers of turtles deposit their eggs. The privilege of collecting turtle eggs on this and other islands of the group is farmed to Malays by the Sultan of Siak for the annual sum of $400 and 12,000 eggs, and two or three tumble-down huts in the gully are more or less regularly inhabited by men on the look-out for the eggs which are laid, fairly uniformly throughout the year. Otherwise the group is quite uninhabited, though formerly it was much resorted to by pirates from Linggi and Selangor, by whom the fine grove of coconuts existing on Pulau Jemor was probably planted.

Vegetation is very scanty, and in the more exposed situations consists merely of a coarse and wiry sedge-like grass growing in isolated tufts on the sandstone, interspersed with a few stunted Pandani and the almost universal Straits Rhododendron or Senduduk (*Melastoma malabathricum*).

Digitized by Google

In the gullies it is rather more luxuriant and one or two large trees and palms occur, while the undergrowth is chiefly a coarse bracken-like fern (*Gleichenialinearis*). The sea-shore trees are the usual *Calophyllum*, overgrown with orchids, ferns (*Davalia, sp.*) and two or three species of Myrmecophilous plants.

The largest tree on the island was a specimen of *Pterocarpus indicus*, and there were also several fine mango trees.

Turning to animal life, the only mammal is a large rat, which was very abundant and which, in the present days of minute differentiation, will probably be honoured with a new specific name. Neither squirrels nor tree-shrews occur.

Lizards of three species—viz., a gecko, a skink (*Mabuia multifasciata*) and a monitor (*Varanus salvator*)—were common; the latter feeding on the small crabs, which scurried in millions over the smooth sand near the water's edge. A toad was also noticed in a small swamp, though specimens were unfortunately not brought home.

During my first visit in August, with the exception of sea and shore birds, very few varieties were noted; but during our second stay in November, the island was frequented by many species on migration, and as little or nothing is known of migration routes in Southern Asia, I have thought it worth while to give a complete list of the species observed or obtained.

Insects were scarce; no butterflies were seen, and only a few moths, principally *Crambidae* and *Tineidae*. Two or three dragon flies, belonging to wide-spread mainland forms, were observed and several species of grasshoppers including a large species of *Acridium*.

LIST OF BIRDS.

* 1. *PTILINOPUS JAMBU*—THE PINK-HEADED FRUIT-DOVE.

Ptilinopus jambu (Gm.); *Salvad., Cat. Birds Brit. Mus.*, xxi., p. 80 (1893).

Leucotreron jambu (Gm.); *Sharpe, Hand-list of Birds*, i., p. 56 (1899).

A single male was seen and shot during our first visit in August, but fell into the sea and could not be retrieved.

This fruit pigeon, though formerly common in the old Malacca collections, is now decidedly rare and local in most parts of the Peninsula with which I am acquainted. It is found at all elevations up to about 4,000 feet, but appears to frequent by preference the vicinity of the coastal belt of mangroves. In such situations, I have, on one or two occasions, seen it in considerable numbers, notably at the mouth of the Linggi River on the borders of Negri Sembilan and the territory of Malacca in December, 1904.

Digitized by Google

2. *AMAURORNIS PHAENICURA*—THE WHITE-BREASTED WATER HEN.

Amaurornis phaenicura (Forst.); *Sharpe, Cat. Birds*, xxiii., p. 156 (1894); *id., Hand-list of Birds*, i., p. 106 (1899).

A single adult was shot in a small swamp. Very common in suitable localities at all seasons of the year throughout the Malay Peninsula.

3. *STERNA DOUGALLI*—THE ROSEATE TERN.

Sterna dougalli (Mont.); *Howard Saunders, Cat. Birds*, xxv., p. 70 (1896); *Sharpe, Hand-list*, i., p. 135 (1899).

Probably nesting on some of the smaller islands of the group. Three specimens in full breeding plumage were shot in August, when the species was very abundant, though not a single tern of any kind was seen in November.

4. *STERNA ANAESTHETA*—THE PANAYAN TERN.

Sterna anaestheta (Scop.); *Howard Saunders, t.c.*, p. 101; *Sharpe, t.c.*, p. 136.

One specimen.

Fairly abundant in August, but not so common as the Roseate Tern

5. *NUMENIUS VARIEGATUS*—THE EASTERN WHIMBREL.

Numenius variegatus (Scop.); *Sharpe, Cat. Birds*, xxiv., p. 361 (1896); *id., Hand-list*, i., p. 158 (1899).

A single female was shot on 13th November.

Along the mud-flats and estuaries of the Selangor coast both whimbrels and curlews are enormously abundant during the winter months, the former occurring in flocks of several hundred individuals, while, on the other hand, it is rare to see more than forty or fifty curlews together.

6. *TRINGOIDES HYPOLEUCUS*—THE COMMON SANDPIPER.

Tringoides hypoleucus (Linn.); *Sharpe, Cat. Birds*, xxiv., p. 456 (1896); *id., Hand-list*, i., p. 161 (1899).

A single female.

Common on river banks and the sea-shore during the winter months.

* 7. *ARDEA SUMATRANA*—THE DUSKY-GREY HERON.

Ardea sumatrana (Raffles); *Sharpe, Cat. Birds*, xxvi., p. 68 (1898); *id., Hand-list*, i., p. 194 (1899).

A single specimen was seen, but not secured. Elsewhere in the Peninsula it is very abundant among the mangroves edging the tidal rivers, and is occasionally met with along open stretches of sandy beach. In the former situations it is remarkably fearless and can be approached within very few yards.

Digitized by Google

8. *DEMIEGRETTA SACRA*—THE REEF HERON.

Demiegretta sacra (Gm.); *Sharpe, t.c.*, p. 136; *id., Hand-list*, i., p. 198.

Very common. All the specimens shot or seen were in the grey phase and those obtained in August were in nuptial plumage.

9. *GORSACHIUS MELANOLOPHUS*—THE MALAY BITTERN.

Gorsachius melanolophus (Raffles); *Sharpe, t.c.*, p. 166; *id., Hand-list*, i., p. 199.

A single immature specimen was shot among high bracken at dusk.

Owing to its skulking and nocturnal habits, this species is rarely obtained and is not represented in the Singapore or Perak Museums or until recently in the Selangor Museum, which, however, has just received a fine adult from Kuala Selangor. I doubt if it is really by any means rare and in past years numerous specimens seem to have been obtained in the vicinity of Malacca.

10. *NYCTICORAX NYCTICORAX*—THE NIGHT HERON.

Nycticorax nycticorax (Linn.); *Sharpe, t.c.*, p. 146; *id., Hand-list*, i., p. 198.

One immature bird was obtained.

11. *BUTORIDES JAVANICA*—THE LITTLE GREEN HERON.

Butorides javanica (Horsf.); *Sharpe, t.c.*, p. 177; *id., Hand-list*, i., p. 199.

Several specimens are in the collection.

Very common throughout the coastal districts, especially among the mangroves.

12. *DUPETOR FLAVICOLLIS*—THE BLACK BITTERN.

Dupetor flavicollis (Lath.); *Sharpe, t.c.*, p. 247; *id., Hand-list*, i., p. 203.

An adult and an immature bird were secured, also from among high bracken.

Somewhat uncommon in the Peninsula.

13. *SULA SULA*—THE BROWN GANNET.

Sula sula (Linn.); *Ogilvie-Grant, Cat. Birds*, xxvi., p. 436; *Sharpe, Hand-list*, i., p. 236.

Very large numbers of this gannet roosted on a small rock known as Pulau Tokong, rising vertically from the sea to a height of forty or

Digitized by Google

fifty feet, some miles south-east of Pulau Jemor, where our main collections were formed. The entire colony, consisting of some hundreds, appeared to be adult birds.

In the immediate neighbourhood of the coasts of the Malay Peninsula gannets are very rarely seen. An adult bird in the Selangor Museum was caught by flying under the thwarts of a boat at Pulau Jarak, in the centre of the Straits of Malacca, about a hundred and thirty miles south of Penang.

* 14. *FREGATA AQUILA*—THE LARGER FRIGATE BIRD.

Fregata aquila (Linn.); *Ogilvie-Grant, t.c.*, p. 443; *Sharpe, t.c.*, p. 237.

Immense flocks of frigate birds were met with round the islands, but none could be obtained. They are not often seen in the southern half of the Straits of Malacca, except during the prevalence of strong winds, and I have only noted them once on the east coast of the Peninsula, near Senggora in December, 1901, during a strong gale from the north-east.

15. *ACCIPITER VIRGATUS*—THE BESRA SPARROW HAWK.

Accipiter virgatus (Temm.); *Sharpe, Cat. Birds*, i., p. 150 (1874); *id., Hand-list of Birds*, i., p. 253 (1899).

A constant stream of these small sparrow hawks, nearly all immature birds and evidently on migration, was passing over the islands during our visit in November and over thirty were shot. They were obviously half starving and showed extraordinary boldness in chasing and striking down birds much larger than themselves, several being captured in the act. They were observed feeding on Pitta cyanoptera, Coccystes coromandus, Surniculus lugubris, Dicrurus annectens and Hierrococcyx fugax; the mimetic resemblance, the latter bird is said to possess, is thus evidently no protection against the actual model.

With the possible exception of the Brahminy Kite and the White-bellied Sea Eagle, this is the commonest bird of prey in the Malay Peninsula and is found everywhere from the top of the highest mountains to sea level, and in the densest jungle as well as on open grass plains.

16. *FALCO PEREGRINUS*—THE PEREGRINE FALCON.

Falco peregrinus (Tunst.); *Sharpe, t.c.*, p. 374; *id., Hand-list*, i., p. 273 (1899).

Two males and a female were shot, but the two former fell into a tide-rip and could not be recovered. The specimen secured is not very dark and cannot be referred to the Sondaic and Papuan race, *Falco ernesti* (Sharpe, Ibis, 1894, p. 548).

Digitized by Google

17. *PERNIS PTILONORHYNCHUS*—THE CRESTED HONEY-BUZZARD.

Pernis ptilonorhynchus (Temm.); *Sharpe, t.c.*, p. 347; *id., Hand-list*, i., p. 271 (1899).

A single immature female.

*18. *HALIAETUS LEUCOGASTER*—THE WHITE-BELLIED SEA EAGLE.

Haliaetus leucogaster (Gm.); *Sharpe, t.c.*, p. 307; *id., Hand-list*, i., p., 267 (1899).

Seen, but not secured.

19. *NINOX SCUTULATA*—THE HAWK OWL.

Ninox scutulata (Raffles); *Sharpe, Cat. Birds*, ii., p. 156 (1875); *id., Hand-list*, i., p. 290 (1899).

One very dark-coloured adult male.

One or more pairs of this owl are generally to be found on the small islands in the Straits of Malacca during the winter months, picking up a precarious existence by feeding on the smaller birds that may halt on the islands during migration.

*20. SCOPS, *sp.*

A very small owl, probably a *Scops* but possibly a species of *Glaucidium*, was observed, but not obtained.

21. *CEYX TRIDACTYLA*—THE THREE-TOED KINGFISHER.

Ceyx tridactyla (Pall.); *Sharpe, Cat. Birds*, xvii., p. 174 (1892); *id., Hand-list*, ii., p. 52 (1900).

One adult female.

A somewhat unexpected find on a tiny island like Pulau Jemor with no running water.

22. *HALCYON COROMANDUS*—THE RUDDY KINGFISHER.

Halcyon coromandus (Lath.); *Sharpe, t.c.*, p. 217; *id., Hand-list*, ii., p. 56 (1900).

One adult.

23. *HALCYON PILEATUS*—THE BLACK-CAPPED KINGFISHER.

Halcyon pileatus (Bodd.); *Sharpe, t.c.*, p. 229; *id., Hand-list*, ii., p. 57 (1900).

Two males and three females, all somewhat immature, as is shown by the black edgings to the feathers of the breast.

Digitized by Google

24. *EURYSTOMUS CALONYX*—THE MIGRATORY ROLLER.

Eurystomus calonyx (Hodgs., M.S.); *Sharpe, t.c.*, p. 38, pl. ii., fig. 2; *id., Hand-list*, ii., p. 47 (1900).

The seven specimens obtained are all immature birds in moult, but seem to belong to this sub-species.

25. *CAPRIMULGUS JOTAKA*—THE JUNGLE NIGHTJAR.

Caprimulgus jotaka (Temm. & Schleg.); *Hart., Cat. Birds*, xvi., p. 552 (1892); *Sharpe, Hand-list*, ii., p. 88 (1900).

Common on the island, four specimens having been obtained; on the mainland of the Peninsula it is decidedly rare, and in the low country is met with only during the winter months, though it is possible that it is resident throughout the year on the higher mountains.

26. *COCCYSTES COROMANDUS*—THE RED-WINGED CRESTED CUCKOO.

Coccystes coromandus (Linn.); *Shelley, Cat. Birds*, xix., p. 214 (1891); *Sharpe, Hand-list*, ii., p. 155 (1900).

Very common.

27. *SURNICULUS LUGUBRIS*—THE DRONGO CUCKOO.

Surniculus lugubris (Horsf.); *Shelley, t.c.*, p. 227; *Sharpe, t.c.*, p. 156.

One specimen brought to ground by a sparrow hawk.

28. *HIEROCOCCYX FUGAX*—THE MALAY HAWK CUCKOO.

Hierococcyx fugax (Horsf.); *Shelley, t.c.*, p. 236; *Sharpe, t.c.*, p. 157.

A series of nine birds, of which three are very adult, as shown by the uniform deep lead grey of the upper surface. All the specimens agree in having a narrow terminal band of bright rufous to the tail.

29. *CUCULUS MICROPTERUS*—THE INDIAN CUCKOO.

Cuculus micropterus (Gould.); *Shelley, t.c.*, p. 241; *Sharpe, t.c.*, p. 158.

Four immature and one adult specimen.

30. *CUCULUS INTERMEDIUS*—THE HIMALAYAN CUCKOO.

Cuculus intermedius (Vahl.); *Shelley, t.c.*, p. 252.

Cuculus saturatus (Hodgs.); *Sharpe, t.c.*, p. 158.

A single adult male.

31. *EUDYNANIS HONORATA*—THE KOEL.

Eudynanis honorata (Linn.); *Shelley, t.c.*, p. 316; *Sharpe, t.c.*, p. 164.

Extraordinarily abundant on most of the small islands of the Straits of Malacca from October to April.

Digitized by Google

32. *PITTA CYANOPTERA*—THE LESSER BLUE-WINGED PITTA.

Pitta cyanoptera (Temm.); *Sclater, Cat. Birds*, xiv., p. 420 (1888); *Sharpe, Hand-list*, iii., p. 180 (1901).

Very numerous; also common in the winter months on Pulau Jarak and the Sembilan Islands, together with the succeeding species.

33. *PITTA CUCULLATA*—THE HOODED PITTA.

Pitta cucullata (Hartl.); *Sclater, t.c.*, p. 442; *Sharpe, t.c.*, p. 184.

Not quite so common as the preceding, but very abundant.

34. *LARVIVORA CYANEA*—THE SIBERIAN BLUE CHAT.

Larvivora cyanea (Pall.); *Oates, Faun. Brit. Ind. Birds*, i., p. 181 (1889); *Robinson, Journ., F.M.S. Mus.*, i., p. 28 (1905).

A single immature male, in plumage precisely resembling the adult female, was obtained on 14th November, and an adult male was also shot on the same day, but at such close quarters that it was found impossible to make a skin of it.

Between November and April the species is not uncommon in the mountains of Selangor and Negri Sembilan, at altitudes varying from 2,000 feet to 4,000 feet, but, so far as my experience goes, it is never met with in the low country. It has not hitherto been recorded from Sumatra.

35. *LOCUSTELLA LANCEOLATA*—THE STREAKED GRASSHOPPER-WARBLER.

Locustella lanceolata (Temm.); *Oates, Faun. Brit. Ind. Birds*, i., p. 353 (1889); *Sharpe, Hand-list*, iv., p. 186 (1903).

Three specimens of this warbler, which is called by the natives *burong tikus* or rat bird, were collected among long grass and bracken, being very shy and secretive in their habits. Two of these have the tail coverts uniform, while the third has them thickly streaked with blackish-brown, the streaks on the flanks being also much more pronounced. Of a pair collected on the coast of Selangor, the male has the under coverts streaked, while those of the female are uniform, so that the difference is possibly sexual. The species has not apparently been recorded either from the Malay Peninsula or Sumatra, though it is probably common in both countries in suitable localities during the winter months.

36. *TURDUS OBSCURUS*—THE DARK OUZEL.

Turdus obscurus (Gm.); *Sharpe, Hand-list*, iv., p. 140 (1903).

Merula obscura (Gm.); *Oates, Faun. Brit. Ind. Birds*, ii., p. 134 (1890).

Numerous individuals were seen on the day of our departure, after a somewhat stormy night, and a single specimen secured. The species

Digitized by Google

was very common on Pulau Jarak in December, 1904, and occurs abundantly on the mountains of the Peninsula throughout the winter months, but appears to make only a very brief stay in the lowlands on arrival and departure.

37. *HEMICHELIDON FERRUGINEA*—THE FERUGINOUS FLYCATCHER.

Hemichelidon ferruginea (Hodgs.); *Sharpe, Cat. Birds*, iv., p. 122 (1879); *Oates, Faun. Brit. Ind. Birds*, ii., p. 6 (1890); *Sharpe, Hand-list*, iii., p. 204 (1903).

A single female.

Very common on the high mountains of the Peninsula, being probably resident throughout the year above 4,900 feet.

38. *ALSEONAX LATIROSTRIS*—THE BROWN FLYCATCHER.

Alseonax latirostris (Raffles.); *Sharpe, t.c.*, iv., p. 127 (1879); *Oates, Faun. Brit. Ind. Birds*, ii., p. 35 (1890); *Sharpe, Hand-list*, iii., p. 206 (1903).

One male.

Common in the low country in the Malay Peninsula throughout the year, but much more abundant in the winter months.

39. *TERPSIPHONE AFFINIS*—THE BURMESE PARADISE FLYCATCHER.

Terpsiphone affinis (Hay.); *Sharpe, t.c.*, p. 349; *Oates, t.c.*, p. 47; *Sharpe, Hand-list*, iii., p. 263 (1903).

An adult female, probably belongs to this species, though it is extremely difficult to distinguish between females and young males of *T. affinis* and the closely allied *T. incii* (Gould).

40. *DICRURUS ANNECTENS*—THE CROW-BILLED DRONGO.

Dicrurus annectens (Hodgs.); *Oates, Faun. Brit. Ind. Birds*, i., p. 312 (1889); *Sharpe, Cat. Birds*, iii., p. 271 (1878); *Robinson, Journ., F.M.S. Mus.*, i., p. 28 (1905).

Numerous specimens, both adult and young. Very common also on Pulau Jarak in December, 1904, and April, 1906. Widely distributed throughout the Malay Peninsula in the winter months up to an altitude of about 3,000 feet, but scarce at other seasons.

* 41. CORVUS, *sp.*

A crow, probably *Corvus macrorhynchus*, but possibly *Corvus enca*, the Slender-billed Crow, which I have recently ascertained to be fairly common in the Malay Peninsula, was also observed.

Digitized by Google

"KAIN PELANGI."

By L. WRAY.

THIS appropriately named cloth is now much in fashion with the Malays of the Straits and the Federated Malay States. It would appear to be of quite modern introduction, though it has obviously been developed from the much older tie-and-dye work so extensively employed in India for the decoration of cloth. The earliest examples of it, in the Native States, came under my observation in about the concluding year of the last century.

The Malay name means "rainbow cloth." It, however, differs very materially from the cloth which was brought out in Europe under this name some few years ago. This had no pattern, but was dyed to represent the colouring of the spectrum, the colours grading one into the other. In the "kain pelangi," on the other hand, there is a regular pattern, but the colours employed are the brightest tints obtainable with aniline dyes of various hues; hence its name.

The cloth is almost invariably silk. In Singapore, the white silk is bought, and comes either from Japan or China. In Tringganu, it is locally woven, especially for this purpose. The work is done entirely by female labour. In Singapore, the women are Boyanese, from the island of Bawean, off the coast of Java; and in Tringganu, they are natives of that State. This manufacture is also carried on in Kelantan, and possibly in other localities, but the subject has only been studied by the writer in Singapore and Tringganu.

The silk is spread on a short-legged table, having a padded top. The pattern is then printed on it, in outline, by means of carved wooden stamps. These are cut out of comparatively soft wood and are not so well finished as those used in stamping the "kain telepoh." The design is also only in outline, no broad-printing surfaces being left. The stamp is pressed on to a pad of wet rag impregnated with red ferruginous earth bought from the Kling shops. This substance is called "khavi," and is the pigment used by the Hindus for making the caste-marks on their foreheads. The stamp having been charged with colour is next rubbed on a stiff brush, which is fastened with its bristles upwards on the tray containing the pigmented pad. It was a common European boot-brush. The stamp after brushing is applied to the cloth. The stamps are small, containing only a single flower or a portion of a border, and considerable judgment and skill is required to build up the pattern with them. It is all done by eye, no register marks being used as in England when printing patterns by means of wooden blocks. The outline is thus formed in rather pale-red lines which wash out in the subsequent process. The stamping of the outline is done by the same people who do the dyeing.

Digitized by Google

The cloth may be single, but usually several thicknesses are tacked together at their edges and are doné at once, the upper one alone having the outline printed on it. This, of course, saves labour and time, but probably the result is not quite so good as when a single thickness is treated at a time. The outlined cloth is given to other women who prepare it for the dyers. A good deal of the pattern is produced by stitching the cloth firmly together in puckers, and larger spaces which are intended not to take the dye are tied up tightly in pieces of the skin of the leafstalk of the banana. The workers are, of course, guided by the outlined pattern which has been printed on the cloth. When finished, the cloth has a curious crumpled-up appearance; a piece, sufficiently large to make a sarong, will have contracted to about 8 inches in diameter in the tying process.

The tied cloth is then given back to the dyers, who immerse it for a short time in the dye for the ground colour of the piece. Favourite colours for this purpose are yellow, green and red. As previously stated, the pigments used are all aniline ones. After the first application of the dye the cloth is allowed to dry, the tying and stitching is then undone and all the threads are pulled out. It now presents the appearance of a coloured cloth with a white pattern on it.

It is now ready for the next process. For this, it is stretched on a wooden frame with short legs. It may be mentioned that the Malay women, when working, sit or squat on a raised platform, like tailors, so that this frame and the printing table, previously mentioned, are furnished with legs about 9 inches high, to be of a convenient height for working at in that position. The frame is provided with a number of sharp brass pins round its outer edges for the purpose of holding the cloth. Further development of the pattern is now carried out on the stretched cloth by means of different coloured dyes applied with the brushes used by the Chinese for writing with. Most of this embellishment is drawn in free-hand on the white spaces left by the last process, but some of it is put on to the ground colour itself.

The cloth after this is taken off the frame and is ready for sale. No attempt is made to fix the colours and, as a consequence, they are fugitive and run badly when the cloth is washed, or even accidentally damped or wetted. Although both the makers and buyers are well aware of this fact, it does not appear to interfere with either their manufacture or sale. The brilliancy of colouring is the great point in their favour in Asiatic eyes. To the question of why they did not use their own permanent dyes, the makers answered that it would be a great deal more trouble and that the results would not be nearly so beautiful.

The idea that the harmonious colouring of the old Eastern art-work was due to the possession of a fine colour sense, is undoubtedly not borne out by facts. It was simply a matter of necessity, as they

Digitized by Google

could not produce the purer and cruder colours. Now that aniline, in all its varied tints, is obtainable, colour effects, which to educated European eyes are excruciating, are produced and much admired by Malays, Chinese and Indians of all nationalities. The Japanese alone, amongst Easterns, appear to be able to deal with these brilliant colours with taste and discretion.

Besides the above described cloth, a curious mixture of two separate methods of tie-and-dye work is sometimes combined in one garment. That is, a piece of cloth is woven with a part of the warp thread treated by the tie and dye method, which is used to produce the so-called "kain limau *," and the remainder of the length is left white. This portion is subsequently tied and dyed as above described. If the ground colours of the two portions harmonise, the effect is by no means displeasing. There is one sarong in the Perak Museum, which was collected in Tringganu, of this composite cloth; the ground colours being a rather dull red for the "kain limau" part and a quiet yellow for the "kain pelangi" division. Another example, said to have been made in Kelantan, had the grounds of two different shades of red.

There is another species of cloth, produced in Singapore by the same people, which is also called "kain pelangi," though the technique of its manufacture is quite different. The basis is also white silk, which is stretched on the frame already described. The pattern is then drawn on it, in various shades of aniline by means of Chinese writing brushes. No stamps or guides are used, the work being entirely done by free-hand drawing, without even a preliminary sketch. In one specimen, in the possession of the writer, the colours employed are violet, red, green and yellow. The patterns are mostly conventionalised floral derivatives.

REPORTS ON CORUNDUM FROM PERAK, FEDERATED MALAY STATES.

By Professor WYNDHAM R. DUNSTAN, M.A., F.R.S.,
Director, Imperial Institute, South Kensington., London, S.W.

130–15. Imperial Institute Road, London, S.W.,
27th September, 1904.

SIR,—I have the honour to send herewith a report on specimens of corundum from the Federated Malay States received from Mr. L. Wray. The report also refers to other specimens of the same material received from Mr. Cecil Wray and from Mr. Alma Baker.

* *See* "Notes on Dyeing and Weaving as practised at Sitiawan in Perak," by L. Wray, in the "Journal of the Anthropological Institute," vol. 32, January-June, 1902.

Digitized by Google

It will be seen that the result of the investigation of the substance, which has been conducted here, render it probable that there may be a remunerative commercial demand for this corundum, and I propose, with your approval, to proceed further with the matter on the lines suggested in the report.

I would suggest that this report should be shown to Mr. Scrivenor, with a view to his assistance in the further development of the subject being secured since it is possible that deposits of this mineral occur elsewhere in the Federated Malay States.

I would also ask that the information contained in the report be conveyed to Mr. Leonard Wray and the other gentleman who submitted specimens.

I have, etc.,

WYNDHAM R. DUNSTAN.

H.E. THE HIGH COMMISSIONER, F.M.S., SINGAPORE.

A SPECIMEN of grey-blue corundum, weighing about 3 ounces, was forwarded to the Imperial Institute by Mr. Leonard Wray, the Curator of the Perak Government Museum, and in the accompanying letter, dated the 28th November, 1903, he stated that he had collected it near Ipoh in the Kinta District, where the mineral occurs in more or less waterworn lumps in the drift which is worked for tin. At present no use is made of the corundum, but it was thought that, if it proved to be of marketable value, considerable quantities could be procured. Mr. Cecil Wray, the Resident Magistrate of Kinta, had also collected a large quantity of the mineral at Koban Sungei Kaiadi.

On Mr. Leonard Wray's return to Perak he forwarded to the Imperial Institute a larger sample, weighing nearly 5 lbs., which he had collected at Pulai, Sungei Raia, also in the Kinta District. In the letter accompanying the consignment, No. 13/04, dated the 24th February, 1904, he stated that the mineral occurs in quantity at or near Pulai, and thought there would be no difficulty in getting from 10 to 20 tons per month, judging from the amount he saw in the mines.

These two samples, the colour of which varies from pale blue to bluish-grey, are exactly similar in characters. No well-developed crystals are visible to the naked eye, the mineral occurs in compact, finely granular masses made up of microscopic crystals. Most of the pieces are more or less rounded by water action, though the exact manner in which this was brought about is not apparent.

Digitized by Google

The mineral is rather harder than some well-crystallised corundum from Ceylon, which was available for comparison. Its specific gravity varies from 3.75 to 3.90 according to the degree of the compactness of its texture. The higher figure is exceeded by few specimens of corundum, except ruby and sapphire, which reach 4.06.

An analysis in the Scientific and Technical Department of the Imperial Institute gave the following results:

Silica	SiO_2	...	.15 per cent.
Alumina	Al_2O_3	...	7.10 „
Lime	CaO	...	.50 „
Magnesia	MgO	...	trace
Combined water ...	H_2O	...	2.41 „

The percentage of alumina is greater than in any sample of corundum which has been analysed, except ruby and sapphire. The amount of water is, however, rather high.

Corundum is used mainly for abrasive purposes in the same manner as emery. The finer qualities are also employed in place of gemstones in the movements of clocks and watches. It has been proposed to utilise it as a source of metallic aluminium, but at present other less refractory and cheaper compounds of the metal are preferred.

In determining the value of corundum for abrasive purposes, whether it be employed as a loose powder or embedded in cement in the form of discs, a trial on a large scale is absolutely necessary. In no other way can it be ascertained if the mineral satisfies industrial requirements, as not only hardness but toughness is important. The liability of some varieties to split into thin plates along the pseudo-cleavage that follows certain planes of decomposition is very objectionable, as instead of irregular points and edges which are effective for grinding purposes, flat surfaces are produced.

This characteristic seriously diminishes the value of Indian corundum, which was formerly exported in considerable amount to Europe, but is now unable to compete with the extensive deposits of the mineral which have been developed in the United States and Canada, and the artificial products carburundum and alurundum. Corundum is now mined in India mainly for local use and for export to China, only a small quantity being sent to Europe or America. On the other hand, the granular structure of the corundum from Perak seems calculated to increase its value for abrasive purposes.

The material from Kinta was sent to a commercial expert dealing in corundum for his opinion as to its value. He stated that he believed the material might be of value for abrasive work and it might be worth from £15 to £25 a ton for such purposes. If it

Digitized by Google

would take a high polish, it could be used for the movements of clocks and watches and might be sold at a higher price. Actual trial on a commercial scale was, however, necessary.

In June, 1904, a further sample of corundum, weighing 32 lbs., was received from Mr. Alma Baker, of Batu Gajah, Perak. This is in large lumps, some weighing as much as 8 lbs., and is in all respects similar to the previous samples.

There seems every reason to believe that, if this corundum can be obtained in the amounts which Mr. Leonard Wray believes to be the case, it could be sold either for abrasive purposes or for use in the movements of time-pieces at remunerative prices; but, in order that its capabilities may be properly determined by trial on a large scale, a consignment of not less than three or four hundredweight would be necessary in order to determine its precise commercial value as an abrasive agent, together with a smaller amount—say, 7 lbs.—of the clearest and most compact material for trial in the manufacture of watches and clocks.

If, therefore, it is considered advisable to proceed further with this enquiry, I should be glad to be informed whether these larger consignments can be supplied, in which case I shall endeavour to make arrangements with experts to carry out practical trials on the lines indicated above.

27th September, 1904. WYNDHAM R. DUNSTAN.

FEDERAL SECRETARIAT,

No. H.C. 8875/04. KUALA LUMPUR, F.M.S.,

31st October, 1904.

SUBJECT:

REPORT ON SPECIMENS OF CORUNDUM FROM F.M.S.

SIR,—I am directed to forward for your information, in connection with the shipments of specimens of corundum which have been made, a report by the Director of the Imperial Institute of the United Kingdom, the Colonies and India, giving the results of his investigations.

2. I am to ask you to report whether you can supply the larger consignments asked for, with a view to the carrying out of further trials by experts.

I have, et

A. R. VENNING,

LEONARD WRAY, ESQ., PERAK. *Federal Secretary, F.M.S.*

Digitized by Google

BATU GAJAH,
6th November, 1904.

SIR,—I have the honour to acknowledge the receipt of your letter of 31st October (H.C. 8875/04) and to inform you that I will collect and send to the Imperial Institute the large sample of corundum asked for by Professor W. Dunstan.

I have, etc.,
L. WRAY.

THE FEDERAL SECRETARY,
KUALA LUMPUR.

TAIPING, PERAK,
22nd February, 1905.

MY DEAR DUNSTAN,—I send you by this post, in two boxes, a sample, weighing 18 lbs., of what appears to me to be the best quality of corundum for the movements of clocks and watches. I shall be much obliged, if, after trial, a sample of the stone, which proves to be suited to the purpose, could be returned to me. Also a few cut "jewels."

I am also sending, in three boxes, the large sample you ask for. It weighs about 5 cwt.

I went to Pulai, in Kinta, on the 17th February, and collected the whole sample from refuse heaps on one mine, in quite a short time. I am sure it could be obtained in considerable quantities if there was a demand for it, at a price which would cover cost of collection, bagging and freight to England.

I found a few pieces, with small well-formed hexagonal crystals on them, of the same form as that of the sapphire. I also found one large lump, with a portion of the matrix adhering to it. This appears to be a mica-schist.

I am, etc.,
L. WRAY.

PROFESSOR W. DUNSTAN, F.R.S.,
DIRECTOR, IMPERIAL INSTITUTE.

IMPERIAL INSTITUTE OF THE UNITED KINGDOM,
THE COLONIES AND INDIA.

IMPERIAL INSTITUTE ROAD, LONDON, S.W.,
9th October, 1906.

SIR,—I have the honour to forward a report on a consignment of corundum from Perak, which was sent for examination to the Imperial

Digitized by Google

Institute by the Director of Museums at Taiping, with letter, dated the 22nd February, 1905, in accordance with the suggestions made in the previous report, dated the 27th September, 1904, on this subject.

The investigation has shown that this corundum, although of unusual character, is likely to be of value for abrasive purpose, but, before further action can be taken, it will be necessary to know what quantity is available and the approximate price at which it can be placed on the market.

I shall be glad to receive information upon those points and, if possible, to be placed in communication with a firm willing to work the deposits in Perak.

I have, etc.,

WYNDHAM R. DUNSTAN.

H.E. THE HIGH COMMISSIONER, F.M.S., SINGAPORE.

SECOND REPORT ON CORUNDUM FROM PERAK, FEDERATED MALAY STATES.

BY PROFESSOR WYNDHAM R. DUNSTAN, M.A., F.R.S.,
DIRECTOR IMPERIAL INSTITUTE, SOUTH KENSINGTON, LONDON, S.W.

IN accordance with the recommendations made in the previous report (dated the 27th September, 1904) on corundum from Perak, further samples of the mineral were forwarded to the Imperial Institute by the Director of Museums, Taiping, Perak, in order that the material might be submitted to manufacturers for technical trial.

DESCRIPTION OF SAMPLES.

The samples consisted of (1) 18 lbs. of selected corundum pebbles which were thought to be specially suitable for the preparation of bearing for the "movements" of clocks or watches, and (2) about 5 cwt. of ordinary corundum.

The larger consignment consisted of pieces of corundum of rather irregular size, which had a quantity of dust and clayey material adhering to the surfaces. The quality of the samples appeared, however, to be equal to that of the previous specimen, about 95 per cent. being genuine corundum.

The smaller sample, supposed to consist of corundum of superior quality, was in smaller pieces, but was practically identical with the main bulk.

COMMERCIAL VALUATION.

Samples of the two consignments were submitted to a firm of mineral brokers, who reported that the small pebbles of corundum would not fetch a higher price than the large consignment. This firm

Digitized by Google

submitted samples to three manufacturers using corundum, all of whom expressed the opinion that the mineral would be of no value for abrasive purposes. Two of the firms also stated that they did not consider the material to be corundum. On this point, however, they were reassured and informed that the examination of the material at the Imperial Institute showed that it was an unusually pure corundum, containing 97.1 per cent. of alumina, whilst in hardness it was equal to any other variety of the mineral, except ruby and sapphire. The unusual appearance of the corundum, which probably gave rise to the doubts expressed, is due in part to its granular character and in part to its freedom from decomposition by silicification along certain plashes, which causes a tendency to split into small flat plates. Both these characteristics, they were informed, ought to increase the value of the corundum as an abrasive.

The communication of these facts to the firms in question resulted in an offer from one of them to make a thorough test of the mineral. Before going to the trouble and expense of such a trial, the firm desires to know the price at which corundum could be delivered in London.

Another firm asked for a quotation for the 5-cwt. sample which was available, and also for quantities up to 1,000 tons per annum: (1) c.i.f. Liverpool, and (2) f.o.b. at port of shipment.

The firms were invited to make offers, but this they declined to do.

It is now necessary, therefore, that an approximate quotation should be given of the price at which quantities of corundum equal in quality to the sample can be delivered at London, Liverpool and New York, or placed on board ship at Singapore or other convenient port.

Subsequently, a sample of this corundum has been submitted to a firm of merchants with whom the Imperial Institute was in correspondence in regard to other minerals. This firm sent a portion to a customer on the Continent, who reported that the mineral is of good quality and would have a value of about £20 per ton, c.i.f. Hamburg. The Imperial Institute is also in correspondence with a firm in the United States with regard to this corundum, and it appears probable that a fair market for the material can be found if it can be supplied in large quantities at reasonable rates.

It would be an advantage if the Imperial Institute could now be placed in communication with some firm in the Federated Malay States willing to take the matter up, so that their name could be given to firms in this country desirous of buying supplies of the mineral.

9th October, 1903. WYNDHAM R. DUNSTAN.

Digitized by Google

REPORT ON THE MUSEUM DEPARTMENT FOR THE YEAR 1905.

PERAK STATE MUSEUM.

BEYOND a few slight improvements, nothing was done to the building itself. These included brick drains round the ethnological wing and guttering round its lantern roof. Guttering was also put round the roof of the porch, while the exterior of the whole was painted and colour washed. A small detached skinning shed was built in the grounds to relieve the workshop of the dirtier portions of the work.

2. In all the departments the rearrangement, which was begun in 1904, was carried on, and, except in a few instances, the various collections were placed in the order which had previously been determined on. A great deal more work, however, remains to be done to complete the details of the installation.

3. Considerable additions were made to most of the sections—by collection, exchange, purchase and donation. The sections to which the greatest increases were made are the ethnological, mineralogical and economic.

4. The registration and cataloguing of the collections, which was begun in December of 1904, was carried on, and by the end of the year the number reached was 3,800, equal to about 8,000 cards, including the guide-cards.

5. The library was also re-catalogued, which involved the typewriting of about 4,000 cards. This new card catalogue is worked on the same system as that for the other departments, which was mentioned in my last Annual Report, and explained in detail in a paper, entitled "A System for the Registration of the Contents of Museums," contributed to the "Museum Association" and reprinted in the third number of the "Journal of the Federated Malay States Museums."

6. The number of visitors admitted during the year was 55,108, and, as the Museum was open to the public on 295 days, this gives a daily average attendance of 188.83.

7. Mr. E. Keilich, the Taxidermist, returned from eighteen months' leave on the 21st of September, and from then to the end of the year the staff was at its full strength.

SELANGOR STATE MUSEUM.

8. The new Museum was not finished by the end of the year, but the case-building had progressed in a satisfactory manner and the woodwork for the wall cases of the two long exhibition rooms was

Digitized by Google

practically ready for erection by December. The amount expended for case-building and furniture was $2,472.66. This included the cost of a safe, the construction of a trap-door and hoisting tackle to enable the furniture, etc., to be raised to the upper floor, a supply of glass-topped boxes for storing the skin collection and cabinets to hold them, as well as some almeirahs and office furniture.

9. Collecting was actively carried on throughout the year and many specimens new to the collection and several new to science were obtained. In January and again in February the high mountains in the neighbourhood of Gunong Batang Kali were visited by the Curator and his collectors, in May the Gunong Tahan expedition started, and at the end of the year a visit was paid to Linggi in Negri Sembilan.

10. Owing principally to its dilapidated state it was decided to close the old Museum to the public in September and use the whole of it as a store. Many of the specimens were packed up, as this appeared to be the best means of preserving them from deterioration.

11. The number of visitors admitted during the first eight months of the year amounted to 20,930, against 23,219, for the corresponding months of 1904.

GENERAL.

12. The most important event of the year was the Gunong Tahan collecting expedition. It started on the 11th of May and returned early in September. Although the Director of Museums was compelled to return, owing to an attack of dysentery, on the 19th of July, the Curator of the Selangor Museum remained on the mountain and brought the work to a satisfactory conclusion. It is impossible to give any results at the present time. The specimens collected were all sent to the British Museum of Natural History, as previously arranged, and it will naturally be some considerable time before the material can be worked out by the specialists of that Institution.

13. Three numbers of the "Journal of the Federated Malay States Museums" were issued during the year: containing 108 pages of letterpress, five plates and one plan.

L. WRAY,
Director of Museums, F.M.S.

REPORT ON THE PERAK MUSEUM FOR THE YEAR 1905.

THE BUILDING.

EARLY in the year the scaffolding and ataps were removed from the four towers, which had been under repair during the greater part of the previous year. The result from a practical aspect is so far satisfactory, there being no sign of leakage up to the present.

Digitized by Google

The brick drain around the new wing, provided for in the Estimates, was built and completed in February.

The Estimates also provided for galvanised iron guttering around the lantern roof of the new wing, along the front verandah, and around the porch, and this was completed in March.

In May the whole of the exterior of the building was white-washed and the wood-work painted.

A new skinning-shed was built, in close proximity to the existing work-rooms, for the skinning, etc., of the larger animals and general work of a dirty nature.

The floors of the laboratory and dark room were re-cemented in parts where they were badly damaged; and numerous shelves, fixed by means of angle-irons, were erected to increase the storage capacity.

CASES.

The cases throughout the Museum are now all numbered a separate set of numbers being employed for each room. This has been done principally to facilitate registration; and by its means it is easy to state correctly and locate at a moment's notice the exact position of any specimen in the various collections.

The scheme successfully adopted in the ethnological galleries and explained in my last report, of a glazed title for each case, has been carried out in all departments. It has proved highly effective from a practical point of view, and improves the general appearance of the rooms.

New double, brass winders for the window and blind-cords were fitted on to the new wall-cases wherever necessary. In the older part of the building the old winders and unsightly screw substitutes were discarded in favour of the new ones.

In the Geological Department the table-case interiors were given two coats of fresh white paint previous to the re-arrangement of the collection.

With a view to obtaining a reliable paint or distemper to replace the old white oil-colour, the large wall-cases of the Economic Department have been experimented on. In changing the contents of a case it has always been necessary to give the interior a fresh coat of paint, owing to the yellow marks made wherever an object has stood on the painted surface for any length of time; and in other ways it has not been satisfactory. In the cases under notice Morse's Calcarium of a French grey shade has been applied, and has in every way proved satisfactory up to the time of writing. It is inexpensive, and the

Digitized by Google

colour chosen gives a warm and pleasing aspect to the general appearance of the room. It also forms an admirable background for whatever objects have, as yet, been exhibited against it. Should the experiment stand the test of time, the distemper will be used universally throughout the exhibition galleries, with a probable slight variety of colours to suit the circumstances.

Another innovation in the wall-cases has been the substitution, in certain cases, of plate-glass for the old wooden side-shelves. These shelves are cut out of broken sheets of plate-glass which were originally intended for case-fronts. They give a decidedly light and airy appearance to the inside of the cases. As there is a good deal of this broken glass still in hand, it will be possible to extend the use of it in this way into all the collections where the opportunity presents itself.

THE COLLECTIONS.

1. Zoology (Rooms D and E) and Osteology (Part of Room B).

The mammalia were registered and catalogued, re-classified in some orders, and cleaned throughout. A list of the collection was compiled and will appear, in due course, in the "Journal of the Federated Malay States Museums." This list gives the total number of mammalian specimens at the end of 1905 as 297, representing eight orders, 27 families and 93 species.

Part of the spirit collection (snakes and batrachia) were installed in the passage leading into the new wing, in two of the old-fashioned cases with small panes of glass; but the impossibility of arranging the specimens without the interference of the wood-work places the preparations at a great disadvantage. A few rectangular preservative jars have been introduced here in place of the round ones. A stock of these jars is in hand, and all the batrachian specimens will eventually be remounted in them, in addition to introducing them into other parts of the Zoological Department.

The first of an instructive series of preparations, illustrating the evolution of different animals' lives from the embryo to the adult stage, has been placed in this case, and shows the metamorphosis of the frog (*Rana esculenta*) from the egg, or spawn, to the fully developed animal. Similar series obtained from England during the year were: the honey-bee (*Apis mellifica*) and the crab (*Carcinus maenas*).

A table-case will also be at the disposal of the reptilia when the birds' nests and eggs have been embodied in the general ornithological collection. The larger specimens of the chelonia already occupy half the case.

Digitized by Google

A fortnight's collecting on the Larut Hills in March was productive of a small collection of mammals, birds, reptiles and invertebrates. In a morning's visit to Bukit Gantang a specimen of the blackwing kite (*Elanus caeruleus*), with nest and egg, was secured. A specimen of a new flying-squirrel was procured at the Tea Gardens by Mr. W. Boomgardt. On being sent to Mr. Oldfield Thomas of the British Museum for identification, this proved to be a specimen of *Pteromys punctata*, of which only one has before been obtained: the type in the British Museum, which, I think, was procured in Malacca. A specimen of the grey musk shrew (*Crocidura caerulea*), not before represented in the collection, and a hill rat (*Mus vociferans*), new to Perak, were other notable additions.

A number of young adjutant, or marabout-storks (*Leptoptilus javanicus*), were purchased from a Malay in April, some dozen or so nests having been destroyed by a strong wind in the neighbourhood of Bagan Serai. One of these birds was killed and mounted at the time of purchase, and another some two or three months later, whilst the remainder are still at large in the Museum grounds. They will eventually form an instructive life-history group of this remarkable genus of birds.

A native collector by the name of Alang Sagab was employed in the neighbourhood of Kota Lama during the months of May, June and July, and a large collection of land mollusca, arachnida, lepidoptera, coleoptera, ornithoptera, rhynchota, chilopoda and diplopoda was the result. Most of the coleoptera have kindly been examined and identified by Mr. Robinson of the Selangor Museum, and a selection from the rest of the collection has been sent to the British Museum for this purpose.

Word was received in January of the discovery of elephant remains at Ulu Briah, but on visiting the spot they were found to be those of the living race (*Elephas indicus*), and in an advanced state of decay. A small selection of the better preserved bones was made, however.

2. Botany.

Early in the year the herbarium cabinets were thoroughly overhauled, and the damage done by white ants to the panelling and backs was repaired. In this connection I am glad to report the complete success of the experiment (described in my last report) to frustrate the attacks of the ubiquitous termites. Not a single instance of attack has to be recorded, although signs of unsuccessful attempts by the little pests were evident.

Ten sheets of botanical specimens were received late in the year from the Royal Botanic Garden, Calcutta. These, with those received during 1904, have been mounted, labelled and incorporated in the herbarium.

Digitized by Google

Many gifts of botanical and agricultural literature were received and will be found duly acknowledged under the library donations for the year.

3. Geology and Mineralogy (Rooms A and B).

Both of these collections have been entirely re-arranged, which has not only added greatly to the attractiveness of the collections, but has permitted of the inclusion of a number of specimens previously stored up for want of space. Noticeable amongst these is, the collection of fossils presented by the Trustees of the British Museum, of cornish minerals presented by Mr. S. Wickett of Redruth, and of a more general collection of minerals and fossils presented and loaned by Mr. Leonard Wray. Reference to the donation list will also show the indebtedness of the Government to Mr. Cecil Wray for his many gifts to this department.

The arrangement in this department consists of two main divisions—local and general. The geological collections are arranged stratigraphically and the minerals alphabetically. In all cases new titles have been printed in large type and placed in position inside the cases, so that any group of minerals, or a geological stratum, can be quickly discovered. As in other collections each group is separated from its neighbours by thin strips of black wood. To effectively carry out the scheme of arrangement in this department, the front verandah (room A) has been used, and the cases there run consecutively with those in the main (room B).

A large amount of registration and cataloguing was done during the year, that of both the general and local mineralogical collections being nearly completed.

4. Economics (Room C).

During the year under review the final arrangement of this section was made. Progress, however, is somewhat slow; but a good amount of work was accomplished, and the registration and cataloguing of the collection was brought up to an advanced stage.

Wherever possible specimens of leaves of the various economical plants have been introduced into the body of the collection. These are mounted on white card, and glazed in frames made in multiples of the boxes containing the products amongst which they are exhibited. Besides adding largely to the attractiveness of the collection, this series proves highly instructive to the observer.

Many new plaster models have been added, both to the fruits and to the vegetables. Amongst these may be mentioned: the papaya or "buah betik" (*Carica papaya*), bullock hearts (*Anona reticulata*), white egg-plants and purple brinjals or "trong" (*Solanum melongena*), sword beans or "kachang parang," and two varieties (Borneo and Ribbon) of the sugar cane (*Saccharum officinarum*).

Digitized by Google

Valuable additions were made to the rubber exhibits, thanks to the very welcome co-operation of the Plantations Department, through the courtesy of the Superintendent, Mr. J. W. Campbell. Details of these gifts will be found in the list of donations for 1905.

A series of marble slabs were purchased early in the year from the Ipoh Marble Quarry Company, and have been placed in the case for economic minerals. They show very effectively the different grades, or varieties, of marble which are procurable from the quarry. Photographic enlargements of the quarry and works were made and hung on the wall contiguous to the case.

5. Ethnology (Rooms F and G).

Progress in this department is still proceeding steadily, with the result that the local section has already advanced to the critical stage when extra space has become a serious matter.

Most additions in these rooms have been made by purchase, and the actual amount thus expended will be seen under "Financial."

In the lower, or comparative, ethnological room amongst the more prominent accessions are: the new Chinese nail chair; the two carved Chinese figures of Buddha, one in the attitude of contemplation (gilded and painted), the other in that of praying (in the plain wood); the handsome series of Satsuma ware from Japan; the various Arabian objects brought back from Mecca by the Muhammadan pilgrims; the interesting series of Batak sarongs in different stages of manufacture, with the implements and materials for making and dyeing the cloth; the large series of wooden stamps used in printing designs on sarongs, etc.; the set of Sudanese bamboo xylophones called "anklung," and other musical instruments; and the pair of quaint Sundanese puppets, resembling in idea the old-fashioned marionettes, and called "agu menura" (male figure), and "raden ankowi jaya" (female figure).

The collection of photographic enlargements of oriental races was augmented by four portraits of Semangs and two of Javanese.

In the historical section a collection of Perak buttons has been formed, derived from various sources, and representing the Perak Armed Police, Perak Sikhs, Perak Police, Federated Malay States Police and Perak Civil Officers.

In the local ethnology section a valuable and handsome series of old Rembau (Negri Sembilan) carving was procured, and forms a conspicuous exhibit on the right-hand side of the room. Many weapons were added to the already comprehensive series; and on the occasion of the Sultan of Perak's visit to the Museum His Highness was careful to inspect these weapons very closely, and afterwards expressed his great admiration for the collection.

Digitized by Google

Some additions to the Semang and Sakai specimens were derived from an expedition, made in November, to the Ulu Plus, the objective of the trip being to enquire into the conditions of life, etc., amongst the aboriginal tribes of the district. Besides the objects secured for the Museum collections, some valuable informations and statistic were obtained concerning these people.

Registration and cataloguing was continued at intervals throughout the year in both branches of ethnology.

THE LIBRARY.

A large amount of time and labour was spent on the library during the latter half of the year in re-cataloguing and numbering the books throughout. For this purpose a small oak cabinet, similar in design to that used for the Museum catalogue, was procured through the Crown Agents at a cost of $75.91, together with 6,000 cards and two sets of guides—one alphabetical and the other numerical. After roughly cataloguing and numbering each volume, the finished cards for the catalogue and register were carefully type-written. The alphabetical catalogue contains three or four cards for each volume, so that a book may be found either by referring to the author or by looking up the title under its various headings. The register, arranged numerically, is formed of cards, giving the author's name for the head-line, with full particulars of the book.

An extra Clerk was sanctioned by the Government to assist in this work. In all 701 books were catalogued, necessitating the typing of over 4,000 cards.

A revised set of Library Regulations was drawn out, approved by the Resident and duly gazetted. A copy of these, printed at the Government Printing Office, will be pasted in each volume.

There were many additions made during the year, mostly by presentation, the smallness of the book vote prohibiting large accessions being made by purchase. Amongst the latter were five more volumes of the Indian Fauna series—a three-volume work on "Museums: their History and their Use;" "Play and Politics: Reminiscences of Malaya;" "The Real Malay;" Maxwell's "Manual of the Malay Language;" and four numbers of the "Journal of the Royal Asiatic Society, Straits Branch"—replacing lost volumes.

With the free distribution of the "Journal of the Federated Malay States Museums" into the various parts of the civilised world, it will be noticed that the list of library donations has increased and expanded.

There were 25 book loans to approved applications during the year.

Digitized by Google

LIST OF DONATIONS TO THE PERAK STATE MUSEUM LIBRARY FOR 1905.

ANNANDALE, Mr. NELSON:
- "Contributions to Oriental Herpetology," parts 1 and 2.
- "Additions to the Collection of Oriental Snakes in the Indian Museum."
- "Notes on an Indian Worm (*Chaetogastor*)."
- "The Hydra of the Calcutta Tanks."
- "On Abnormal Ranid Larvæ from North-east India."

CEYLON ROYAL BOTANIC GARDEN:
- "Circulars and Agricultural Journal for 1905."

EGYPTIAN GOVERNMENT ZOOLOGICAL GARDENS, GIZA (per the Director, Capt. Stanley S. Flower):
- "Report of the Giza Zoological Gardens for 1904."

INDIAN MUSEUM, CALCUTTA:
- "Catalogue of the Indian Decapod Crustacea," Part 11, *Anomura.*
- "An Account of the Deep-sea Holothurioidea, collected by the 'Investigator.'"
- "Annual Reports for 1903-1904."

INDIAN ROYAL BOTANIC GARDEN, CALCUTTA:
- "The Aconites of India."
- "A List of Laccadive Plants."

KEILICH, Mr. E.:
- "The Adventures of Louis de Rougement."

KEW ROYAL BOTANIC GARDENS:
- "Bulletin of Miscellaneous Information for 1905."

LEICESTER CORPORATION MUSEUM AND ART GALLERY (per the Curator, Mr. Montagu Browne):
- "14th Report of the Museum and Art Gallery, 1902-1904."

LLOYD, Mr. C. G.:
- "Bulletin of the Lloyd Library of Botany, Pharmacy and Materia Medica," Nos. 4-6.
- "Mycological Notes," Nos. 10-19.
- "Puff Ball Letter," No. 5.

"LOUISIANA PLANTER" (per the Editor):
- Complete Issues for 1905.

MAC GREGOR, Mr. R. C. (Bureau of Government Laboratory, Manila):
- "Birds from the Islands of Romblon, Libuyan and Cresta de Gallo."
- "Further Notes on Birds from Ticao, etc."
- "Birds from Mindoro and small adjacent Islands."
- "Notes on three rare Luzon Birds."

MANCHESTER MUSEUM (per the Director, Dr. W. E. Hoyle):
- "Manchester Museum Report for 1904-1905."

MISSOURI BOTANICAL GARDENS (per the Director, Mr. W. Trelease):
- "Annual Report of the Missouri Botanical Gardens," 14th, 15th and 16th.

MUHAMMAD TAJUDIN BIN HAJI ABDULLAH:
- "Sa-air Mamhangunkan Himat or Pikiran Bagi Laki Laki."

MONTEVIDEO, MUSEO NACIONAL (per the Director):
- "Flora Uruguaya," Parts i and ii.
- "Geografica Fisica y Esferica del Paraguay."

OTAGO UNIVERSITY MUSEUM:
- "Curator's Annual Report for 1904" (2 copies).

Digitized by Google

LIST OF DONATIONS TO THE PERAK STATE MUSEUM LIBRARY FOR 1905—(*cont.*)

"PERAK PIONEER" (per the Editor):
Complete Issues for 1905.

RAFFLES LIBRARY AND MUSEUM, SINGAPORE:
"Annual Report for 1904."

SARAWAK MUSEUM (per the Curator, Mr. R. Shelford, M.A.):
"Report on the Sarawak Museum for 1904."

SECRETARY TO RESIDENT, PERAK:
"Agricultural Bulletin of the Straits and Federated Malay States," vol. IV (1905).
"Journal of Indian Art and Industry," vol. IX, Nos. 72 and 73, 75 and 76.
"Diagnosis of Phytophagous Coleoptera" (*Fasiculi malayensis*).
"Abstract of Proceedings of the Linnean Society of New South Wales for 1905."

"SINGAPORE FREE PRESS" (per the Editor):
Mail Editions, complete for 1905.

SMITHSONIAN INSTITUTION, U.S.A.:
"The Birds of North and Middle America," Part iii.
"An Account of the Buildings occupied by the National Collections."
"United States National Museum Annual Report for 1903" (2 copies).

SMITHSONIAN INSTITUTION, U.S.A.—(*cont.*)
"Contributions from the United States National Herbarium," vol. IX.
"Catalogue of Geological Types in the United States National Museum."
"Progress Report of the United States National Museum."
"Proceedings of the United States National Museum," vols. XXVI and XXVII.
"Annual Report of the United States National Museum, 1901 and 1902."
"American Hydroids, Part ii, the Sertu laridae."

SYED ABDULLAH:
"Um-al-Mazhab."

"TIMES OF MALAYA" (per the Editor):
Daily Edition, complete for 1905.
Weekly do. do.

TOKIO IMPERIAL MUSEUM (per the Director, Prof. C. Ishikawa):
"Proceedings of the Department of Natural History."

WEST INDIES, IMPERIAL DEPARTMENT FOR AGRICULTURE:
"West Indian Bulletin for 1905."

REGISTRATION.

1. UNDER THE "BOOK REGISTRATION ORDER IN COUNCIL, 1895."

There were two publications issued in Perak during the year, both in the Malay vernacular:

No. 9.—"Sa-air Mamhangunkan Himat or Pikiran Bagi Laki Laki," by Muhammad Tajudin bin Haji Abdullah, published at Ipoh by the Author;

Digitized by Google

No. 10.—"Um-al-Mazhab," by Syed Abdullah, Chief Kathi, published at Kuala Kangsar by the Translator. As this book deals exclusively with the Muhammadan religion, a special exemption from Section 3 (ii) was granted, and the name and address of the Printer and Publisher was omitted from the work.

"The Perak Pioneer" (No. 1) was issued as a daily from the 1st March, and "The Times of Malaya," daily edition (No. 7), was enlarged to eight pages.

In January copies of all the Perak publications issued during 1904 were packed and sent to the British Museum, and henceforth they were forwarded quarterly.

2. Under the "Inventions Order in Council, 1896."

Five petitions for grants of exclusive privileges were registered during the year:

No. 23.—Mr. Fred. Arthur Turner, for "Improvements in, or connected with, Vapour Generating Lamps for Hydrocarbon Oil or Spirit" (Amended);

No. 24.—Mr. A. Grant Mackie, for a "New Form of Puddler Harrow;"

No. 25.—Messrs. David Christie and Lai Tet Loke, for "Improvements in Puddling Machinery;"

No. 26.—Mr. Charles Ernest Cumming, for "Improvements in Puddling Machinery (Centrifugal Puddler);"

No. 27.—Mr. Charles Ernest Cumming, for "Improvements in Puddling Machinery (Percussive Puddler)."

The inventions register was brought up to date. All past specifications, not previously registered, were procured from the Secretariat, copied, and the copies filed.

ACCESSIONS.

There was a considerable increase in the number of donors and donations during 1905, as a comparison of the list given below with that of 1904 will show. Through the courtesy of the Editor of "The Perak Pioneer," all donations have been publicly acknowledged monthly in the columns of the local newspaper; and this has, perhaps, been largely instrumental in recruiting fresh donors. There is still lacking, however, the co-operation on the part of officials in other Government Departments.

Many valuable accessions have been made by purchase and collection. The small staff of Malay collectors at Bukit Gantang in particular have been untiring in their efforts to increase the Museum collections. Attention has, however, already been drawn to the more important accessions of the year, so there is no need for further comment.

Digitized by Google

LIST OF DONATIONS TO THE PERAK STATE MUSEUM FOR 1905.

AH KWI (Sungei Siput):
Specimen of Galena.

AHMAT (Orderly, Sanitary Board Office):
Indian Mangoes (*Mangifera indica*).

ARCHER, MISS:
Perak Dog Tickets for 1902 and 1903.

BARNARD, MR. B. H. F.:
Gecko Lizard (*Gymnodactylus pulchellus*).
Common Malayan Porcupine (*Hystrix longicauda*) "Babi landak."

BIRCH, MR. E. W., C.M.G.:
Small collection of Insects from "The Box," Larut Hills.

BIRD, MR. G. F.:
Red Hematite from Salak, Kuala Kangsar.

BODGER, MR. WILLIAM:
Head and Horns of Bangalore Goat (*Ovis aries*).

BOOMGARDT, MR. W.:
Large Malayan Flying-Squirrel (*Pteromys petaurista*) "Grabah."
Malayan Spotted Flying-Squirrel (*Pteromys punctata*).
Large Malayan Squirrel (*Ratufa bicolor*) "Tupai nanding."
Indian White-backed Vulture (*Pseudogyps bengalensis*).

BOURNE, REV. J. B.:
Dusky Leaf Monkey (*Semnopithecus obscurus* "Lutong."
Skull of Crested Monkey (*S. cristatus*).
Chinese Commemorative Brass Disc.

BRATT, MR. E. H.:
Sheet of Para Rubber (*Hevea braziliensis*).

BROWN, MR. G. GORDON:
Three Sheets of Para Rubber (*Hevea braziliensis*).

CAMPBELL, MR. J. W.:
Larvæ attacking Caladiums on Maxwell's Hill (*Pplo. polytes*).
A small collection of Invertebrates from Maxwell's Hill.
Two Sheets of Para Rubber (*Hevea braziliensis*).
Two Sheets of Rambong Rubber (*Ficus elastica*).
Two Sheets of Ceara Rubber (*Manihot glazioire*).
Two Sheets of Castilloa Rubber (*Castilloa elastica*), coagulated from washed Latex.
Two Sheets of Castilloa Rubber (*Castilloa elastica*), coagulated from unwashed Latex.
One Ball of Scrap Rambong (*Ficus elastica*).
Latex of Para Rubber Tree (*Hevea braziliensis*).

CHOO CHAK SANG, TOWKAY:
Common Leopard (*Felis pardus*), black var., juv. "Remau kumbang."

COATES, MR. W. J.:
Two Avocada Pears or "Alligators" (*Persea gratissima*).

CUMMING, MR. C. E.:
Vein Tin from the Hydraulic Workings, Bruseh.
Tin in Decomposed Rock from Bruseh.
Coal from Selebin, near Ipoh.

DEPUTY COMMISSIONER OF POLICE, PERAK:
Perak Government Buttons.
Perak Sikh Tunic Buttons and Pouch Badges.
Perak Armed Police Buttons.
Perak Police Tunic Buttons and Badges.
Bronze Cape-Buttons of the Perak Sikhs.
Tunic Buttons and Cap and Helmet Badges of the Malay States Police, Perak.
Three $10-Hongkong and Shanghai Bank Notes, Forgeries.
Three $5-Government Notes, Forgeries.

Digitized by Google

LIST OF DONATIONS TO THE PERAK STATE MUSEUM FOR 1905—(*cont.*)

DISHMAN, MR. A.:
- Stone Implement from Bidor.
- Brown Garnet from Ipoh District.
- Small collections of Minerals from Kinta and Batang Padang.

EPHRAUMS, MR. W.:
- Marabout, or Adjutant, Stork (*Leptoptilus javanicus*) "Burong babi."

FURNIVAL, MR. H.:
- Stag Beetle, *sp. inc.*

GAY, MR. E. M.:
- Reticulated Python (*Python reticulatus*), juv., "Ular sawah."
- Leaf Insect and Eggs, *sp. inc.*
- Long-tailed Lizard (*Tachydromus sexlineatus*).

GERRARD, DR. P. N.:
- Malayan Wood Owl (*Syrnium seloputo*).
- Burrowing Snake (*Cylindrophis rufus*), juv.
- Cicada (*Dundubia sp.*).
- Fresh Water Bug (*Belostoma sp.*).

GOWLAND, MR. H. J.:
- Limb Bones of Common Leopard (*Felis pardus*).

GRAHAM, CAPT. A. McD.:
- Bronze Helmet-Badge of the 1st Perak Sikhs.
- White-metal Tunic Buttons of the Malay States Police, Perak.
- White-metal Helmet and Cap-Badges of the Malay States Police, Perak.

GRAY, MR. N. T.:
- Combs of Honey-bee.

HALE, MR. A.:
- Shells of River Snails (*Paludina sp.*).
- Malayan Sword Bean (*Canavalia ensiformis*) "Kachang parang."

HARPER, MRS. J. P.:
- Snake (*Macropisthodon flaviceps*).

HARRISON, MR. C. W.:
- Malay Fishing Net, "Ambai."

HOGG, MR. W.:
- Tree Snake (*Dipsas boops*).

HUME, MR. W.:
- Bug (*Eurostus sp.*).

KEESING, MR. J. C.:
- Eastern Purple Heron (*Ardea manillensis*).

KEILICH, MR. D.:
- Burmese Wattled Lapwing (*Sarcogrammus atrinuchalis*).
- Common Snipe (*Gallinago coelistis*).
- Moth (*Anisoneura sp.*).

KHYE GUAN AND SONS, MESSRS.:
- Three Chinese Shell Figures from Amoy.
- Fungi (*Lentinus sp.*) "Susu rimau," abnormal growth.

KNOCKER, MR. FRED. W.:
- Collection of Marine Invertebrates from Port Dickson, Negri Sembilan.
- Collection of Reptiles from Negri Sembilan.
- Small collection of River Fishes from Negri Sembilan.
- Small collection of Chilopoda and Diplopoda from Negri Sembilan.
- Common Scorpion (*Buthus spiniger*).
- Sword Beans (*Canavalia ensiformis*), var.
- White Egg Plants (*Solanum melangena*) "Trong."
- Negri Sembilan Dog Tickets for 1902-1903 and 1904.
- Perak Dog Ticket for 1905.
- Five-cent Ceylon Coin, 1870.
- One do. do.

Digitized by Google

LIST OF DONATIONS TO THE PERAK STATE MUSEUM FOR 1905—(*cont.*)

KYDD, MR. JAS:
Larvæ of Butterflies (*Delias hyparete*).

LAIDLAW, MR. G. W.:
$5-Government Note, Forgery.

MACKIE, MR. A. GRANT:
Tin Ore from Sungei Besi (Selangor).

MADDON, MR. L. J. B.:
Cicada (*Dundubia sp.*).

MASTER-TAILOR, MALAY STATES GUIDES:
Perak Government Buttons.

MOIR, MR. GEORGE:
Specimens of Horse Fly (*Tabanus sp.*).

MOSS, MR. P.:
Four-tailed Grey Moth (*Nyctalemon patroclus*).

NELSON, MRS. P. J.:
Long-tailed Lizard (*Tachydromus sexlineatus*).

NG BOO BEE, TOWKAY:
Two Framed Photographs of Ng Boo Bee's Tin Mine at Kamunting and Visit of H.E. the High Commissioner to the Mine.

NICHOLAS, MR. F. W.:
Guinea Worm (*Filaria medinensis*).
Nematodes or Thread Worms (*Anchylostoma duodenale*).
Thread Worm, *sp. inc.*

OSMAN:
Malay Humming Top made from the Fruit of the "Klium" Tree (*Sorodocarpus borneensis*).

PEARSE, MR. CECIL:
Cubic Iron Pyrites.

RETHINASAMY PILLAY, MR. M.:
Silver Dart worn pierced through the tongue during the Hindu penance known as "Alagu."
Double-pointed Silver Dart worn pierced through the cheeks during the Hindu festival known as "Alagu."

ROBINSON, MR. H. C.:
Nest of Bronze-backed Imperial Pigeon (*Carpophaga badia*).

ROWLEY, MR. T. W.:
Long-tailed Lizard (*Tachydromus sexlineatus*).

SAYERS, MR. WM.:
Stick Insects and Young, *sp. inc.*

SECRETARY TO RESIDENT, PERAK:
Perak Revenue Officer's Badge.

SELANGOR STATE MUSEUM:
Collection of Minerals.

SHELFORD, MR. R., M.A.:
Fruit Bat (*Cynopterus marginatus*).
Two Snakes and one Young (*Macrocalamus lateralis*).
Two Bull Frogs (*Rana macrodon*).
Horned Toad (*Megalophrys longipes*).
Scorpion (*Buthus spiniger*).
Five Burrowing Spiders (*Ctenizidoe, sp. inc.*).

SHEFFIELD, MR. J. NEWTON:
Sakai (? Semang) Bamboo Spear.
Bird-eating Spider (*Thrigmopoeus sexlineatus*).
Reptiles from Gunong Grah.

STONEY, MR. B. O.:
Pupae of Butterfly (*Euploea midamus*).

STRONACH, MR. A.:
Specimens of Tin Money.

TAHIB:
Nests of Malay House Swifts (*Cypselus subfurcatus*).

Digitized by Google

LIST OF DONATIONS TO THE PERAK STATE MUSEUM FOR 1905—(*cont.*)

TAYLOR, MR. F. E.:

Candle Nuts (*Aleurites moluccana*) known in the F.M.S. as "Buah kras."

WATSON, MR. E. LAUDER:

Tree Snake (*Dipsas boops*).
Smaller Atlas Moth (*Attacus cynthia*).
Abnormal growth of branch of a Para Rubber Tree (*Hevea braziliensis*).

WILKINSON, MR. W. A.:

Hamadryad (*Naia bungarus*).

WILSON, MR. A. WALLIS:

Indian Mongoose (*Herpestes mungo*).

WRAY, MR. CECIL:

Quartz containing Auriferous Copper, Lead, etc., from Kechau, Pahang.
Ditto ditto 1 oz. of gold per ton.
Quartz containing Auriferous Galena, Blende, etc., from Kechau, Pahang, 1 oz. of gold per ton.
Auriferous Quartz from Mount Morgan, Australia.
Auriferous Pyrites from Celebes, 2 oz. of gold per ton.
Auriferous Copper from Kechau, Pahang, 1 oz. of gold per ton.
Blende Ore from Kechau, Pahang.

WRAY, MR. CECIL—(*cont.*)

Antimony from Merbau Lode, Silinsing, Pahang.
Thorianite from Bamberabos-luwa District, Ceylon.
Two rough cut Rose Catseyes from Ceylon.
Three specimens of Corundum from Ceylon.
Garnet Rock from Kandy, Ceylon.
Gem Rock from the Gem Mines, Ratnapura, Ceylon.
Two specimens of Plumbago from Ratnapura, Ceylon.
Zircon from Kandy, Ceylon.
Blue Apatite in Limestone from Kandy, Ceylon.
Magnetite in Limestone from Kandy, Ceylon.
Rock containing Garnets from Niuwara Eliya, Ceylon.

WRAY, MR. LEONARD, I.S.O.:

Bamboo Bottle for holding Mercury (Chinese).
Gambier (*Uncaria gambier*).
First Class Perak Officers' Buttons.

WRIGHT, DR. M. J.:

Larvæ of Moth (*Gynautoceras sp.*).

YONG FOOK, MR.:

Young King Coconut.

THE FOLLOWING SPECIMENS WERE ON LOAN:

BOURNE, REV. J. B.:

Brass Jar of the time of the Ta Ming Dynasty, A.D., 1426, from Wei-hai-wei.

HODSON, MR. A. W.:

Skull and Jaws of Tiger (*Felis tigris*).

KNOCKER, MR. FRED. W.:

Japanese Three-stringed Musical Instrument.
Japanese Lady's Chop-sticks in Case.
Pack of Japanese Playing Cards, "Hana huda."

Digitized by Google

SPECIMENS WERE ON LOAN—(*cont.*)

MAXWELL, MR. W. G.:
- Head of Malay Tapir (*Tapirus indicus*).
- Head of Javan, or Smaller one-horned, Rhinoceros (*Rhinoceros sondaicus*).
- Head of Sumatran, or two-horned, Rhinoceros (*Rhinoceros sumatrensis*).

WRAY, MR. CECIL:
- Gold with Iron Pyrites.

WRAY, MR. LEONARD, I.S.O.:
- Eight specimens of Agate.
- Specimen of English Amber.
- Malachite (green carbonate of copper).

WRAY, MR. LEONARD, I.S.O.—(*cont.*)
- Serpentine from Cornwall.
- Labradorite from Canada.
- Seventy-four Stone Implements collected in Kent.
- Stone Implement from Ireland.
- Two Drinking Cups made of Buffalo Horn.
- Elephants' Tooth found at Gapis, Perak.
- Chinese Chop-sticks and Knife in Case.
- Two Plates of old Chinese china.
- Two Chinese Tin Cups.
- Chinese Fan Knife.

ATTENDANCE.

The attendance for the year was greater than it has ever been before, and, though at times it is very erratic, it would appear that a steady annual increase has set in from 1902, the figures being:

1902.		1903.		1904.		1905.
40,022	...	46,685	...	52,854	...	55,103

A rough analysis of the attendance would probably show that Tamils far outnumbered other native races; and then, in order of numbers: Chinese, Malays, Indians (exclusive of Tamils), Europeans and Eurasians, and Siamese and Burmese in small numbers.

Experimental opening on public holidays was successful only in the case of native festivals (excepting the Taiping race week), and towards the end of the year opening on European holidays was discontinued.

An examination of the attendance book gives the following interesting statistics:

The largest monthly attendance was 6,017, registered during March. The largest weekly attendance was 2,622, registered during the Taiping race week. The largest daily attendance was on the Hindu festival of "Pangini Utram" (21st March), the number being 1,074.

Other large daily attendances were recorded as under:

Race Week, 1st day, 15th August	1,025
Tai Pusum (Hindu festival), 21st January ...	800
H.H. the Sultan of Perak's Birthday Celebrations, 20th June	569
Race Week, 2nd day, 17th August	554
Chinese New Year, 6th February	512

Digitized by Google

The Museum was open throughout the year on 295 days, and this makes a daily average attendance of 188.83.

Mean daily average of visitors to Museum during 1905:

Month.	Days open.	Maximum.	Minimum.	Total, monthly.	Daily average.
January ...	25	800	117	4,784	191.36
February ...	22	512	127	5,706	259.36
March	27	1,074	135	6,017	222.85
April	22	289	114	4,063	184.68
May	26	268	104	4,233	162.80
June	24	569	100	4,101	170.81
July	26	210	85	3,595	138.26
August ...	25	1,025	41	5,414	216.56
September ...	26	227	97	3,777	145.26
October ...	25	185	100	3,601	116.16
November ...	24	300	90	4,514	188.08
December ...	23	427	168	5,298	230.34
Means ...	24.58	490.50	106.50	4,591.92	185.54

The total for the year is 55,103, the number of days the Museum was opened during the year is 295, giving a mean daily average of 185 visitors.

H.H. the Sultan of Perak, Sir Idris Mersid-el-Aäzam Shah, G.C.M.G., and suite, visited the Institution on the 24th June; H.E. the High Commissioner of the Federated Malay States, Sir John Anderson, K.C.M.G., on the 4th August; the Resident-General, Sir W. T. Taylor, K.C.M.G., on the 5th and 6th December; and the British Resident, Mr. E. W. Birch, C.M.G., with Lieut.-Colonel R. S. F. Walker, C.M.G., Commandant of the Malay States Guides, on the 1st February. Mr. R. Shelford, late Curator of the Sarawak Museum, made a prolonged inspection of the collections in March, on passing through Taiping, and the thanks of the Government are due to him for afterwards obtaining the valuable Javanese ethnological objects already mentioned.

Classes from the Central School visited the Museum on the 3rd April and 2nd June. On the former occasion the Curator was able to give the pupils a short address. Pupils and Sisters from the Klian Pau Convent School paid a visit on the 2nd August; and on Sunday, the 5th February, the Museum was opened, by special request, to the Penang Convent School.

STAFF.

Mr. E. Keilich, Taxidermist, returned from leave and resumed duties on the 21st September, after 18 months' furlough.

Digitized by Google

An extra Clerk was employed during the last five months and eight days of the year, and paid for out of the extra clerical assistance vote.

One Malay Attendant was added to the staff from the 1st January, being provided for in the Estimates, to watch and patrol the new wing.

FINANCIAL.

. . . . . .

Owing to the circular issued in January from the Resident-General's Office disallowing rice allowance to Orderlies, Peons, etc., joining Government Service after 1st January, there was a balance in hand of $24 on the rice allowance vote of $96. The total saving on the expenditure of the department for the year was $1,014.55, $662.42 of which was saved on exchange compensation allowance vote.

The revenue collected by Taxidermist's fees, etc., amounted to $50.45: 45 cents in excess of that estimated.

NOTES AND OBSERVATIONS.

The gift of a pair of slow loris (*Nycticebus tardigradus*)—commonly known in the Peninsula by the misnomer of "Sloth"—was made to the Zoological Society of London in August, and they were safely deposited in the Society's Gardens in September.

A young leopard (*Felis pardus*) of the black variety, which was presented to the Perak Museum by Mr. Choo Chak Sang, of Seremban, was sent to the Egyptian Government Zoological Gardens at Giza, where it arrived in excellent condition in October and was warmly acknowledged by the Superintendent, Captain Stanley Flower.

A pair of argus pheasants (*Argusianus argus*), procured for a similar purpose for the London Zoological Gardens, failed to survive for more than a month or so, and their skins were therefore added to the Perak Museum collections.

A specimen of the Malayan flying-squirrel (*Pteromys petaurista*) was presented to the British Museum in May.

A portrait of the late Sir Hugh Low, G.C.M.G., founder of the Perak State Museum, was framed and hung up; and the portrait of Mr. James Wheeler Woodford Birch, first British Resident of Perak, was hung at the entrance of the comparative ethnology room.

Towards the end of the year a new style of typewriter of the Hammond make was noticed, and one was immediately ordered through the Crown Agents. This machine writes only nine letter to the inch, instead of 11 to the inch as in the ordinary Hammond typewriter; and as the one drawback to type-written labels is their indistinctness, due to the closeness of the type, it was assumed that this machine would be of great assistance in coping with the labelling question.

FRED. W. KNOCKER,
Curator.

Digitized by Google

REPORT ON THE SELANGOR STATE MUSEUM, 1905.

EXPENDITURE.

ON the vote of $6,096 for personal emoluments there was a saving of $2,316.06, owing to the non-appointment of a taxidermist as provided for in the estimates and to the rise in exchange.

2. Under other charges, annually recurrent expenditure, $3,600 was voted, which was spent as follows:

(1)	Collecting trips and transport	$861.34
(2)	Specimens	830.75
(3)	Glassware	422.05
(4)	Preservatives, collecting and cleansing materials	303.18
(5)	Mounting birds and mammals	98.82
(6)	Plates for "Museum Journal"	82.52
(7)	Books and periodicals	136.15
(8)	Postage and petty cash	108.03
(9)	Freight and insurance charges	54.71
(10)	Repairs and sundries	55.26

3. Under special expenditure, $1,000 was voted for the purchase of instruments and specimens and utilised as below:

(1)	Purchase of ethnographical specimens ...	$735.00
(2)	Microscope	193.88
(3)	Rifle	60.00
(4)	Freight charges	10.77
	Total ...	$999.65

4. $10,200 was revoted for purchase of furniture and much progress was made with the construction of cases for the new building; by the end of the year the whole of the hardwood framing for the wall cases of the main galleries was practically ready for erection and the construction of table cases well advanced. A further supply of glass-topped boxes for containing the study collections of birds and small mammals, similar to those used in the British Museum, was obtained from the Crown Agents, and three zinc-lined cabinets, designed to be practically air tight, were ordered from the Public Works Department Factory. It is hoped that this method of storing specimens will be successful in preserving the valuable collections of the Museum from the ravages of a climate which is peculiarly destructive to zoological specimens.

A further stock of chengai was purchased at the end of the year and stacked to season, as it has been found that it is hopeless to attempt to make satisfactory cases unless the wood of which they are built has been cut approximately to size for at least a year.

Digitized by Google

The following charges were incurred on account of this vote:

(1) Labour	$1,043.24
(2) Factory Engineer, almeirahs, bird cabinets and office furniture	498.75
(3) Timber	359.10
(4) Supplying trap-door and hoisting tackle to upper floor of Museum	69.08
(5) Iron work for cases	60.00
(6) Safe	160.00
(7) Shipping and handling charges ...	9.83
(8) Glass-topped boxes	272.66
Total ...	$2,472.66

REVENUE.

Including a balance of $14.46 from 1904, the revenue realised from work done for private persons and sale of surplus specimens was $370.88.

Under authority, previously obtained, $384.67 was expended, principally on freights on specimens sent to England for examination, on ethnographical collections and on expenses connected with the Gunong Tahan expedition, leaving a debit balance carried to the 1906 account of $13.79.

VISITORS.

A large portion of the Museum was closed throughout the year and the entire building was closed from the 8th September. Notwithstanding this, the total attendance for the first eight months of the year amounted to 20,930 compared with 23,219 for the corresponding period of 1904, but it should be pointed out that these figures are merely recorded by a native watchman and, as he was under no European supervision from May to September of 1905, the figures should probably read considerably higher.

Of the total number of visitors the percentage distribution according to race works out as follows:

		First eight months,	
	1903, per cent.	1904, per cent.	1905, per cent.
Europeans ...	1.3	1.8	1.5
Eurasians ...	2.5	3.5	3.9
Bengalis	3.9	5.3	6.1
Tamils	16.7	16.2	18.9
Malays	22.7	20.1	17.5
Chinese	52.9	53.1	52.1
Total ...	100.0	100.0	100.0

Digitized by Google

It will be noted that the attendance of Europeans and Eurasians, taken together, is practically a constant proportion while that of Malays is diminishing; the variation, however, is probably due to changes in the constitution of the population of the town and not to any other cause.

LIBRARY.

No important additions were made to the library during the current year. Contributions were received from the Trustees of the British Museum, the Smithsonian Institution and the Philippine Museum, as well as several small pamphlets and annual reports from other sources. A duplicate set of "Stray Feathers," a journal of Indian ornithology, which contains much matter dealing with the Malay Peninsula, was purchased from the Singapore Museum and a few other books were ordered through the Crown Agents.

APPARATUS.

A Zeiss microscope and a dissecting microscope were purchased from the Cambridge Scientific Instrument Company, Limited.

EXCHANGES.

During the present period of transition it has not been feasible to arrange any very important exchanges, but a small collection of reptiles, desiderata of the Museum, was received from the British Museum as well as a few tubes of named termites.

PUBLICATIONS.

Two numbers of the "Journal of the Federated Malay States Museums" were issued during the year, consisting of about 70 pages of letterpress illustrated by two plates and a plan. Material for two other numbers is under preparation.

ECONOMIC ZOOLOGY.

A few insect pests were submitted and identified during the year including the larva of a small beetle of the family *Bostrichidae*, which was causing much damage to seriah furniture manufactured by the Public Works Department Factory.

ADDITIONS.

I.—ZOOLOGICAL.

In January and February two brief expeditions were undertaken to the high mountains in the neighbourhood of Gunong Batang Kali and small collections were obtained from a height of over 5,000 feet. Amongst other specimens, new to the Museum, may be mentioned, *Cryptolopha trivirgata*, a small green warbler; *Cyanops ramsayi*, a brilliantly plumaged barbet; *Chalcurus inopinatus*, a fine peacock pheasant only known from two specimens obtained by the Hon. Walter

Digitized by Google

Rothschild's collector in Ulu Pahang; and a blue whistling thrush, new to science, which has been described by Mr. W. R. Ogilvie-Grant, of the British Museum. A small squirrel proved to be *Sciurus rufigenis*, hitherto not known from the Malay Peninsula and supposed to be confined to the mountain districts of Burma and Tenasserim. Another extremely rare squirrel, *Rhinosciurus laticaudatus*, was also obtained within the town limits of Kuala Lumpur.

The collections made on Gunong Tahan and in its vicinity have been sent to the British Museum, in accordance with the terms of the agreement whereby the Trustees of that institution paid a considerable proportion of the expenses of the expedition; but it is anticipated that the balance remaining after the first set has been deposited in the national collection will provide a number of species not hitherto represented in either the Perak or Selangor Museum. The numerous other additions, vertebrate and invertebrate, call for no special remark.

II.—ETHNOLOGICAL.

As in 1904 very special attention was paid to this department, and the accessions, mostly from Negri Sembilan and Pahang, are very numerous. The collection of native wood carving has been much extended and further additions have been made to the series of handmade pottery, which now comprises examples of nearly every fabric known from the Federated Malay States, including two beautiful specimens of a type of incised work now no longer made. A large number of spears, showing the development of the blade from a wooden model, were purchased and numerous specimens of the less common types of weapons. Several examples of old brass and silver work were also secured, including two waist buckles of silver, "jadam," the manufacture of which is now a lost art on this side of the Peninsula.

Mr. Cecil Wray, Resident of Pahang, kindly purchased for the Museum a most interesting set of miscellaneous ethnological specimens, mostly from Pekan, including a curious *tumbok lada*, or dagger, with a bronze blade.

Whilst at Kuala Tembeling I also made a small but varied collection, amongst which there may be mentioned a set of the dies used in making the pottery for which the district is famous and several fine specimens of "batu lintar" or neolithic celts dug out of the sand banks which border the Tembeling in several places. At the end of the year a visit was paid to Linggi, where several unique and curious objects were purchased, including a set of the implements used in the "zunnat" operation.

III.—MINERALOGY, GEOLOGY AND ECONOMIC PRODUCTS.

Works on these groups was entirely suspended, pending the transference of the collection to the new Museum, but arrangements have been made whereby the technical collections made by the Mines,

Digitized by Google

Geological, Agricultural and Forests Departments will be placed on view in the central hall of the new Museum; in the meantime, however, no storage room has been available.

DONATIONS.

Considering the out-of-the-way situation of the existing building and the fact that it has been impossible to exhibit specimens to advantage, it is not surprising that donations to the Museum have been few and unimportant. It is hoped, however, that on the removal of the collections to the commodious premises now practically finished this will be altered and that the general public will assist in making the Museum really representative of the resources of these States by contributing any specimens of interest that they may be in a position to obtain.

CONSERVATION.

The collections have throughout the year been cleaned and where necessary repaired, and many of the more perishable articles have been packed up in tin-lined cases, as the increasing dilapidation of the building has rendered their further exposure inadvisable.

A large number of rare mammals and birds were sent home for mounting by an experienced taxidermist, and the former have been safely received back in a most satisfactory condition, the results in the case of a large male siamang and a wild cat being particularly fortunate. Mounting from the dried skin, however, can never show such good effects as when the specimens are taken in hand immediately after death, and in a humid climate like that of the Federated Malay States the drying and subsequent relaxation of the skins are attended with special risk to the specimens, due to incipient decomposition.

STAFF.

The Dyaks attached to the Museum worked hard and well during the year, their duties on Gunong Tahan being specially arduous; but the Bengali watchmen were not satisfactory.

The Museum clerk absconded in September after pawning the silver mounts of several spears and krises; he was, however, captured and sentenced to nine months' rigorous imprisonment, and fortunately the majority of the stolen articles were recovered from the pawnbroker with whom they had been pledged, whilst the value of the balance was made good by the Government Officers' Guarantee Fund.

H. C. ROBINSON,
Curator.

Digitized by Google

THE MALAY VARNISH CALLED "GETAH LULI"

By L. WRAY.

MR. E. M. HOLMES, F.L.S., Curator of the Museum of the Pharmaceutical Society, writes in the Museum Report for 1903-6, p. 32, published in 1907: "Nearly eleven years ago I described in the Journal of this Society (3), 25, a specimen of a varnish used by the Malays of the Straits Settlements, which is there considered to be the best in use, forming a white brilliant hard varnish. It was received from Mr. L. Wray, the Curator of the Perak Museum, who sent with it a leafy branchlet of the tree, but with fruit only, not flowers. From the specimens then sent, so far as I could determine, the tree yielding the varnish was either *Garcinia merguensis*, Wight, or nearly allied to it. Now Mr. Wray has sent specimens of flowers, and, on submitting the flowers to Mr. J. T. Duthie, B.A., the Assistant for India, at the Royal Herbarium, Kew, he has confirmed my supposition as correct."

This species is thus described in the "Materials for a Flora of the Malayan Peninsula," by Sir George King, K.C.I.E.:

"2. GARCINIA MERGUENSIS, Wight, Ill. 122, Ic, 116.—A tree 30 to 40 feet high; young branches thin, terete, dark brown when dry. Leaves: ovate-elliptic to lanceolate, bluntly caudate-acuminate, the base cuneate; upper surface when dry shining, dark brown; the lower dull pale brown, the midrib distinct on both; nerves indistinct, thin, spreading, about .075 inches apart; length 3 to 3.5 inches, breadth 1.1 to 1.4 inches; petiole .25 inches. Male flowers: .15 inches in diameter, in rather dense axillary minutely bracteolate 3- to 6-flowered cymes longer than the petioles; pedicls .2 inches, buds globose; sepals four, fleshy, the outer pair small, ovate-orbicular, sub-acute; the inner pair orbicular, all concave; petals four, orbicular, fleshy, concave, covering the stigma in bud; anthers numerous on both sides of four fleshy processes; sessile, oblong, dehiscing suturally; rudy-style long, cylindric, thick; stigma discoid, smooth, flat. Hermaphrodite flowers: sepals four, the outer pair, as in the male, ovate-orbicular, thin; petals four, orbicular-reniform, fleshy, not covering the stigma; stamens numerous on both sides of four triangular fleshy processes; anthers sessile, sub-orbicular, dehiscing vertically by the sutures; stigma sessile, very large, hemispheric, convex, smooth, covering the anthers when young. Female flowers: sepals four, the outer pair much smaller than the inner, all thin and concave; petals four, orbicular, about the same size as the inner sepals, concave, thinly coriaceous, with a thick-ended coloured patch at the base; staminodes and disk O; stigma semi-hemispheric, almost covering the whole ovary. Fruit: pedicelled, globular, .75 inches in

Digitized by Google

diameter, smooth, covered by the concave smooth stigma. Hook., fil. Fl. Br. Ind., I., 267; Kurz., Fl. Burm., 1, 89; Pierre Flora Forest, Coch.-Chin. Fasc., VI., p. VI., tab. 68, 69, 91, D.

"Malacca: Griffith, Maingay, No. 155; Kew Distrib. Perak: Scortechini, Nos. 224A and 812; King's Collector, No. 2660; Wray, 1075. Penang: Curtis, No. 900."

Professor Wyndham R. Dunstan, F.R.S., Director of the Imperial Institute, furnished the following report on this substance in 1905. It is printed in the "Bulletin of the Imperial Institute," Vol. III., No. 2, p. 149:

"GARCINIA RESIN FROM PERAK, FEDERATED MALAY STATES.

"This material was forwarded to the Imperial Institute on behalf of the Government of the Federated Malay States by Mr. Leonard Wray, Curator of the Perak Museum. The specimen was accompanied by a letter, giving the following information with regard to the extraction and preparation of the resin:

"The resinous substance is the dried sap of a *Garcinia*. The sap is obtained by making incisions in the bark of the trees. It is then boiled until it is as thick as cream, when a little turpentine is added, and it is ready for use as varnish, being applied to the wood by means of a pad of cloth.:

"As prepared, it is an emulsion of a pale yellow colour; if boiled till all the water is evaporated it solidifies, and cannot be dissolved again with turpentine; but if water is added at once it may again be made into an emulsion. It will only keep in good condition for a few days, fermentation of the watery portion of the sap readily setting in.

"This Malay varnish is, when dry, nearly white, very hard and brilliant, being quite equal to the Japanese lacquer. The tree which yields it is a wild one, and as it fruits freely there should be no difficulty in planting it.

"CHEMICAL EXAMINATION.

"The sample of this product forwarded has been examined in the Scientific and Technical Department of the Imperial Institute. The specimen weighed about 4 ounces, and consisted of a semi-solid resin contained in a portion of a bamboo stem. Internally the material was soft and opaque, and had a pale yellowish colour, and an odour resembling that of "t'ung" oil; but externally it was dark-brown in colour, and was covered by a very thin layer of brittle material, probably produced by the action of the atmosphere on the resin. This hard outer layer, which is probably identical with the insoluble resin produced by evaporating the whole of the water from the sap, constituted only a minute proportion of the whole; it was insoluble in turpentine oil and the usual solvents, but the small amount obtainable precluded its further investigation.

Digitized by Google

"The resin, when freed from the thin outer layer of altered material, was soluble in turpentine oil, chloroform, benzene and ether, and almost completely so in alcohol. It melted at 65° C. (159° F.), and on ignition furnished 0.21 per cent. of ash. One grain of the resin required 89.2 milligrams of potassium hydroxide for neutralisation, and 93.5 milligrams of this re-agent for complete saponification. It contains, therefore, a large proportion of free resin acids, and a comparatively small amount of resin esters.

"When dissolved in turpentine oil and the solution applied as a varnish to wood, there was left on drying a hard almost white 'coat,' similar to that produced by damar varnishes.

"A small sample of the resin was submitted to a firm of varnish makers for technical trial: they reported that it could probably be used as a substitute for damar resin in the preparation of varnishes suitable for in-door work, but that it would be necessary to carry out experiments on a large scale before a definite commercial value could be assigned to the material.

"These results indicate that this *Garcinia* resin is a product of considerable interest and likely to prove commercially valuable, and it has been suggested that a larger sample of about 14 pounds of the material should be prepared and forwarded to the Imperial Institute for further examination, technical trial and commercial valuation.

"At the same time a similar sample of the hard insoluble resin prepared by evaporating the whole of the water from the sap, as described in the letter accompanying the present specimen, has been requested, since it is possible that a process might be devised for preparing a resistant varnish of the copal type from this material.

"It is desirable that steps should be taken to identify the particular species of *Garcinia* from which this resin is derived. In this connection, it is of particular interest to note that this resin appears to be quite different in constitution from the gum-resin, gamboge, obtained from the nearly allied plants *Garcinia hanburii* and *Garcinia morella*."

I will now supplement the above particulars as to its collection and use with further details obtained from some Perak Malays.

The method of collection is as follows:

Small horizontal notches are cut in the bark of the trees down to the wood. Each notch is made by a double cut, one with the knife held with the edge turned upwards and the next with it pointing downwards. The result being that a wedge-shaped piece of bark is removed. The tapping is to be done about 5 p.m., and it is essential that the trees be visited early in the morning as soon after sunrise as possible, otherwise the small bees, called *kelulut*, will carry away all the gummy sap for use in their nest building. During the night the sap oozes out and there is found in the morning a small quantit

Digitized by Google

of *getah* in each cut. It is removed by the finger tip and then scraped off into a bamboo. The *getah* is of a creamy consistency and of a pale yellow colour, with a characteristic smell. Examined under the microscope it is seen to be an emulsion.

It is next run out of the bamboo into a piece of white cloth. This is folded up lengthwise, the ends grasped by the two hands and the cloth twisted tightly, till all the fluid has been rung out; leaving only the chips of bark and other refuse in the cloth. To one part of the *getah*, two parts of spirits of turpentine are added, and the whole put into either a brass cooking pot or an iron *kuali*. This is placed over a fire and the contents brought to the boil three times in succession, when it is ready for use as a varnish. As thus prepared, it retains a considerable amount of water and is still an emulsion of a pale yellowish-brown colour. Some Malays say they use *minyak kapor barus*, or camphor oil, but the oil I have been shown under this name appears to be only turpentine, with possibly a little camphor in it. In Larut, any way, common spirits of turpentine is used. It was called *minyak kayu puteh* by my informant, which is the Malay name for Cajeput oil, but turned out to be turpentine on examination.

Formerly, it was considered that it should be cooked only at midnight and the operator had to work in a state of nature; otherwise the process could not be brought to a successful termination.

To apply the varnish, a rag is sometimes used, but the best results are obtained by laying it on with the ball of the thumb, which has been previously smoothed by rubbing on a sharpening stone. If this is not done, the grain of the skin leaves marks on the finished surface of the varnish. No oil is employed to prevent sticking, as in the somewhat similar process of French polishing. Having been coated, the article is hung up to dry, usually under the eaves. This takes from three to five days according to the state of the weather. As first put on, the varnish is translucent from the admixture of water; but, as it dries, the water evaporates and it becomes transparent.

The wood, previous to varnishing, is rendered as smooth as possible by means of a knife, and the final finish given to it by rubbing it down with the leaves of a white-flowered climber, called *mamplas kasap* (*Delima sarmentosa*, Linn.), or those of several species of rough-leaved figs may be employed instead. These leaves give a smoother surface than the finest glass-paper can impart. With hard, close-grained woods like *kamuning* (*Murraya exotica*, Linn.), one coat of the varnish is sufficient; but with softer and more absorbent woods two are required. Nothing in the way of size is employed by the Malays to fill the grain before varnishing, as is done in Europe. It has, therefore, to be filled with the varnish itself.

The articles which are most frequently coated with this varnish are the scabbards and handles of weapons. The surface is bright and

Digitized by Google

hard and will stand much wear. No European varnish, that I am acquainted with, can be compared to it in these respects.

The tree is not a large one; it is found growing in the big forest of the low hills and some way up the sides of the bigger ranges. It is nowhere plentiful, though it is scattered sparsely over a large area of country.

About eleven years ago I obtained some seeds and raised four plants from them. Of these, three are still growing in the Museum Grounds, Taiping. The soil is very bad, the land having been previously mined, so that they have probably not made the growth they would have done under more favourable circumstances. The largest tree is now 21 feet 7 inches in height, measures $9\frac{1}{2}$ inches in circumference, at 6 inches from the ground and 7 inches at 3 feet from the ground. The branches are long, slender and drooping, quite unlike the sturdy growth of the familiar Garcinias, such as the mangosteen and the *gluga*. Up to the present time the trees have not flowered. According to the Malays they are quite big enough to tap.

I have been unable to comply with Professor Dunstan's request for a 14-pound sample of the *getah*; although $5 per gallon has been offered to the Malays for it, no one has yet undertaken to collect it.

"BIAK": AN OPIUM SUBSTITUTE.

By L. WRAY.

THE leaves of an indigenous tree are sometimes used in Malaya as an opium substitute. In the State of Perak its use is said to have declined in recent years, owing to the introduction of cheap opium; but it is still reported to be much in vogue in Patani and other Northern States. This native report was corroborated by Phya Sri Sahabheb, Vice-Minister for the Interior, Siam, who lately visited Perak. He described a tree, the leaves of which were used in place of opium, in the Siamese-Malay States of the northern part of the Malay Peninsula. From his description, I have no doubt, that the tree is *poko biak*. He said it was a much worse form of drug-habit than opium smoking, the effects on its habitual devotees being far more deleterious.

Poko biak is a medium-sized tree, with large leaves and balls of greenish-white flowers. It is widely distributed in Perak, and there is a place near Salak, in the Kuala Kangsar district, named after it. It is known as *Keton* in Patani. It occurs in the jungle and is planted in the kampongs, and also has been preserved when the other trees were felled and cleared away. Consequently, it is frequently seen in and around villages. Specimens of the dried and powdered leaves, as prepared for consumption, have been shown in the economic collection

Digitized by Google

of the Perak State Museum for over twenty years, and botanical specimens of it were collected in the year 1888. Mr. E. M. Holmes, Curator of the Museum of the Pharmaceutical Society, kindly examined and identified them as *Mitragyne speciosa* of Korthals. This was subsequently confirmed by the Botanists of the Royal Botanical Gardens, Calcutta, to whom I also sent them. The following description of the tree appears in Sir George King's "Materials for a Flora of the Malayan Peninsula:"

"2. MITRAGYNE SPECIOSA, Korth., Obs. de Nauclées Indices, p. 19 (name only).—Young branches usually dark-coloured, compressed. Leaves membranous, oblong-obovate to oblong, shortly and abruptly acuminate or sub-acute, the base broad and rounded or rarely slightly and suddenly contracted; both surfaces glabrous, the lower minutely reticulate and sometimes puberulous on the 12 to 15 pairs of slightly curved ascending nerves; length 4 to 5.5 inches; breadth 2 to 3.5 inches; petiole thin, .8 to 1.2 inches long; stipules lanceolate, sparsely pubescent. Corolla .3 inch long; tube of calyx wide, ridged, its mouth about .075 inch across. Anthers sagittate at the base. Stigma mitriform.

"Haviland, in Journ. Linn. Soc., XXXIII., 69; *Stephegyne speciosa*, Korth., Verh.-Nat. Gesch. Bot., p. 160; *S. parvifolia*, K. Schum, fl. Kaiser-Wilh. Land., p. 127; *Nauclea speciosa*, Mig., Fl. Ind. Bat., II., 140.

"Pahang: Ridley, 2190. Perak: Wray, 1896, 4280; Scortechini, 616; King's Collector, 1770, 10029, 10459. Distrib., Sumatra; Forbes, Borneo; Motley, 1169; Korthals, Philippines; Cuming, Motley: Vidal, New Guinea."

It will be noticed that the geographical range of the species is very wide: embracing the whole Malayan Archipelago and Peninsula.

A reference to the supposed properties of the plant appears in the "Kew Bulletin," No. 5 of 1907, p. 199, where it is stated: "A communication from Mr. D. Hooper drawing attention to an article by Mr. H. N. Ridley in 'Journal of the Asiatic Society' for July, 1897, wherein the writer refers to the leaves of *Mitragyne speciosa*, Korth., as being employed in Perak as a remedy for the opium habit." It appears, however, that in the July number for that year there is only one article by Mr. Ridley, and that is "Malay Plant Names," and at p. 58 occurs the only mention of the plant, which is as follows:

"'BIAK' (Perak): MITRAGYNE SPECIOSA, Korth. (Rubiaceae).—Leaves used as a substitute for opium in Perak, according to Mr. Wray."

This is quite another matter; "remedy" and "substitute" being words of such widely diverse meaning. It only shows, once again, how very necessary it is to look up references.

Digitized by Google

There are two distinct ways of preparing the drug for use. In the first, the leaves are picked and put out to dry in the sun, until they become crisp, when they are reduced to a powder by rubbing between the hands. The fibrous ribs and veins of the leaves being removed during the process. The resulting powder may then be stored for future use.

The dose was, characteristically described by an old Malay to be, about four-*duit ayam*'s weight of the powder. A *duit ayam* is a small copper coin having on the obverse the figure of a cock. It was issued by the East India Company at several dates at the beginning of the last century. They weigh on an average 34 grains each, so that the dose would be 136 grains, or, say, $2\frac{1}{4}$ drams Apothecary's weight. The powder is mixed with cold water in a cup and the whole drunk; or an infusion is made with hot water and it is taken like tea. It is usual to take it twice a day, before meals.

The second method of preparation is to dry the leaves as before in the sun, then boil them in water so as to form an infusion. This is strained and the clear filtrate is evaporated to a sirupy consistency. This extract can be kept a long time, and is usually stored in the little horn boxes used by opium smokers for keeping prepared opium in. It is called *chandu* by the Malays, which is also the name of opium when prepared for smoking. This extract of *biak* is mixed with hot water before taking. The dose is said to be one *hun*, which is equal to 5.83 grains Troy. Some people just put it on to the tongue and wash it down with a drink of water.

The extract may also be smoked, somewhat in the same way as prepared opium. The pipe employed for this purpose is made of the bamboo known to the Malays as *buloh minyak* (*Oxytenanthera sinuata*), and is $14\frac{1}{2}$ inches long and $\frac{7}{8}$ths inch in diameter. It is closed by a natural septum at one end, and is open at the other, this is the end which is applied to the mouth in use. Near the closed end a brass tube is inserted, which projects at right angles to the bamboo, and is $1\frac{3}{8}$ inch long, with a bore of $\frac{1}{4}$ inch in diameter. There is in the Museum collection an opium pipe of Patani pattern, almost exactly similar to the one described above, only the bowl, if it may be so called, is of tin in place of brass. The extract is prepared for smoking by mixing it intimately with the finely shredded leaves of the *Palas* palm (*Licuala paludosa*), cut in the same way, and with the same implements, as native-grown tobacco. This mixture, which is a sticky, fibrous, brown mass, is called *madat*.

A lamp on a tall foot completes the outfit. A specimen in the Perak Museum has a wooden base in the form of a conventionalized four-lobed flower, of $5\frac{1}{2}$ inches square and $1\frac{1}{2}$ inch thick. The upper part consists of a piece of bamboo $2\frac{5}{8}$ inches in diameter, cut so that the upper portion forms a shallow cup, closed beneath by a septum.

Digitized by Google

Below this the greater part of the walls of the bamboo have been cut away, leaving only four equidistant cylindrical-shaped pieces, the lower ends of which are mortised into the wooden base, the whole being 9 inches in height, the cup serves to hold the oil container which is a valve of a fluvio-marine shell. The wick is of twisted cotton cloth, kept in place by a metal support. Coconut oil is burned in it.

The method of smoking is as follows: The smoker sits tailorwise on the floor, with the lamp in front of him. He then takes a small piece of the *madat*, rolls it with his fingers into a pellet, the size of the bore of the brass tube, into which he inserts it, then putting his mouth to the other end of the bamboo he brings the *madat* in contact with the flame of the lamp and inhales the smoke of the burning pellet through the pipe. From twenty to thirty pellets are smoked at a time.

The effects of the drug, whether taken internally or smoked, are said to resemble those of opium, and in large doses it is poisonous, producing stupor. It is also said that users of it suffer from permanent enlargement of the abdomen. This is attributed, by some, to the indolent life which is induced by indulgence in the *biak* habit.

Besides the purposes already mentioned, the leaves of this tree are used medicinally for worms in children. They are made into a poultice and applied externally over the upper portion of the abdomen. It is held that, if applied to the lower portion, the worms are driven upwards and escape by the mouth; but if confined to just beneath the termination of the ribs they are expelled downwards and are passed in the ordinary way. Of their efficacy as a vermifuge, applied in the manner indicated above, I have very grave doubts.

Some time back I sent about 16 pounds' weight of the dried leaves to Mr. E. M. Holmes for examination. He, however, reported that no poisonous alkaloid had been found in it. A further consignment has now been sent, and it is hoped that the active principle will be successfully separated from the drug.

"SUJI TIMBA."

By L. WRAY.

THIS is a form of gold-thread embroidery, much used by the Malays for the ornamentation of mats and other articles. It appears to be very closely related to the so-called "gold lace" on Civil Service and some other uniforms; though whether it is produced in the same way, I am not in a position to say.

The design is drawn on white paper, in free-hand, for the most part; but where there is a pattern which consists of two or four symetrical divisions, the paper, or, in the case of a large design, a

Digitized by Google

separate smaller piece of paper is folded in half or quarters and the motive is drawn on one section of the folded paper. It is then put on to a board and cut through all the folds by means of a sharp-pointed knife. It is subsequently unfolded and laid on the large pattern, being kept in place by means of a few small fragments of bees'-wax placed between the two papers, and a pencil run round it, when it may be removed. The drawing of the pattern being completed, it is cut out with a knife, all those portions of the paper which are to appear in gold thread being left and those which are to show the foundation are to be removed, care being taken to leave narrow strips of paper to support the pattern where necessary, and a circle, square, or other border is to be left to enclose the whole. This latter is called the *tali-ayer*, or water-course. These paper templets are called *achu* in Kuala Kangsar.

Strong cardboard is then built up by pasting several thicknesses of brown paper together, with two sheets of white for outside covers. When dry the paper templet is laid on this card, being kept in place as before mentioned by a little wax here and there, and the design is carefully traced by means of a fine-pointed pencil. The templet being removed, the pencil lines are cut through with a knife.

To make cording, narrow strips of rattan of the kind called *rotan segur* are taken. These are then passed through holes punched in a piece of tinned iron. First through large holes and then successively through smaller ones, till the strip becomes round and of the required size.

This process much resembles wire drawing, but differs from it mainly on account of the physical characteristics of the two materials. In the case of wire, the diameter is reduced by passing it through a series of conical holes, whereby its length is augmented at the expense of its section; while in the rattan, the sharp edges of the tin-plate scrape off portions of its substance without adding anything to its length.

The cardboard pattern, which is called *tempulok*, is put on to the cloth, usually velvet, which is to form the foundation of the design, and tacked down with stitches from a quarter to half an inch apart. The stitches are taken transversely across the card and not through it. Where lines are required to complete the design, the prepared rattan is stitched on in the same way.

It should be mentioned that the foundation cloth, with its backing of coarser material, is stretched on a horizontal work-frame before the application of the card pattern.

The next step is to cover the pattern with gold thread. For this purpose a winder is used consisting of a piece of bamboo about 9 inches long, across one end, and about $1\frac{1}{2}$ inches from it, a shorter

Digitized by Google

piece of bamboo about 3 inches long is securely tied. This implement is called in Perak *olak-alek*, but it is known as *choban* in Pahang: where it is, or rather was, made of many fanciful and graceful shapes; in silver, brass, horn and other materials. A fine series of these was collected by the writer and is now in the Perak Museum.

On to the cross is wound the gold thread, usually a double strand, the other end of the implement serving as a handle. A small needle with fine white or ground coloured cotton is also necessary, as the gold thread is not passed over the card pattern and through the foundation and up the other side after the manner of crewel work, but is only carried over the front of the card, being stitched down on either side of it with the needle and cotton. To do this neatly requires some skill, as the cotton must not show and the gold thread must be laid evenly so as to completely cover the whole surface of the card. The way it is done is, after having fixed one end of the gold thread, to lay, by means of the winder, which is held in the left hand, the thread across the pattern, then the needle is brought up through the material at the edge of the card on one side of the thread, then over it and back again down through the material. This fastens the thread down on that side, then the winder is moved to the other side, so that the thread lies evenly next to that first laid, the needle is brought up again, over and down through the material. This process is continued till the whole of the card pattern is covered evenly with gold thread. As the supporting pieces of card previously mentioned are come to, they are cut off, and the surrounding outer ring, if it does not form a part of the design, is also removed by undoing the tacking cotton, when it is no longer required for the support of the pattern.

The pieces of rattan are covered in the same way as the card. As many as five of these strips of rattan are laid together to form a border in some cases. At other times two, three or four are used. In covering these borders the thread is carried across from No. 1 to the next, perhaps six times, then the same is done from No. 2 to No. 3, then again from No. 1 to No. 2, and so on alternately so as to form a chequered pattern, as is done in English gold lace. The gold thread is stitched down as already described. Occasionally single pieces of the rattan are covered by coiling thread round them before applying it to the work.

Beads, usually white, and spangles are freely used in this work to fill up all empty spaces. In this, as in most classes of oriental design, there appears to be a feeling that the whole surface should be covered with work of some sort. The restful effect of an unbroken back-ground does not seem to appeal to an Asiatic.

Sometimes the representation of coloured flowers is attempted by filling in spaces, which have been purposely left in drawing the design,

Digitized by Google

with a closely packed mass of coloured beads. It is probable that this shows Chinese influence, and it is not by any means an improvement on the plain gold; particularly as in many cases the choice of colours is apt to be anything but happy. Filling is also done with silver thread, which is much more harmonious.

When completed the result is a raised design in gold, on a foundation of some dark-coloured velvet or cloth, usually red, green or purple. Of the square mats the whole central portion of the upper one is generally embroidered in this method, while the edges of the top fold and of the lower ones are covered with some figured cloth of a different colour for each fold. It may be mentioned that these mats are made somewhat like the conical bellows of a photographic camera, with sometimes as many as six folds, each one being smaller than the one below it. The better class sleeping and praying mats are also made after this fashion, but usually have only two folds. In these long mats the portions that are ornamented by *suji timba* are the head piece and a row on either side of more or less triangular-shaped pieces. These are worked separately and then cut out and sewn on in their proper places. The centre of the mat, to the edges of which these pieces of embroidery are applied, is most effective when of plain or watered silk, but the Malays often use figured silk with not such good results; at any rate, from a European's art point of view. The bag at one end of a praying mat, which contains the praying staff, is also extensively embroidered.

Pillow-ends of circular, octagonal or rectangular shapes, and also bags, shoes and purses are frequently enriched with *suji timba*.

TWO RUBBER PESTS.

By L. WRAY.

SOME years ago a large number of caterpillars appeared on the Para rubber trees at the Government Plantations at Pondok Tanjong, and did very considerable damage by defoliating the trees. Some of the caterpillars were sent to me, and I endeavoured to rear them, but they all died in a few days' time: apparently because they had had rough treatment before reaching the Museum.

The second outbreak of this same pest was in the early part of this present year at Gapis Estate, Padang Rengas, belonging to the Kuala Kangsar Plantations Company. Here again very marked damage was done to some twenty acres of young trees. Four of the caterpillars were sent to me in a tobacco tin, which had had some holes punched through it with a nail, the rough jagged edges of the tin projecting inwards. It is, perhaps, hardly necessary to state that they all died a few hours after arrival. Although I was promised more of the insects, they have never been sent.

Digitized by Google

The following superficial description, which will be sufficient to identify the pest when it occurs elsewhere, was taken down when the insects were received:

"General colour above black, minutely spotted and lined with white, sides with a bright yellow, waved line, starting from just behind the third pair of legs and continuing to the tail. There are some conspicuous white spots on the shoulders and on the last segment but one of the body. Head and legs bright reddish brown, prolegs black, largely spotted with pale reddish brown; beneath black largely spotted with dull yellow. The largest specimen was some inch and a half in length."

In both cases the fields attacked were next to some young secondary jungle, or *bluka*, and the caterpillars were also found numerously on much of the vegetation composing it.

The remedy I proposed in both instances was the well-known one of poisoning the leaves by spraying them with water containing Paris green held in suspension, and the Museum spraying apparatus was lent for the purpose. It was reported that the treatment was quite effective and rapidly killed the pest.

It may be mentioned here, as a good deal of misapprehension exists, that this poison acts by being eaten with the natural food of the insect—that is the leaf. Consequently it is necessary in applying it to mix with the water some substance which will make it adhere to the leaves. Otherwise, when they become dry, the powder will fall off, or at any rate the first shower of rain will wash the leaves quite clean. The material I have found effective is a paste made with flour, or some other form of starch, which has been well boiled. A small quantity of this mixed with the water serves to fix the poison to the leaves sufficiently firm to withstand the rain.

The mere contact of the poison with the body of the insect has no effect, it must reach the organs of digestion and be absorbed before it becomes operative. The object of spraying is, therefore, to deposit a film of poison on the leaves which will subsequently be consumed by the leaf-eating pest which it is wished to destroy.

Recently considerable damage has been done to some young rubber trees at Lauderdale Estate, Matang, by the attacks of a green leaf-eating weevil, which I identified as *Astycus chrysochlorus*, Wied.

In 1897 this same beetle did a very large amount of damage to many acres of Liberian coffee at Gapis Estate; and at the request of Sir W. H. Treacher I worked out its life history. The report, which was dated 27th July, 1897, was published in "Perak Museum Notes,"

Digitized by Google

Vol. II., Part I., p. 61-8. From this I will quote the summary, which will be sufficient here:

"The egg is laid in a small hole in the surface of the ground. On hatching, the grub burrows into the soil and lives on the well-rotted roots and other vegetable matter contained in it. Having attained a size of about $\frac{3}{4}$ of an inch in length, it forms for itself a chamber in the earth, about 2 inches below the surface, in which it undergoes its metamorphosis. The perfect insect burrows its way out of the earth at night and flies, probably the next day, in search of food. Having found a tree on which it can live, it stays on it while there is any leaf to eat, the females leaving the food plant from time to time to deposit their eggs in the ground.

"The results of digging showed that the grubs were most frequent in the cleanest land. I dug in grass and weeds in many parts of the estate, but could not find one. The same results followed digging in scrub and *lalang* land, and also under the hedges . . . In the clear land, in one place, as many as six grubs were found within an area of less than one square yard; but, on an average, there are not more than one or two per square yard. Of course, the younger ones being very small undoubtedly escape observation when turning over the soil. At one per square yard we get 4,840 per acre, which is a sufficiently large total to account for a very extensive destruction of foliage."

Taking into account the life history of the insect, there appears to be only one period of its life when it is possible to attempt to destroy it—and that is when it has attained maturity. Then it might be collected by hand picking or killed by poisoning its food supply with one of the arsenical powders applied as previously mentioned. Mr. E. Lauder Watson informs me that he has nearly exterminated it by hand picking. The same method was also reported by the late Sir Greame Elphinstone to be effective in ridding the Liberian coffee on Gapis Estate of the same pest.

DIE INLANDSTÄMME DER MALAYISCHEN HALBINSEL.

By Dr. RUDOLF MARTIN.

IN this work—which covers two volumes and is extremely well printed and illustrated—Dr. Martin discusses the data that he has obtained, either personally or through the reports of other observers, regarding the wild tribes of the Malay Peninsula. He does not do more than touch upon linguistic questions, but, except in this important branch of research, his work is very thorough, and is only inconclusive because the data that we possess are insufficient to lead to any very positive results.

Digitized by Google

It is customary to divide the wild tribes of the Malay Peninsula into three distinct classes: the "Sĕmang," or black woolly-haired aborigines of the North; the "Sakai," or fair wavy-haired aborigines of the Batang Padang mountains; and the "Jakuns," or Indonesian aborigines of Malacca and Johor. Of the Jakuns, Dr. Martin has little to tell us—he saw nothing of them; but confined his personal observations to a few men of the Blanda, Bĕsisi, Sĕnoi and Sĕmang types —the best-known or stock types of "aborigines." Quite apart, however, from the "Jakun" omissions, it is extremely doubtful whether Dr. Martin has really done more than deal with the outer fringe of the "Sakai" question. The "Sĕmang," in the North, are certainly a highly specialized race; but between them and the Sĕnoi of Batang Padang lie other important tribes—the "Tembe," of Clifford; the "Bastard Sĕmang," of Annandale and Robinson—who differ from both Sĕnoi and Sĕmang, and who are not at all adequately discussed in Dr. Martin's book. In the valley of the Nĕnggiri there is said to be a large community of Sakais; very little is known about them, and Dr. Martin adds nothing to our knowledge. In the little-known country between the Tĕmbĕling and the Kuantan, there are more Sakais, but nothing whatever is known about their language, and the little that is known about their blowpipes and their costume shows a great difference between them and the other wild tribes of the Peninsula. In Selângor, the dialect of the Sakais behind Rasa has some marked peculiarities, while that of the Orang Kĕnaboi between Sungei Lui and Jelebu is (if our vocabularies are to be trusted) totally unlike any other known language. The numerous Sakai settlements between Johol and the Upper Rompin have also to be investigated. In any case, it is quite clear that the three stock divisions—"Sĕmang," "Sakai" and "Jakun"—are not an adequate description of the aboriginal races of the Peninsula, and will have to be extensively modified in the future.

Dr. Martin's work is, therefore, not by any means "the last word" on the wild tribes of Malaya, but it is an excellent summing up of all that we know at present about them. Our information hitherto has been largely of the nature of travellers' tales; Dr. Martin has subjected those tales—especially the tales of "Professor" Vaughan-Stevens—to scientific analysis and distinguishes to some extent between the true and the false. He begins by giving us 73 pages on the Geography, Geology, Climate, Flora and Fauna of the Peninsula—a section of the work which is called for by continental ideas of thoroughness and not by any special light that it throws on the questions at issue. He then goes on to discuss the data about Pre-historic Malaya. Who made the stone implements that we find in the Peninsula? Dr. Martin gives good reasons for believing that the Sakais did not make them. He then discusses the historical data, from Herodotus to the last census returns; but they throw no light on the origin of the Sakais. We then get a very useful 20 pages on the History of Sakai Research, in which Dr. Martin discusses very thoroughly the work of Vaughan-

Digitized by Google

Stevens and finally dismisses the "Professor" by quoting, with some show of approval, a casual remark that he was "the biggest liar in Asia." It was certainly time that the "Professor's" statements should begin to be taken with the salt of incredulity. Dr. Martin's account of the distributions and divisions of the wild tribes (pp. 177-218) comes next. It is the least satisfactory part of the book; he mentions very few tribes, confuses the Blandas and Bĕsisi, and devotes for too much attention to trivial points, such as the spelling of tribal names. How can it really help us to know that the word "Sĕmang" has been spelt in no less than seven different ways?

The consideration of the "Physical Anthropology" of the Sakai and Sĕmang takes up no less than 433 pages, and is by far the most valuable portion of Mr. Martin's work. Of course, we need more data. No single aboriginal tribe has yet been exhaustively studied; many tribes are still practically unknown; the material that we possess is of unequal value. The "Ergology" of the wild tribes is discussed in about 350 pages, and Dr. Martin completes his work with 41 pages of "Concluding Remarks" on the anthropological position of the wild tribes of the Malay Peninsula. His conclusions are mainly negative. A good bibliography and some excellent plates are included in the second volume of Dr. Martin's work.

There can be no question of the utility of Dr. Martin's book. Except in the matter of linguistics, it completely supersedes every existing work, and is an excellent statement of the results obtained up to the present by the study of these little-known wild tribes. But they still remain little known. The great desideratum—a full account of the distribution of the aborigines and of their differences—is still lacking. Three tribes—Sĕnoi, Sĕmang and Bĕsisi—loom far too large in all accounts of the wild tribes of the Peninsula. We are left to judge the others by these three. Yet there are immense differences that are not to be so easily dismissed. The Kĕnaboi language differs far more from the language of the neighbouring Bĕsisi, than the Bĕsisi differs from Sĕmang. What again is the explanation of the common element in the language of the Bĕsisi, Sĕmang and Sĕnoi, when the racial differences are so great? What is the explanation of the ergological differences, the different types of blowpipe coming from different parts of the Peninsula, the differing poisons, the various ways of making fire? What is the true relation between the so-called "Bastard Sĕmang" and the Sĕnoi and Sĕmang? Mere admixture of race will not explain the differences. Sakai Research is too much confined to "stock" tribes; we want to know more about the men of the Nĕnggiri, of Kuantan, of Ulu Rompin and the Kĕnaboi. There are numerous questions still remaining to be answered; and until more data are available any ambitious work on the wild tribes must run the risk of being considered premature.

R. J. WILKINSON.

Digitized by Google

THE FOOD OF THE HAMADRYAD.

THE Hamadryad, *Naia bungarus*, Schleg., is the largest of poisonous snakes. Lydekker in the "Royal Natural History" gives the size as 13 feet and states that it probably grows larger. The longest one in the collection of the Perak Museum, measured in the flesh 14 feet 9 inches. I have heard of larger specimens, but have had no means of verifying the measurements.

Ophiophagus, one of the synonyms of the Hamadryad, means "snake-eating," in allusion to its well-known habit of devouring members of its own order. It, however, does not appear to have been recorded that it eats, not only innocuous, but poisonous snakes as well. Two instances of this have come under my observation. In the first a Hamadryad of about 10 feet in length was caught by hitting it with a stick, when it disgorged a 6-feet long Sun-snake (*Adeniophis bivirgatus*, Boie.), which had only just been swallowed. The second case was of a Hamadryad which was caught and killed while in the act of englutting a *Bungarus fasciatus*, Cantor.

The Sun-snake is, although poisonous, not of a very virulent type, and has such a small gape that it would be no match for a powerful snake like the King Cobra. The *Bungarus fasciatus*, on the other hand, is one of the more poisonous species, and is, according to the Fauna of British India, a snake-eater itself. Cantor in his "Catalogue of Reptiles inhabiting the Malayan Peninsula and Islands" writes: "A fowl, four minutes after it had been bitten on the inner side of the thigh by a *Bungarus fasciatus*, fell on the wounded side and was shortly after seized with slight purging. The eyes were half closed, the pupils alternately dilated and contracted, immobile. In seventeen minutes slight spasms occurred, under which the bird expired forty-three minutes after it had been wounded.

"Another fowl, wounded in the same place as the former by the same serpent, but, after an interval of seven hours, expired under similar symtoms, only more violent spasms, in the course of twenty-eight minutes."

Bearing on this subject, Sir J. Fayrer, Bt., K.C.S.I., in the "Thanatophidia of India" writes: "I have not been able to satisfy myself positively, after many experiments made on purpose, that the poisonous snakes are absolutely insensible to their own, or to the venom of others, but to a great extent they certainly are so.

"I have repeatedly made Cobras and Daboias bite themselves, and each other, and they never seemed the worse for it. But I believe that the poison does take effect on snakes of a less deadly character, and although I have generally seen the *Bungarus* escape, I have seen an occasional death of this snake after a bite by a Cobra that, I think,

Digitized by Google

might, with some reason, be attributed to the poison. The non-venomous snakes die rapidly—the Ptyas, a large, vigorous and fierce snake, though non-venomous, succumbs within an hour or so to the bite of a Cobra."

From the fact that, in natural circumstances, a Hamadryad has been found to have killed and almost swallowed a large *Bungarus*, it appears that it may be assumed that the poison of the latter is not effective against the former, while the venom of the former is fatal to the *Bungarus*. The Hamadryad being a much more agile reptile than the other, it may rely on its quicker powers of movement to enable it to inflict a fatal bite on its prey and escape a bite itself; in the same way as the Mongoose does. There is, therefore, still some doubt respecting the first assumption, though, I think, that the second is clearly proved.

Two cases of Hamadryads, caught in the act of eating non-poisonous snakes, have also come under my notice. In one the prey was a *Coluber radiatus* of 5 feet 5 inches in length, while the Hamadryad measured 9 feet 7 inches; and in the second it was a common Rat Snake.

L. W.

REPORT ON *ERYTHROXYLON COCA* LEAVES FROM PERAK.

By Professor WYNDHAM R. DUNSTAN, M.A., F.R.S.,
Director.

THE sample of coca leaves which is the subject of this report was forwarded for examination to the Imperial Institute by the Director of Museums, Federated Malay States, with letter No. D. M. 56/1907, dated the 15th April, 1907. The leaves were procured from the Kamuning Estate, Perak, where about half an acre has been planted with *Erythroxylon coca*.

DESCRIPTION OF SAMPLE.

The sample consisted of about 15 lbs. of brownish-green leaves, which varied in length from 1 to 2 inches; they were brittle and very much broken. The leaves resembled those of *Erythroxylon coca*, Lam., var. *spruceanum*, as cultivated in Java, but were rather browner than a good sample of the latter.

RESULTS OF EXAMINATION.

Chemical examination of the leaves gave the following results:

Moisture at 100° C.	9.19	per cent.
Ash	6.95	,,
Total alkaloids	0.64	,,

Digitized by Google

The percentage of alkaloids present is quite equal to the average amount found in commercial supplies of coca leaves from other sources.

COMMERCIAL VALUATION.

A sample of the leaves was submitted for valuation to a firm of manufacturing chemists, who reported that the colour was not particularly good, and that at present similar leaves containing 0.6 per cent. of total alkaloids would fetch $7\frac{1}{2}d.$ to $8d.$ per lb. on the London market.

The firm stated that they had recently made a considerable purchase of Java leaves of the same alkaloidal strength, but of superior colour at the above-mentioned price.

CONCLUSIONS AND RECOMMENDATIONS.

These coca leaves from Perak were not very well prepared, being much broken and discoloured. To obtain the best price, the leaves should be bright green, unbroken, and of good aroma, and these characters can only be obtained by collecting the leaves carefully and drying them fairly rapidly.

It is stated that, in Java and Ceylon, the best qualities of coca leaves are dried quickly by means of a current of warm air produced by a fan.

The price obtainable at the present time for coca leaves is fairly remunerative, because the trade, outside South America, is in a few hands and there is no over-production of the leaves. The total demand for coca leaves is, however, small, and there would be great risk of overstocking the market and so reducing prices if further extensive planting is undertaken. In these circumstances, if it is proposed to plant *Erythroxylon coca* in the Federated Malay States, the enterprise should be started on a small scale and afterwards extended, should circumstances point to the desirability of this being done.

(Sd.) WYNDHAM R. DUNSTAN.

15th July, 1907.

A HAND-LIST OF THE BIRDS OF THE MALAY PENINSULA, SOUTH OF THE ISTHMUS OF KRA.

By HERBERT C. ROBINSON, C.M.Z.S., M.B.O.U.,
Curator, Selangor State Museum.

SINCE Hume published his three papers [1] on "The Birds of the Western Half of the Malay Peninsula" in 1879 and 1880, no general list of the birds of the region has been issued, though a very considerable amount of collecting has been accomplished, more especially on

[1] *Stray Feathers*, viii., pp. 37-72; *tom. cit.*, pp. 151-163; *op. cit.*, pp. 107-132.

Digitized by Google

the main mountain range, in central Pahang, and on the north-east coast. In view, therefore, of a work on the Vertebrate Fauna of the Malay Peninsula, which is shortly to be undertaken under the auspices of the Government of the Federated Malay States, I have thought it well to bring together a revised list of the species at present recorded from the area. Considerations of space have prevented me from giving the distribution of the species, either local or general, nor have I, except in very occasional instances, thought it necessary to give any references to descriptions or authority for occurrence.

My sources of informations have been the collections of the Perak, Selangor and Singapore Museums (the two former of which are very rich in birds), the "Catalogue of Birds in the British Museum" and various papers on recent collections which I have cited in a former article [1] and need not here repeat.

For the convenience of local students, species, which are represented in one only of the local museums, are marked with an asterisk for Perak and a dagger for Selangor, while those, which are desiderate to both collections, are printed in antique type—*e.g.*, **Rheinwardtius nigrescens.** In addition, those forms which, though included in the list, are of somewhat doubtful occurrence in the Peninsula, are printed within square brackets.

ORDER *GALLIFORMES*—GAME-BIRDS.

1. Rhizothera longirostris (*Temm.*).
2. Arboricola charltoni (*Eyton*).
†3. Arboricola campbelli, *Robinson*
4. **Caloperdix oculea** (*Temm.*).
5. Rollulus roulroul (*Scop.*).
6. Melanoperdix nigra (*Vig.*).
7. Excalfactoria chinensis (*Linn.*).
8. Acomus erythrophthalmus (*Raffles*).
9. Lophura rufa (*Raffles*).
10. Gallus gallus (*Linn.*).
11. Polyplectron malaccensis (*Scop.*).
12. Polyplectron inopinatus (*Rothsch.*).
13. Argusianus argus (*Linn.*).
14. **Rheinwardtius nigrescens,** *Rothsch.*
15. Pavo muticus, *Linn.*
16. Turnix taigoor, *Sykes.*

ORDER *COLUMBIFORMES*—PIGEONS.

17. Butreron capelli (*Temm.*).
†18. Sphenocercus robinsoni, *Grant.*
†19. Sphenocercus korthalsi (*Temm.*).

3. High mountains of South Perak and Selangor.

12. Mountains of Selangor and Pahang above 3,000 feet.

14. Ulu Dong, Gunong Tahan, and possibly the vicinity of Kuala Lipis, Pahang.

18. Gunong Tahan, Pahang; Semangko Pass and Gunong Mengkuang Lebah, Selangor.

19. The only specimen certainly known from the Malay Peninsula is one shot on Pulau Rumpia, one of the Sembilan Islands, off the mouth of the Perak River, in April, 1906.

[1] *Journ. Fed. Mal. States Mus.*, i., p. 15 (1906.)

Digitized by Google

PIGEONS—(*cont.*)

20. Osmotreron fulvicollis (*Wagl.*).
†21. Osmotreron bicincta (*Jerd.*).
22. Osmotreron vernans (*Linn.*).
23. Osmotreron olax (*Temm.*).
24. Treron nipalensis, *Hodgs.*
25. Ptilinopus jambu (*Gm.*).
26. Carpophaga ænea (*Linn.*).
27. Carpophaga badia (*Raffles*).
[28. **Carpophaga griseicapilla** (*Wald.*).]
[29. **Columba grisea**, *G. R. Gr.*]
30. **Columba punicea** (*Blyth*).
31. Myristicivora bicolor (*Scop.*).
32. Macropygia leptogrammica (*Temm.*).
33. Macropygia ruficeps (*Temm.*).
[34. **Turtur humilis** (*Temm.*).]
35. Turtur tigrinus (*Temm.* and *Knip.*).
36. Geopelia striata (*Linn.*).
37. Chalcophaps indica (*Linn.*).
†38. Calœnas nicobarica (*Linn.*).

ORDER *RALLIFORMES*—RAILS.

39. Hypotænidia striata (*Linn.*).
40. Rallina fasciata (*Raffles*).
†41. Rallina superciliaris (*Eyton*).
42. **Porzana auricularis**, *Rchnw.*
43. Poliolimnas cinereus (*Vieill.*).
44. Limnobænus fuscus (*Linn.*).
45. Amaurornis phœnicura (*Forst.*).
46. Gallinula chloropus (*Linn.*).
47. Gallicrex cinerea (*Lath.*).
48. **Porphyrio edwardsi**, *Elliot.*
†49. Heliopais personata (*G. R. Gr.*).

ORDER *PODICIPEDIDIFORMES*—GREBES.

50. **Podicipes philippinensis** (*Bonn.*).

---

21. One specimen was shot at Kuala Selangor on the Selangor coast in December, 1904.

28. The inclusion of this species in the Peninsular list rests on a specimen so identified by Colonel Bingham, which was obtained at an altitude of 1,500 feet on Bukit Serudum, Kuantan, Eastern Pahang. The species will not improbably be found on the mountains of the northern half of the Peninsula, which have not yet been properly explored.

29. I believe I have seen this pigeon in the mountains of South Perak and on Pulau Jarak in the centre of the Straits of Malacca, off the mouth of the Perak River. Mr. Boden Kloss has also obtained a specimen on Pulau Taya, a small island of the Lingga group, south of Singapore (*Journ. Straits Branch Roy. Asiat. Soc.*, No. 41, p. 58 (1904)).

34. The only specimens recorded from the Malay Peninsula are three in the British Museum (*Salvad. Cat. Birds Brit. Mus.*, xxi., p. 436, spms. *r'*, *s'*, *t'*, (1893)), obtained at Malacca by Wallace and Maingay. The bird is imported from South China to Singapore as a cage-bird, and I am inclined to think that these specimens were escapes from captivity, as the species is not one that is at all likely to be overlooked and no recent collector has met with it.

38. The only authentic locality for these species within the limits of the present paper is Pulau Jarak, where I obtained two specimens in December, 1904. The specimen from Khota Bharu, Kelantan, listed by Bonhote (*P.Z.S.*, 1901 (i), p. 77), is almost certainly a cage-bird.

42. Recorded only from Singapore (*Raffles Museum, Singapore*) and from Patelung on the north-east coast.

50. One specimen from Patelung is on record.

Digitized by Google

ORDER *LARIFORMES*—GULLS AND TERNS.

51. **Hydrochelidon leucoptera**, *Meisn.* and *Schinz.*
52. Gelochelidon anglica (*Mont.*).
53. **Seena seena** (*Sykes*).
54. **Sterna tibetana**, *Saunders.*
55. Sterna longipennis, *Nordm.*
56. **Sterna dougalli**, *Mont.*
57. Sterna media, *Horsf.*
†58. Sterna bergii, *Licht.*
†59. **Sterna sinensis**, *Gm.*
†60. Sterna minuta, *Linn.*
†61. Sterna saundersi, *Hume.*
62. Sterna anæstheta, *Scop.*
63. Sterna melanauchen, *Temm.*
64. **Anous stolidus** (*Linn.*).
65. **Micranous leucocapillus**, *Gould.*

ORDER *CHARADRIIFORMES*—PLOVERS AND WADERS.

†66. Arenaria interpres (*Linn.*).
67. Sarcogrammus atrinuchalis, *Jerd.*
68. **Squatarola helvetica** (*Linn.*).
69. Charadrius dominicus (*P. L. S. Müll.*).
70. Ochthodromus geoffroyi (*Wagl.*).
71. **Ochthodromus mongolus** (*Pall.*).
72. Ochthodromus pyrrhothorax (*Gould.*).
73. **Ochthodromus veredus** (*Gould.*).
74. Ægialitis dubia (*Scop.*).
75. Ægialitis alexandrina (*Linn.*).
76. Numenius arquata (*Linn.*).
†77. Numenius phæopus (*Linn.*).
78. **Limosa novæ-zealandiæ**, *G. R. Gr.*
†79. Limosa limosa (*Linn.*).
80. **Himantopus himantopus** (*Linn.*).
81. **Macrorhamphus taczonowskii** (*Verr.*).
†82. Totanus calidris (*Linn.*).
†83. Totanus stagnatilis, *Bechst.*
84. Tringoides hypoleucus (*Linn.*).
†85. Glottis nebularius (*Gunner*).
†86. Pseudoglottis guttifer (*Nordm.*).
87. Rhyacophilus glareola (*Gm.*).
88. **Pavoncella pugnax** (*Linn.*).
89. **Limonites minuta** (*Leisler.*).
90. **Limonites ruficollis** (*Pall.*).
†91. Limonites damacensis (*Pall.*).
92. Ancylochilus subarquatus (*Güldenst.*).
93. **Tringa crassirostris**, *Temm.* and *Schleg.*
†94. Limicola platyrhyncha (*Temm.*).
95. Gallinago stenura (*Kuhl.*).
96. Gallinago gallinago (*Linn.*).
*97. Scolopax rusticula, *Linn.*
98. Rostratula capensis (*Linn.*).
99. **Hydrophasis chirurgus** (*Scop.*).
100. Glareola orientalis, *Leach.*

51. Noted in the Perak River estuary in November, 1906.

80. A specimen labelled as coming from Jelebu, a small State in the centre of the Peninsula, east of Selangor, is in the Singapore Museum.

81. Also in the Singapore Museum from the Dindings.

86. Two specimens shot at Kuala Kedah, December, 1907.

88. Also in the Singapore Museum from Malacca.

97. I have examined the remains of a Woodcock shot at Parit on the Perak River, and have also heard of occurrence at Province Wellesley and Malacca.

Digitized by Google

FAMILY *GRUIDÆ*—CRANES.

101. **Antigone sharpii** (*Blanf.*).

FAMILY *IBIDIDÆ*—IBISES.

102. Ibis melanocephala (*Lath.*).
103. **Graptocephalus davisoni** (*Hume*).
104. **Thaumatibis gigantea** (*Oust.*).

FAMILY *CICONIIDÆ*—STORKS.

†105. Pseudotantalus cinereus (*Raffles*).
106. **Dissoura episcopus** (*Bodd.*).
107. Leptoptilus dubius (*Gm.*).
*108. Leptoptilus javanicus (*Horsf.*).
109. **Xenorhynchus asiaticus** (*Lath.*).

FAMILY *ARDEIDÆ*—HERONS AND BITTERNS.

110. Pyrrherodias manillensis (*Meyen*).
111. Ardea sumatrana, *Raffles*.
112. Ardea cinerea, *Linn.*
113. **Mesophoyx intermedia** (*Wagl.*).
†114. Garzetta garzetta (*Linn.*).
115. Demiegretta sacra (*Gm.*).
†116. Nycticorax nycticorax (*Linn.*).
117. Gorsachius melanolophus (*Raffles*).
118. Butorides javanica (*Horsf.*).
119. **Ardeola grayi** (*Sykes*).
120. **Ardeola bacchus** (*Bp.*).
121. Bubulcus coromandus (*Bodd.*).
122. Ardetta sinensis (*Gm.*).
123. Ardetta cinnamomea (*Gm.*).
124. Dupetor flavicollis (*Lath.*).

FAMILY *ANATIDÆ*—DUCKS AND GEESE.

*125. Asarcornis leucoptera (*Blyth*).
126. Nettopus coromandelianus (*Gm.*).
127. Dendrocygna javanica (*Horsf.*).
†128. Spatula clypeata (*Linn.*).
*129. Querquedula circia (*Linn.*).
130. **Nyroca fuligula** (*Linn.*).

FAMILY *PLOTIDÆ*—DARTERS.

131. **Plotus melanogaster** (*Gm.*).

101, 109. Recorded from Penang (*ex coll.* Dr. Cantor), but in both cases probably imported.

105. By no means uncommon on the Selangor coast, but almost unprocurable owing to the depth of mud on the flats it frequents. Also seen at Kuala Kedah.

106. Very common on the eastern side of the Peninsula, but almost unknown on the west coast, south of Kedah.

119, 120. Both these Pond Herons are also very rare on the west coast.

125. Very rare in the southern portion of the Peninsula, but commoner towards the north.

128. A specimen shot near Kuala Lumpur in 1898 is the only record for the Shoveller.

129. Occasionally met with on the Perak River, but rare.

130. A specimen shot some years ago at Temerloh, Central Pahang, was (*fide* A. L. Butler) identified as this species by Mr. F. Finn.

Digitized by Google

FAMILY *PHALACROCORACIDÆ*—CORMORANTS.

*132. Phalacrocorax carbo, *Linn.*

133. **Phalacrocorax javanicus** (*Horsf.*).

FAMILY *FREGATIDÆ*—FRIGATE BIRDS.

134. **Fregata aquila** (*Linn.*).

135. **Fregata ariel** (*Gould.*).

FAMILY *PHÆTHONTIDÆ*—TROPIC BIRDS.

136. **Phæthon indicus**, *Hume.*

FAMILY *SULIDÆ*—GANNETS.

137. Sula sula (*Linn.*).

FAMILY *PELECANIDÆ*—PELECANS.

138. **Pelecanus roseus**, *Gm.*

*139. Pelecanus philippinensis, *Gm.*

ORDER *ACCIPITRIFORMES.*

FAMILY *VULTURIDÆ*—VULTURES.

*140. Vultur tenuirostris (*Hodgs.*).

*141. Pseudogyps bengalensis (*Gm.*).

*142. Otogyps calvus (*Scop.*).

FAMILY *FALCONIDÆ*—EAGLES AND HAWKS.

143. **Circus spilonotus**, *Kaup.*

†144. Circus melanoleucus, *Forst.*

145. **Circus pygargus**, *Linn.*

†146. Circus æruginosus, *Linn.*

147. Astur trivirgatus (*Temm.*).

†148. Astur soloensis (*Lath.*).

149. **Astur badius** (*Gm.*).

*150. Accipiter nisus (*Linn.*).

151. Accipiter gularis, *Temm.* and *Schleg.*

†152. Eutolmaetus pennatus (*Gm.*).

153. Lophotriorchis kieneri (*Geoffr.*).

*154. Ictinaetus malayensis (*Gm.*).

132, 133. The shores of the southern portion of the Malay Peninsula are not suitable for Cormorants, and the most southerly recorded locality is Pulau Lalang, one of the Sembilan Islands, off the mouth of the Perak River.

134. Noted off the coast of Senggora, November, 1901, and near Pulau Tioman, S. China Sea, September, 1907.

135. Seen off Batu, Selangor coast, November, 1906, and at the Aroa Islands, Straits of Malacca, November, 1906, and June, 1907.

138, 139. Very local and occasionally disappearing for years at a time. Fairly common at Patani, north-east coast in June, 1901.

140, 141, 142. The southerly limit of the Vulture in the Malay Peninsula appears to be Kuala Kangsar on the western side and the north bank of the Pahang River on the east.

140. Shot near Taiping about fifteen years ago, and not met with since.

149. Recorded from Singapore by Dr. Hanitsch, but probably belonging to the Burmese race, *A. poliopsis*, Hume.

150. Two specimens in the Perak Museum, shot near Taiping many years ago, undoubtedly belong to this species.

151. I have followed Ogilvie-Grant in regarding the Malayan Besra as referrable to *A. gularis* and not to the typical *A. virgatus*. In the mountains, however, a small richly coloured bird is found resembling *A. rufotibialis* from Kina Balu, which may possibly be a distinct species. Further material is wanted before the point can be decided.

Digitized by Google

EAGLES AND HAWKS—(*cont.*)

155. Spizaetus limnætus (*Horsf.*).
156. Spizaetus albouiger (*Blyth*).
157. **Circaetus hypoleucus** (*Pall.*).
158. Spilornis pallidus (*Wald.*).
159. Spilornis bacha (*Daud.*).
†160. Butastur indicus (*Gm.*).
161. Buteo desertorum (*Daud.*).
162. Haliaetus leucogaster (*Gm.*).
†163. Haliaetus leucocoryphus (*Pall.*).
164. Haliastur intermedius, *Gurney*.
165. **Milvus govinda** (*Sykes*).
166. Elanus cæruleus (*Desf.*).
167. Machærhamphus alcinus, *Westerm.*
168. Pernis cristatus, *Temm.*
169. Pernis tweedalei, *Hume*.
†170. Baza lophotes, *Temm.*
*171. Baza jerdoni (*Blyth*).
†172. Cerchneis saturata (*Blyth*).
173. **Microhierax fringillarius** (*Drap.*).
174. Falcus peregrinus, *Tunst.*
175. **Falcus severus,** *Horsf.*

FAMILY *PANDIONIDÆ*—OSPREYS.

176. Pandion haliaetus (*Linn.*).
177. Polioaetus ichthyaetus (*Horsf.*).
*178. Polioaetus humilis (*Müll.* and *Schleg.*).

ORDER *STRIGIFORMES*—OWLS.

179. **Asio otus** (*Linn.*).
180. Huhua orientalis (*Horsf.*).
181. Ketupa ketupa (*Horsf.*).
182. Scops malayana, *Hay.*
[183. **Scops sunia,** *Hodgs.*]
184. Scops lempiji (*Horsf.*).
185. **Scops sagittata,** *Cassin.*
186. Scops rufescens (*Horsf.*).
†187. Heteroscops vulpes, *Grant.*
188. Ninox scutulata, *Raffles.*
189. Syrnium seloputo (*Horsf.*).
*190. Syrnium newarense (*Hodgs.*).
191. **Syrnium maingayi,** *Hume.*
192. Glaucidium brodei (*Hutton*).
193. Photodilus badius (*Horsf.*).
194. **Strix javanica** (*Horsf.*).

---

157. The species is recorded from Ampang, near Kuala Lumpur, Selangor, by Mr. A. L. Butler, but the specimen is no longer extant.

161. Two specimens, adult and immature, obtained many years ago near Taiping, are in the Perak Museum. A third has recently been obtained near Kuala Lumpur.

163. Equally common with *H. leucogaster* at Langkawi, 70 miles north of Penang, in December, 1907.

171. A very immature bird from near Taiping.

172. Though very much faded, two mounted specimens in the Singapore Museum appear to belong to this race. I obtained a third specimen in Langkawi in November, 1907.

179. A specimen was shot some years ago by Mr. H. N. Ridley in the Botanic Gardens, Singapore, and is now in the Raffles Museum.

180. Specimens of *Bubo coromandus* of reputed local origin, and attributed to this species, are in the Singapore Museum. Some mistake has probably been made about locality.

187. So far as is at present known, confined to the high mountains of Selangor and Pahang.

Digitized by Google

ORDER *PSITTACIFORMES*—PARROTS.

†195. Palæornis fasciatus (*P. L. S. Müll.*).
196. Palæornis longicauda (*Bodd.*).
197. Psittinus incertus (*Shaw*).
*198. Loriculus vernalis (*Sparrm.*).
199. Loriculus galgulus (*Linn.*).

ORDER *CORACIIFORMES*.

FAMILY *PODARGIDÆ*—FROGMOUTHS.

†200. Batrachostomus auritus (*Gray*).
201. **Batrachostomus stellatus** (*Gould*).
†202. Batrachostomus affinis (*Blyth*).

FAMILY *CORACIIDÆ*—ROLLERS.

203. **Coracias affinis, *McClell.***
204. Eurystomus orientalis (*Linn.*).
205. **Eurystomus calonyx**, *Sharpe.*

FAMILY *ALCEDINIDÆ*—KINGFISHERS.

206. **Pelargopsis amauroptera** (*Pears.*).
*207. Pelargopsis malaccensis, *Sharpe.*
208. **Pelargopsis burmanica**, *Sharpe.*
209. Pelargopsis fraseri, *Sharpe.*
210. Alcedo bengalensis, *Gm.*
*211. Alcedo euryzona, *Temm.*
212. Alcedo meninting, *Horsf.*
213. Ceyx tridactyla (*Pall.*).
214. Ceyx euerythra, *Sharpe.*
215. Carcineutes pulchellus (*Horsf.*).
216. Halcyon coromandus (*Lath.*).
217. Halcyon smyrnensis (*Linn.*).
218. Halcyon pileatus (*Bodd.*).
219. **Halcyon armstrongi**, *Sharpe.*
220. Halcyon humii, *Sharpe.*
221. Halcyon concretus (*Temm.*).

FAMILY *BUCEROTIDÆ*—HORNBILLS.

222. Buceros rhinoceros (*Linn.*).
*223. Dichoceros bicornis (*Linn.*).
224. Anthracoceros convexus (*Temm.*).
†225. Anthracoceros malabaricus (*Gm.*).
226. Anthracoceros malayanus (*Raffles*).
227. Cranorrhinus corrugatus (*Temm.*).
228. Rhytidoceros undulatus (*Shaw*).
229. Rhytidoceros subruficollis (*Blyth*).
230. Anorrhinus galeritus (*Temm.*).
231. Berenicornis comatus (*Raffles*).
232. Rhinoplax vigil (*Forst.*).

---

195. Seen at Trengganu by Davison, but not apparently procured.

198. A northern form extending as far south as Larut, and doubtfully to Klang.

203. Only recorded at present from the vicinity of Patani.

211. Confined to mountainous districts and very rare.

225. Not met with south of Kedah. Numerous on Langkawi—an island on the coast of that State.

229. Met with in large flocks along the west coast during the north-east monsoon, hence Maingay's name "Hydrocissa migratorius."

Digitized by Google

FAMILY *UPUPIDÆ*—HOOPOES.

233. **Upupa indica**, *Reichenb.*

FAMILY *MEROPIDÆ*—BEE-EATERS.

234. Melittophagus swinhoii (*Hume*).
235. Merops sumatranus (*Raffles*).
236. Merops philippinus, *Linn.*
237. Nyctiornis amicta (*Temm.*).

FAMILY *CAPRIMULGIDÆ*—GOATSUCKERS.

*238. Lyncornis cervineiceps, *Gould.*
239. Lyncornis temmincki, *Gould.*
240. Caprimulgus ambiguus, *Hartert.*
†241. Caprimulgus jotaka, *Temm.* and *Schleg.*

FAMILY *CYPSELIDÆ*—SWIFTS.

†242. Collocalia innominata, *Hartert.*
†243. Collocalia inexpectata, *Hume.*
244. Collocalia linchi, *Horsf.* and *Moore.*
245. **Collocalia gigas**, *Hartert.*
246. Chætura gigantea (*Temm.*).
247. Chætura indica, *Hume.*
248. Chætura cochinchinensis, *Oust.*
249. Chætura leucopygialis, *Blyth.*
†250. Cypselus pacificus (*Lath.*).
251. Cypselus subfurcatus (*Blyth*).
252. Tachornis infumata, *Sclater.*
253. Macropteryx longipennis (*Rafin.*).
254. Macropteryx comata (*Temm.*).

ORDER *TROGONES*—TROGONS.

255. **Pyrotrogon neglectus**, *Forbes* and *Robinson.*
256. Pyrotrogon kasumba (*Raffles*).
257. Pyrotrogon erythrocephalus (*Gould*).
258. Pyrotrogon duvaucelii (*Temm.*).
259. **Pyrotrogon orrophæus**, *Cab.* and *Heine.*
260. Pyrotrogon orescius (*Temm.*).

ORDER *COCCYGES*—CUCKOOS.

261. Coccystes coromandus (*Linn.*).
262. Surniculus lugubris (*Horsf.*).
263. Hierococcyx sparverioides (*Vig.*).
†264. Hierococcyx nisicolor (*Hodgs.*).

---

233. A line drawn from the mouth of the Kedah River on the west coast to the mouth of the Patani on the east seems to be the southern limit of this species.

238. Penang is the most southerly locality for this species.

241. Possibly a resident in the mountain districts throughout the year; common on migration during the winter months.

246, 247. Both forms are found in the Malay Peninsula, *Chætura indica* being commoner during the winter months and in the more northerly districts.

248. Recorded from Semangko Pass, Selangor, and from Taiping, Perak.

250. Until quite recently a specimen in the British Museum from Penang was the only authority for the occurrence of this species in the Malay Peninsula. In October, 1907, however, it appeared in immense flocks in the vicinity of Kuala Lumpur.

259. Not known north of Klang.

Digitized by Google

CUCKOOS—(*cont.*)

265. **Hierococcyx nanus,** *Hume.*
*266. Hierococcyx bocki, *Wardl.-Rams.*
267. Cuculus micropterus, *Gould.*
268. **Cuculus canorus,** *Linn.*
†269. Cuculus saturatus, *Hodgs.*
†270. Cuculus poliocephalus, *Lath.*
271. Penthoceryx sonnerati (*Lath.*).
272. Cacomantis merulinus (*Scop.*).
273. Chalcococcyx zanthorhynchus (*Horsf.*).
274. Chalcococcyx maculatus (*Gm.*).
275. **Chalcococcyx basalis** (*Horsf.*).
†276. Chalcococcyx malayanus (*Raffles*).
277. Eudynamis honorata (*Linn.*).
†278. Centropus rectunguis, *Strickl.*
279. Centropus sinensis (*Steph.*).
280. Centropus javanicus (*Dumont*).
281. Zanclostomus javanicus (*Horsf.*).
282. Rhopodytes tristis (*Less.*).
283. Rhopodytes diardi (*Less.*).
284. Rhopodytes sumatranus (*Raffles*).
285. Rhinortha chlorophæa (*Raffles*).
286. Urococcyx erythrognathus (*Hartl.*).

FAMILY *CAPITONIDÆ*—BARBETS.

287. Calorhamphus hayi (*J. E. Grey*).
288. Chotorhea chrysopogon (*Temm.*).
289. Chotorhea versicolor (*Raffles*).
290. Chotorhea mystacophanes (*Temm.*).
291. Cyanops henrici (*Temm.*).
292. Cyanops ramsayi (*Wald.*).
293. Cyanops oorti (*Müll.*).
†294. Thereiceryx lineatus (*Vieill.*).
295. Mesobucco duvauceli (*Less.*).
296. **Mesobucco cyanotis** (*Blyth*).
*297. Zantholæma hæmatocephala (*P. L. S. Müll.*).
298. Psilopogon pyrolophus (*S. Müll.*).

FAMILY *INDICATORIDÆ*—HONEY-GUIDES.

299. **Indicator archipelagicus** (*Temm.*).

FAMILY *PICIDÆ*—WOODPECKERS.

300. Gecinus vittatus (*Vieill.*).
301. **Gecinus viridanus** (*Blyth*).

---

266. A somewhat immature specimen from the Taiping Hills has, Mr. Wray assures me, been identified as this species by comparison at the British Museum.

270. High mountains of Selangor, January, 1905.

282. Not occurring south of Kedah, except on the high mountains of Batang Padang.

292, 293, 298. All confined to the zone above 3,000 feet.

294. On the western side not recorded south of Kedah; on the east, it has been met with in central Pahang.

299. One of the rarest of all Malayan birds, the only Peninsular specimen being the one obtained by Davison, near Klang, and now in the British Museum.

301. Like so many other birds, this species attains its southern limit in Patani and Kedah.

Digitized by Google

WOODPECKERS—(*cont.*)

302. **Gecinus robinsoni**, *Grant.*
303. Gecinus rodgeri, *Hartert* and *Butler.*
304. Gecinus observandus, *Hartert.*
†305. Gauropicoides rafflesi (*Vig.*).
306. **Gecinulus viridis**, *Blyth.*
307. **Iyngipicus pumilus**, *Hargitt.*
308. Iyngipicus canicapillus, *Blyth.*
†309. Iyngipicus auritus (*Gm.*).
[310. Dendrocopus analis (*Horsf.*).]
†311. Pyrrhopicus pyrrhotis (*Hodgs.*).
312. Pyrrhopicus porphyromelas (*Boie.*).
313. Miglyptes grammithorax (*Malh.*).
314. Miglyptes tukki (*Less.*).
315. Micropternus brachyurus (*Vieill.*).
316. **Micropternus phæocepa**, *Blyth.*
317. Tiga javanensis (*Ljung*).
318. Chrysophlegma malaccense (*Lath.*).
319. Chrysophlegma humii, *Hargitt.*
320. Chrysophlegma wrayi, *Sharpe.*
321. Chrysocolaptes gutticristatus (*Tick.*).
322. Chrysocolaptes validus (*Temm.*).
323. Hemicercus sordidus (*Eyton*).
324. **Hemicercus canente** (*Less.*).
325. Alophonerpes pulverulentus (*Temm.*).
326. Thriponax javensis (*Horsf.*).
327. **Picumnus innominatus** (*Burton*).
328. Sasia abnormis (*Temm.*).

ORDER *EURYLÆMIFORMES*—BROADBILLS.

329. Calyptomena viridis, *Raffles.*
330. Psarisomus dalhousiæ (*Jameson*).
†331. Serilophus rothschildi, *Hartert* and *Butler.*
332. Eurylæmus javanicus, *Horsf.*
333. Eurylæmus ochromelas *Raffles.*
334. Corydon sumatranu, (*Raffles*).
335. Cymborhynchus malaccensis, *Salvad.*

ORDER *PASSERES*—PERCHING BIRDS.

FAMILY *PITTIDÆ*—GROUND-THRUSHES.

*336. Pitta cærulea (*Raffles*).
337. Pitta cyanoptera, *Temm.*
†338. Pitta megarhyncha, *Schleg.*
339. Pitta coccinea, *Eyton.*
340. Pitta cucullata, *Hartl.*
341. Eucichla boschii, *Müll.* and *Schleg.*
342. **Eucichla gurneyi**, *Hume.*

302. At present known only from the types from Gunong Tahan.

306. From the vicinity of Tongkah only.

310. This Woodpecker is recorded from Malacca, but I very much doubt whether it really occurs there; no recent collectors have met with it.

327. The only recorded specimen from the Malay Peninsula is one from the Larut Hills, obtained by Mr. Wray, and now in the British Museum.

330. Larut Hills, Perak; Semangko Pass, Selangor; Gunong Tahan, Pahang.

331. Known only from the four original specimens obtained by Mr. Butler on Gunong Ijau, Perak, and from two males from Ginting Bidei, Selangor, 2,300 feet, shot in November, 1907.

Digitized by Google

FAMILY *HIRUNDINIDÆ*—SWALLOWS.

†343. Hirundo rustica, *Linn.*
344. Hirundo gutturalis, *Scop.*
345. Hirundo javanica, *Sparrm.*
346. Hirundo badia, *Cass.*

FAMILY *MUSCICAPIDÆ*—FLYCATCHERS.

347. Hemichelidon fuliginosa, *Hodgs.*
348. Hemichelidon ferruginea, *Hodgs.*
349. Alseonax latirostris (*Raffles*).
†350. Cyornis concreta (*S. Müll.*)
351. Cyornis ruecki, *Oust.*
352. Cyornis unicolor, *Blyth.*
353. Cyornis tickelliæ, *Blyth.*
354. Cyornis frenata, *Hume.*
355. Cyornis erythrogaster, *Sharpe.*
356. Cyornis sumatrensis, *Sharpe.*
357. Cyornis turcosa, *Brüggem.*
358. Nitidula hodgsoni (*Moore*).
359. Anthipes malayana, *Sharpe.*
360. Niltava decipiens, *Salvad.*
361. Muscitrea cinerea, *Blyth.*
†362. Erythromyias muelleri (*Blyth*).
†363. Poliomyias luteola (*Pall.*).
364. Muscicapula malayana, *Grant.*
365. Muscicapula westermanni, *Sharpe.*
366. Gerygone modiglianii, *Salvad.*
†367. Xanthopygia xanthopygia (*Hay*).
†368. Cyanoptila bella (*Hay*).
369. Hypothymis azurea (*Bodd.*).
370. Rhipidura albicollis (*Vieill.*).
371. Rhipidura perlata, *S. Müll.*
372. Rhipidura javanica (*Sparrm.*).
373. Terpsiphone affinis (*Blyth*).
374. Terpsiphone princeps (*Temm.*).
375. Terpsiphone incii (*Gould*).
376. Philentoma velatum (*Temm.*).
377. Philentoma pyrrhopterum (*Temm.*).
†378. Rhinomyias pectoralis (*Salvad.*).
379. Culicicapa ceylonensis (*Swains.*).
380. Cryptolopha trivirgata (*Strickl.*).
381. Cryptolopha butleri, *Hartert.*
382. Cryptolopha davisoni, *Sharpe.*
†383. Abrornis schwaneri (*Temm.*).
384. Stoparola melanops (*Vig.*).
385. Stoparola thalassinoides (*Cab.*).

FAMILY *CAMPOPHAGIDÆ*—CUCKOO-SHRIKES.

386. Artamides larutensis, *Sharpe.*
387. Artamides sumatrensis (*S. Müll.*).
388. Volvocivora neglecta (*Hume*).
389. Pericrocotus flammifer, *Hume.*

366. Known only, so far as the Malay Peninsula is concerned, from two specimens, both from Pahang.

381. The types are from Gunong Ijau, Perak, and no other specimens are known.

382. Recently obtained in numbers at Ginting Bidei, Selangor, 2,300 feet.

Digitized by Google

CUCKOO-SHRIKES—(*cont.*)

390. **Pericrocotus fraterculus,** *Swinh.*
391. Pericrocotus montanus, *Salvad.*
392. Pericrocotus zanthogaster (*Raffles*).
393. **Pericrocotus igneus,** *Blyth.*
394. Pericrocotus cinereus, *Lafr.*
395. Lalage terat (*Bodd.*).
396. **Lalage culminata** (*Hay*).

FAMILY *PYCNONOTIDÆ*—BULBULS.

397. Ægithina viridissima (*Bp.*).
398. Ægithina tiphia (*Linn.*).
399. Æthorhynchus lafresnayei (*Hartl.*).
400. Chloropsis hardwickii, *Jard.* and *Selby.*
401. Chloropsis zosterops (*Vig.*).
402. **Chloropsis cholorocephala,** *Wald.*
403. Chloropsis icterocephala (*Less.*).
404. Chloropsis cyanopogon (*Temm.*).
405. Irena cyanea, *Beybie.*
406. **Irena puella** (*Lath.*).
407. Hemixus cinereus (*Blyth*).
408. Hemixus malaccensis (*Blyth*).
409. Iole olivacea, *Blyth.*
410. Iole peracensis, *Hartert.* and *Butler.*
411. **Iole virescens,** *Blyth.*
412. Euptilosus euptilosus (*Jard.* and *Selby*).
413. Microtarsus melanocephalus (*Gm.*).
414. **Microtarsus cinereiventris** (*Blyth*).
415. Microtarsus melanoleucus (*Eyton*).
416. **Criniger salangæ,** *Sharpe.*
417. Criniger tephrogenys (*Jard.* and *Selby*).
418. Criniger ochraceus, *Moore.*
†419. Criniger finschi, *Salvad.*
420. Alophoixus phæocephalus (*Hartl.*).
421. Tricholestes criniger (*Blyth*).
422. Trachycomus ochrocephalus (*Gm.*).
423. Pycnonotus analis (*Horsf.*).
424. Pycnonotus finlaysoni (*Strickl.*).
425. **Pycnonotus blanfordi,** *Jerd.*
426. **Pycnonotus robinsoni,** *Grant.*
427. Pycnonotus plumosus, *Blyth.*
428. Pycnonotus simplex, *Less.*
429. Pycnonotus salvadorii, *Sharpe.*
430. Otocompsa emeria (*Linn.*).
431. Otocompsa flaviventris (*Tickell*).
432. Rubigula cyaniventris (*Blyth*).
433. Rubigula weberi (*Hume*).

391. *Pericrocotus wrayi*, Sharpe, and *P. croceus*, Sharpe, have been shown to be synonyms or aberrations of this species, originally described from the mountains of Sumatra.

402, 406. Only known from the extreme north of the Peninsula.

418. *Criniger sordidus*, Richmond, *Proc. U. S. Nat. Mus.*, xxii., p. 320 (1900), is probably a synonym of this species, the author having evidently compared it with the yellower lowland form, *C. tephrogenys*, J. and S.

425. Listed by Bonhote from Biserat Jalor in the interior of the Patani States on the east coast of the Peninsula. (*P. Z. S.*, 1901, (i), p. 62).

426. As yet only known from the types collected on the coast of Patani.

Digitized by Google

FAMILY *TIMELIIDÆ*—BABBLERS.

434. Eupetes macrocercus (*Temm.*).
435. Trochalopteron peninsulæ, *Sharpe.*
436. Pomatorhinus borneensis, *Cab.*
437. **Pomatorhinus olivaceus,** *Blyth.*
438. Pomatorhinus wrayi, (*Sharpe*).
439. Melanocichla lugubris, (*S. Müll.*).
440. Rhinocichla mitrata (*S. Müll.*).
441. **Timelia jerdoni,** *Walden.*
442. Pellorneum subochraceum, *Swinh.*
443. Turdinus olivaceus (*Strickl.*).
444. Turdinus magnirostris, *Moore.*
445. Turdinus macrodactylus, *Strickl.*
446. Turdinus loricatus (*S. Müll.*).
447. Erythrocichla bicolor (*Less.*).
448. Drymocataphus nigricapitatus (*Eyton*).
449. Drymocataphus tickelli (*Blyth*).
†450. Æthostoma rostratum (*Blyth*).
451. Setaria magna (*Eyton*).
452. Setaria cinerea (*Eyton*).
453. Setaria albigularis, (*Blyth*).
454. Setaria affinis (*Blyth*).
455. **Setaria melanocephala** (*Davison*).
456. Anuropsis malaccensis, *Hartl.*
457. Turdinulus humei, *Hartert.*
458. **Turdinulus granti,** *Richm.*
459. Corythocichla leucosticta, *Sharpe.*
460. Alcippe peracensis, *Sharpe.*
461. Alcippe cinerea, *Blyth.*
462. Pseudominla soror (*Sharpe*).
463. Stachyris davisoni, *Sharpe.*
†464. Stachyris poliogaster, *Hume.*
465. Stachyris poliocephala (*Temm.*).
466. Stachyris nigricollis (*Temm.*).
†467. Stachyris leucotis (*Strickl.*).
468. Stachyris maculata (*Temm.*).
469. Stachyris chryssæa (*Blyth*).
470. **Stachyris chrysops,** *Richm.*
†471. Kenopia striata (*Blyth*).
472. Cyanoderma erythopterum (*Blyth.*).
473. Mixornis gularis (*Raffles*).
474. Macronus ptilosus, *Jard.* and *Selby.*
475. Myiophoneus dichrorhynchus, *Salvad.*
†476. Myiophoneus robinsoni, *Grant.*

437. Not known south of Kedah.

439. *Melanocichla peninsularis*, Sharpe, from the mountains of Perak and Selangor is identical with this Sumatran species.

442. The most southerly recorded locality is Taiping.

446. Hitherto known only from Sumatra. A single female was obtained at Ginting Bidei, Selangor, 2,300 feet, in dense bamboo jungle.

449. The only Peninsular localities at present known are Bukit Kutu, Ulu Selangor, at a height of 3,000 feet, and Ginting Bidei, 2,300 feet.

455. Only known from the type and one other specimen, both from Pahang.

458, 470. From the mountains of Trang, northern part of the Peninsula. Unique in the United States National Museum.

476. High mountains of Selangor.

Digitized by Google

BABBLERS—(*cont.*)

477. Brachypteryx wrayi, *Grant.*
478. Sibia simillima, *Salvad.*
479. Siva malayana, *Hartert.*
480. Siva sordidior, *Hartert.*
481. Herpornis zantholeuca, *Hodgs.*
482. Cutia cervinicrissa, *Sharpe.*
483. Pterythius æralatus (*Tickell*).
484. Pterythius tahanensis, *Hartert.*
485. Mesia argentauris, *Hodgs.*

FAMILY *TROGLODYTIDÆ*—WRENS.

†486. Pnoepyga lepida, *Salvad.*

FAMILY *TURDIDÆ*—THRUSHES.

487. **Geocichla interpres** (*Temm.*).
488. **Geocichla citrina** (*Lath.*).
489. **Geocichla innotata** (*Blyth.*).
490. Cichloselys davisoni (*Hume*).
491. **Oreocichla affinis,** *Richm.*
492. Turdus obscurus (*Gm.*).
†493. Petrophila solitaria (*P. L. S. Müll.*).
*494. Petrophila gularis (*Swinh.*).
495. **Henicurus leschenaulti** (*Vieill.*).
496. **Henicurus schistaceus** (*Hodgs.*).
497. Hydrocichla ruficapilla (*Temm.*).
498. Hydrocichla frontalis (*Blyth.*).
†499. Larvivora cyanea (*Pall.*).
500. Copsychus musicus (*Raffles.*).
501. Cittocincla macrura (*Gm.*).
502. Trichixus pyrrhopygus (*Less.*).
†503. Pratincola maura (*Pall.*).
†504. Pratincola caprata (*Linn.*).

FAMILY *SYLVIIDÆ*—WARBLERS.

505. **Acrocephalus orientalis,** *Temm.* and *Schleg.*
†506. Locustella lanceolata (*Temm.*).
507. **Sutoria sutoria** (*Forst.*).
508. Sutoria maculicollis (*Moore*).
509. Orthotomus atrigularis (*Temm.*).
510. **Orthotomus ruficeps** (*Less.*).
511. Orthotomus cineraceus (*Blyth.*).
512. Cisticola cisticola (*Temm.*).
†513. Cisticola exilis (*Vig.* and *Horsf.*).
†514. Franklinia rufescens (*Blyth.*).
515. **Arundinax æedon** (*Pall.*).
516. **Acanthopneuste tenellibes** (*Swinh.*).
517. **Acanthopneuste trochiloides,** *Sundev.*
518. Acanthopneuste borealis (*Blas.*).

---

486. Gunong Batu Puteh, South Perak; Gunong Tahan, Pahang.

489. As Hume himself considered, it is more than doubtful if this so-called species can be separated from *C. sibirica* (Pall.).

491. From Trang. United States National Museum.

494. The Perak Museum possesses a single specimen of this rare Rock Thrush from the Taiping Hills.

496. Recorded from Gunong Ijau, Perak, and from the vicinity of the Semangko Pass, Selangor.

503. At present only met in Singapore.

504. Sporadic in winter in the northern parts of the Peninsula.

506. Batu, Selangor Coast; Aroa Islands, Straits of Malacca; Singapore.

Digitized by Google

WARBLERS—(*cont.*)

†519. Acanthopneuste coronatus (*Temm.*).
520. **Acanthopneuste magnirostris** (*Blyth*).
521. Phyllergates cinereicollis, *Sharpe.*
522. Suya waterstradti, *Hartert.*
523. Burnesia flaviventris (*Delese.*).

FAMILY *LANIIDÆ*—SHRIKES.

524. Hemipus obscurus (*Horsf.*).
525. Hemipus picatus (*Sykes*).
526. Tephrodornis gularis (*Raffles*).
527. Platylophus ardesiacus, *Cab.*
528. **Lanius bentet** (*Horsf.*).
529. Lanius tigrinus, *Drap.*
†530. Lanius luconiensis (*Bp.*).
531. Lanius cristatus, *Linn.*
532. Lanius superciliosus, *Lath.*

FAMILY *PARIDÆ*—TITMICE.

533. **Parus cinereus** (*Vieill.*).
534. Melanochlora flavocristata (*Lafr.*).

FAMILY *SITTIDÆ*—NUT-HATCHES.

535. Dendrophila azurea (*Less.*).
†536. Dendrophila frontalis (*Swains*).
537. Dendrophila saturatior, *Hartert.*

FAMILY *CORVIDÆ*—CROWS.

538. Corvus macrorhynchus, *Wagl.*
539. Corvus enca, *Horsf.*
540. Cissa robinsoni, *Grant.*
541. **Crypsirhina varians** (*Lath.*).
542. Platysmurus leucopterus (*Temm.*).

FAMILY *DICRURIDÆ*—KING-CROWS.

543. Dicrurus annectens, *Hodgs.*
544. **Dicrurus nigrescens,** *Oates.*
545. Dicrurus leucogenys, *Walden.*
546. Chaptia malayensis (*Hay*).
547. Bhringa remifer (*Temm.*)
548. Dissemurus paradiseus (*Linn.*).

FAMILY *ORIOLIDÆ*—ORIOLES.

549. Oriolus indicus, *Jerd.*
550. **Oriolus melanocephalus,** *Linn.*
551. Oriolus zanthonotus, *Horsf.*
552. Oriolus consanguineus, *Wardl. Rams.*

FAMILY *STURNIDÆ*—STARLINGS.

553. **Eulabes intermedia** (*Hay*).
554. Eulabes javanensis (*Osbeck*).

---

520. High mountains of Perak, Selangor and Pahang.
522. Gunong Tahan, Pahang.
525. Mountains of South Perak and Pahang.
533. Coast line of the northern parts of the Peninsula only.
540. Gunong Tahan and high mountains of Selangor.
541. Coast of Patani.
550. Not known south of the vicinity of Tongkah (Junk Ceylon).

Digitized by Google

STARLINGS—(*cont.*)

555. Calornis chalybea (*Horsf.*).
556. **Sturnia sinensis** (*Gm.*).
[557. **Sturnia malabarica** (*Gm.*).]
[558. **Sturnia nemoricola** (*Jerd.*).]
†559. Agrospar sturninus (*Pall.*).
560. **Acridotheres torquatus**, *Davison.*
561. Æthiospar fuscus (*Wagl.*).

FAMILY *PLOCEIDÆ*—WEAVER BIRDS.

562. **Sporæginthus amandava** (*Linn.*).]
[563. **Sporæginthus flaviventris** (*Wallace*).]
564. Ploceus inexpectatus, *Hartert.*
565. Munia oryzivora (*Linn.*).
566. Munia atricapilla (*Vieill.*).
567. Munia maja (*Linn.*).
568. Munia acuticauda, *Hodgs.*
569. Munia leucogastra (*Blyth.*).
570. Munia punctulata (*Linn.*).
571. **Erythura prasina** (*Sparrm.*).
572. **Chlorura borneensis**, *Sharpe.*

FAMILY *FRINGILLIDÆ*—FINCHES.

573. Passer montanus, *Linn.*
574. Pyrrhula waterstradti, *Hartert.*
†575. Emberiza aureola, *Pall.*

FAMILY *MOTACILLIDÆ*—WAGTAILS.

576. **Motacilla feldeggii**, *Mich.*
577. Motacilla melanope, *Pall.*
578. **Motacilla borealis**, *Sundev.*
579. **Motacilla taivanus**, *Swinh.*
580. Limonidromus indicus (*Gm.*).
†581. Anthus richardi, *Vieill.*
582. Anthus malayensis, *Eyton.*

FAMILY *NECTARINIIDÆ*—SUNBIRDS.

583. Chalcostetha pectoralis (*Temm.*).
584. Æthopyga wrayi, *Sharpe.*
585. Æthopyga temmincki (*Horsf.*).
586. Æthopyga siparaja (*Horsf.*).
†587. Æthopyga cara, *Hume.*
†588. Æthopyga anomala, *Richm.*
589. Arachnecthra hasselti (*Temm.*).

557, 558. Both these species occur (*fide* Hanitsch) in Singapore. They have not been met with elsewhere in the Peninsula.

560. As yet known only from the type from central Pahang.

562, 563. The records of these species from Singapore are probably due to escapes from captivity. Both are found in large numbers in the bird shops of the city.

571. Rare; the only authentic localities are Klang, Selangor, and Bentong, Pahang.

572. The only specimen as yet secured is a female from the Telôm valley borders of Perak and Pahang at nearly 4,000 feet.

587. Obtained on Bukit Kutu, Selangor, 3,000 feet, by Mr. A. L. Butler, in November, 1898, and the only record for this species in the Peninsula.

588. Described from Trang in the north of the Peninsula, but also found on Bukit Kutu with the preceding.

Digitized by Google

SUNBIRDS—(*cont.*)

590. Arachnecthra pectoralis (*Horsf.*).
591. Arachnecthra flammaxillaris (*Blyth.*).
592. Anthothreptes hypogrammica (*S. Müll.*).
593. Anthothreptes malaccensis (*Scop.*).
594. Anthothreptes rhodolæma, *Shelley.*
†595. Anthothreptes simplex (*S. Müll.*).
596. Chalcoparia phœnicotis (*Gm.*).
597. Arachnothera magna, *Hodgs.*
598. Arachnothera modesta, *Eyton.*
599. Arachnothera longirostris (*Lath.*).
600. Arachnothera chrysogenys (*Temm.*).
601. Arachnothera flavigastra (*Temm.*).
602. Arachnothera crassirostris (*Reichenb.*).
603. Arachnothera robusta, *Müll.* and *Schleg.*

FAMILY *DICÆIDÆ*—FLOWER PECKERS.

604. Dicæum cruentatum (*Linn.*).
605. Dicæum trigonostigma (*Scop.*).
606. Dicæum chrysorrheum (*Temm.*).
607. Dicæum ignipectus, *Hodgs.*
608. Dicæum olivaceum, *Walden.*
609. Prionochilus ignicapillus, *Eyton.*
610. Prionochilus maculatus, *Tenim.*
†611. Prionochilus thoracicus (*Temm.*).
612. **Piprisoma modestum,** *Hume.*

FAMILY *ZOSTEROPIDÆ*—WHITE EYES.

†613. Zosterops palbebrosa (*Temm.*).
†614. Zosterops aureiventer, *Hume.*
615. **Zosterops tahanensis,** *Grant.*
616. **Zosterops simplex,** *Swinh.*

613, 616. Found only in the north of the Peninsula and possibly seasonal visitors.

SUMMARY.

Total number of species in Fauna		616
Represented both in Perak and Selangor Museums ...	376	
„ in Selangor Museum only	88	
Total in Selangor Museum	—	464
Represented in Perak Museum only	23	
Total in Perak Museum		399

REPORT ON A SAMPLE OF LEAD ORE FROM PAHANG.

BY L. WRAY.

MR. CECIL WRAY, the British Resident, Pahang, sent me a sample of galena, obtained from the alluvial in the Kuantan District, for examination. The ore, which is in small waterworn fragments, without any admixture of gang, came from Sungei Jambu,

Digitized by Google

Kuantan. The valley is rather small with low hills on either side. The *karang* or wash-dirt, which was being worked for tin, as the miners approached the high ground on the north side of the valley, held more and more galena, mixed with the tin oxide, and when the foot of the hill was reached, the lead ore was found in masses. It is reported to be the outcrop of a lode.

Lead occurs, associated with tin oxide, iron pyrites and copper ores, in the Pahang Consolidated Company's lode deposits at Sungei Limbing, so that it is just possible that lode tin ore may be discovered at Sungei Jambu also.

TAIPING, PERAK,
25th October, 1907.

SIR,—I have the honour to inform you that I have assayed the sample of alluvial galena, from Kuantan, that you sent me some time back, with the following results:

Lead	...	...	...	78 per cent.
Silver	...	...	...	1 oz. 12 dwt. 6 grs. per ton

2. The galena is of good quality, as far as its lead contents are concerned; for not only is the percentage high, but the metallic button obtained was soft under the hammer and evidently free from impurity.

3. The proportion of silver is so small that it would not pay to extract. It is, in fact, the poorest galena I have ever assayed from the Malay Peninsula.

I have, etc.,

L. WRAY,
Director of Museums, F.M.S.

THE BRITISH RESIDENT,
PAHANG.

REPORT ON THE MUSEUMS DEPARTMENT FOR THE YEAR 1906.

PERAK STATE MUSEUM.

SATISFACTORY progress was made in all the departments during the year, the greatest additions being made to the ethnological and economic sections. Pahang, Tringganu, Negri Sembilan, Selangor and Malacca were visited, and large collections made in these States: while the Singapore Agri-Horticultural Show yielded, as did the previous one held in Kuala Lumpur, quite an extensive series of specimens.

Digitized by Google

2. The local ethnological room, certainly, now contains the most complete Malayan collection in existence. It is still, of course, far from perfect, but since the newer portion of the building was available for the housing of it, very satisfactory progress has been made in filling up the gaps which previously existed.

3. The economic section has now assumed, as it should in a State like Perak, quite an important position. The room is not yet finished, but a great deal has been done towards its completion, by the collection of the necessary specimens, and in the year 1907 the original intention will be nearly fulfilled. It is the only collection of the kind which has been, so far, attempted in Malaya.

4. A point has now been reached in the history of the Museum, when it again becomes necessary to consider the question of additional space. The last enlargement, which was begun in 1900 and finished by the end of 1903, is at present practically full, as is also the space which was rendered available in the older portions of the building by the rearrangement of the collections, when the new galleries were occupied. Adequate space is also urgently required for the proper accommodation of the library, herbarium and the study collections; and some provision should be made for a small reading room. An inexpensive block, very similar to that last added, only 20 feet longer, would meet the requirements of the case.

5. The Perak Museum was founded in January of 1883, so that the year under review is the 24th of its existence. The central portion of the present building was begun in 1886, and it has been added to from time to time as it became overcrowded. When considering the progress which has been made, and comparing it with that of other institutions of a similar character and age, it should be remembered that the funds available for general expenses have been very limited in extent, and that out of this small annual vote the whole cost of the case building and fittings has had to be defrayed.

6. The registration and cataloguing of the contents of the Museum was proceeded with, and 2,700 specimens were registered; 846 of these being new accessions. Up to the end of the year, 13,000 cards had been used, exclusive of guides and subsidiary entries. It was found necessary to obtain a second eight-drawer card-cabinet, as the first had become congested. This should give sufficient accommodation for the next three or four years, at the present rate of progress. Five hundred and eleven new labels were typed, poisoned and mounted on cards. This work was much delayed in consequence of changes in the clerical staff, neither of the new clerks knowing how to use a typewriter at the time of appointment, and one being, up to the end of the year, incapable of using the instrument. There are many thousands of old and dirty labels which require replacing with new ones, and thousands more of manuscript ones which should be typed.

Digitized by Google

7. The number of visitors continues to increase, year by year, in the most satisfactory manner. The total for the year was 61,449, being the greatest number ever recorded. It is also pleasant to be able to report that there has been no case of damage to the Museum or to the exhibits, or of misbehaviour on the part of any of the many persons who have visited the Institution.

8. The Curator, Mr. Knocker, was absent on leave from the 1st of March to the end of the year. Mr. E. Keilich, the Taxidermist, acted for the Curator, and Mr. Yong Fook, the Assistant Taxidermist, for the Taxidermist. There were three changes in the appointment of Caretaker and Clerk, and from having a man at the top of Grade III, the present occupant is at the very bottom of that Grade.

9. In consequence of the fixing of the dollar at 2*s.* 4*d.*, a saving was effected on the estimates of $715.15, from the salaries of Messrs. Knocker and Keilich.

SELANGOR STATE MUSEUM.

10. The new Museum building was handed over by the Public Works Department during the year, and by the end of it the greater part of the case building was finished. A portion of the painting, glazing and fitting remained to be done, and some of the cases in the central hall were not completed. The sum of $7,378.56 was expended on cases, and the general effect of the galleries, considering the low cost of construction, is by no means bad.

11. The collections were removed from the old building to the new. The old cases and fittings were sold and realised $340.93. The work of installing the specimens was begun and carried on, as far as the state of the cases would allow.

12. Collecting proceeded throughout the year and many additions were made to all the departments. An Assistant Curator was appointed and arrived in August. He has already made very considerable progress in collecting and mounting various zoological specimens, but it will necessarily be some years before this portion of the collection is brought up to a satisfactory standard. In the early part of the year, prior to his appointment, a good many birds and mammals were sent to be mounted in England. Nearly the whole of the old collection of mammals will have to be discarded as soon as better mounted examples of the various species can be procured.

13. The wing set apart for the ethnological collection, although this is strictly local in character, is already becoming congested.

GENERAL.

14. One number of the "Journal of the Federated Malay States Museums" was issued during the year, and the MS. for another was

Digitized by Google

sent to the Government Printer in December. Material for other numbers was in hand, and the preparation of a guide to the Perak Museum and the report on the Gunong Tahan Expedition, together with the illustrations for these two latter works, was far advanced.

15. The birds and reptiles obtained during this expedition have been worked out at the British Museum, and the Federated Malay States share has been returned. These specimens will add many novelties to both Museums.

16. A considerable number of botanical specimens of economic plants have been collected and sent to the herbarium of H.H. Prince Roland Bonaparte. Including one consignment sent in December, 1905, 114 plants have been forwarded up to the end of 1906.

L. WRAY,
Director of Museums, F.M.S.

REPORT ON THE PERAK MUSEUM FOR THE YEAR 1906.

THE BUILDING.

OWING to the ravages of the white ants, the roof of the Laboratory and Workshop had to be removed, and a new one built in its place, the galvanized iron roofing tiles were used again. Two Dormer-windows were at the same time built in the eastern side of the roof, this has greatly improved the light in the building. Before the old roof was removed, a temporary atap roof was placed over the building, thereby preventing the interior and the contents from being damaged by rain.

The Museum was closed to the public for two days—the 26th and 27th of July—for a general cleaning, and all the wooden floorings were washed, and afterwards dressed with earth oil and kerosene.

CASES.

Nine shallow wall cases, size 3 ft. by 1 ft. 11 ins., were made and fixed on the walls of the Economic Botany room, four of which contain fibres, two native medicinal plants, one native drugs and two specimen blocks of native woods. Twenty frames, size $12\frac{1}{2}$ ins. by $9\frac{1}{2}$ ins., were also made for showing mounted botanical specimens, and there are 34 mounted specimens awaiting the completion of more frames. Eight two-drawer cabinets, size of drawer 3 ft. by 1 ft. 9 ins. by 4 ins. deep, have been made and fixed under one of the table cases in the upper Ethnological room.

Digitized by Google

ZOOLOGY.

The following mammals and birds were added to this section :

MAMMALS.

A Malayan Bear, female (*Ursus malayanus*) :
A Burmese Civet, male (*Viverra megaspila*) ;
A Flying Lemur, male (*Galeopithecus volans*) ;
A Grey Agile Gibbon, female (*Hylobates agilis*) ;
Two Bats, male and female (*Megaderma spasma*).

BIRDS.

A Black Bittern, male (*Dupetor flavicollis*) ;
A Lesser Coucal, male (*Centropus bengalensis*) ;
Three Young Coucals (*Centropus bengalensis*) ;
A Crested Goshawk, female (*Lophospixias trivirgatus*) ;
A Burmese Peafowl, male (*Pavo muticus*) ;
Two Argus Pheasants, male and female (*Argusianus argus*) ;
A White-breasted Kingfisher, female (*Halcyon smyrnensis*) ;
A Malayan-pied Hornbill, male (*Anthracoceros malayana*) ;
A Malaccan Yellow-naped Woodpecker, male (*Chrysophlegma malaccensis*).

The alcohol in all the jars of the reptile collection was changed, and the discoloured spirit was re-distilled in the Laboratory; altogether over 40 gallons of clear alcohol passed through the still.

BOTANY.

About 66 specimens were mounted and added to the Herbarium, some more additions were made to the rubber exhibits, by the Superintendent of the Government Plantations, Mr. T. W. Main.

A very fine collection of fibres, medicinal plants, essential oils, etc., were given by the Manager of the Kamuning Estate, Mr. A. D. Machado.

Seventeen plaster of Paris models of fruits—*i.e.*, machangs, mangoes and pisangs—were cast and coloured to nature for the fruit collection.

Nineteen framed botanical specimens, a good many produce samples in glass-topped tins and a series illustrating the newly discovered anti-opium plant and its use were added to this section.

GEOLOGY.

Five very handsome specimens were presented to this department by Mr. E. Gervais, of the French Tin Mining Company, Lahat; Mr. Cecil Wray contributed three specimens from Pahang, particulars of which are given in the donation list; and a large number of

Digitized by Google

specimens have been transferred from the Selangor State Museum. Messrs. G. and C. E. Cumming gave specimens of tin ore, the former from Salak South, Selangor, and the latter from a tin vein in granite, showing polished surface of slickensides.

ETHNOLOGY.

Quite a large number of valuable specimens have been added to this section, the result of some collecting trips made by the Director of Museums in Pahang, Tringganu, Negri Sembilan and Malacca, and a visit to the Agri-Horticultural Show, Singapore. The Curator, Mr. F. W. Knocker, also obtained a few Sakai specimens in his trip to Negri Sembilan in February.

Twelve papier-mâché models were made from four iron implements found in Selangor and Batang Padang. One set was presented to the British Museum and another to the Selangor Museum. Plaster casts of eight cannon balls, found in various places, were made and coloured.

REGISTRATION AND CATALOGUING.

A new eight-drawer card-cabinet was obtained, and registration and cataloguing has been carried on throughout the year in all the sections of the Museum. The total number of things registered amounts to 2,700, the total number of cards written to date, exclusive of guides, etc., is 13,000. The number of new accessions registered during the year was 846. The number of cards added to the Library Catalogue was 75, and 511 tickets were typed.

THE LIBRARY.

There were many additions to the Library by presentation, and the additions by purchase are as follows:

"British Malaya," by Sir Frank Swettenham; "Museums Journal," Vol. 3 of 1903-4, Vol. 4 of 1904-5; "Journal of the Royal Asiatic Society, Straits Branch"; "Philippine Journal of Science"; "Colonial Office List"; "The Straits Directory"; "Whitakers' Almanac" for 1906; "Who's Who" for 1906; "Who's Who in the Far East" for 1906; "Vocabulary of Malay Medical Terms," by Dr. P. N. Gerrard; "Carchester: a Tale of West and East," by a Pilgrim; the second edition of the "Living Races of Mankind," 2 Vols.; "Journal of Indian Art and Industry," Vol. X; Bland's "Historical Tombstones of Malacca"; Giles' "Religions of Ancient China"; "The Life of Sir Andrew Clarke"; "Chinese Porcelain," by W. G. Gulland; "Pottery and Porcelain Marks," by Hooper and Phillips; "Elephant and Seladang Hunting in Malaya," by T. R. Hubback; "Heroes of Exile," by Hugh Clifford,

Digitized by Google

LIST OF DONATIONS TO THE PERAK STATE MUSEUM LIBRARY FOR 1906.

BIOLOGICAL SOCIETY OF WASHINGTON, U.S.A.:
"Proceedings of the Biological Society, Description of a New Species of Acordium from the Philippines," by Oakes Ames.

EGYPTIAN GOVERNMENT ZOOLOGICAL GARDENS, GIZA (per the Director, Captain Stanley S. Flower):
"Report of the Giza Zoological Gardens for 1905."

FEDERAL SECRETARY:
"Blood-sucking Flies, Ticks and how to Collect Them" (by E. E. Austen).

GOVERNMENT PRINTER:
"Enactments, Pahang, 1905."
" Negri Sembilan, 1905."
" Selangor, 1905."
" Perak, 1905."

HOBSON, MR. S. G.:
"The Ball."

INDIAN MUSEUM, CALCUTTA (per the Trustees of the Indian Museum):
"Annual Report for 1904-1905."
"Catalogue of the Indian Decapod Crustacea in the collection of the Indian Museum," Part III, Macrura.

KEW ROYAL BOTANIC GARDENS:
"Bulletin of Miscellaneous Information" for 1906.

KING, COLONEL SIR GEORGE, K.C.I.E.:
"Materials for a Flora of the Malayan Peninsula," Nos. 16, 17 and 18.

KYOTO IMPERIAL UNIVERSITY (per the Secretary, Hajime Ishikawa):
"The Kyoto Imperial University Calendar" for 1905-1906.

LLOYD, MR. C. G.:
"Bulletin of the Lloyds Library Mycological Series," No. 3.
"Index of the Mycological Writings," by C. G. Lloyd, Vol. 1, 1898-1905.
"Mycological Notes," by C. G. Lloyd, Vol. 1, 1898-1905.
"Mycological Notes," by C. G. Lloyd, May, 1905.
"Mycological Notes," by C. G. Lloyd, June, 1905.
"The Tylostomeæ," by C. G. Lloyd.

"LOUISIANA PLANTER" (per the Editor):
Complete Issues for 1906.

MACGREGOR, MR. R. C.:
"Birds from Mindoro and small adjacent Islands."
"Notes on Three Rare Luzon Birds."
"A Hand List of the Birds of the Philippine Islands."

MANCHESTER MUSEUM (per the Director, Dr. W. E. Hoyle):
"Notes from the Manchester Museum."
"Calendar of Lectures and Addresses for 1906-1907."
"Manchester Museum Report for 1906-1907."

MONTEVIDEO MUSEO NACIONAL (per the Director-General):
"Anales del Museo Nacional de Montevideo."

OTAGO UNIVERSITY MUSEUM:
"Curator's Annual Report for 1905" (2 copies).

"PERAK PIONEER" (per the Editor):
Complete Issues for 1906.

PLYMOUTH MUSEUM AND ART GALLERY (per the Curator, Mr. E. E. Lowe, F.L.S.):
"Annual Report for 1905."

Digitized by Google

LIST OF DONATIONS TO THE PERAK STATE MUSEUM LIBRARY FOR 1906—(*cont.*)

RAFFLES LIBRARY AND MUSEUM, SINGAPORE:

"Annual Report for 1905."

ROYAL COLONIAL INSTITUTE:

"Journal of the Royal Colonial Institute."
"Sessions, 1905-1906," Nos. 1, 2, 3, 4, 5, 6, 7 and 8.
"Sessions, 1906-1907," No. 1.

SARAWAK MUSEUM (per the Curator, Mr. J. Hewitt, B.A.):

"Report of the Sarawak Museum for 1905."

SCRIVENOR, MR. J. B.:

"Fossils from Singapore," by R. Bullen Newton, F.G.S.

SECRETARY TO RESIDENT, PERAK:

"Agricultural Bulletin of the Straits and Federated Malay States," Vol. V, 1906.
"Programme of the Presentation of Colours to the Malay States Guides."
"Federated Malay States Civil Service List" for 1906.
"Bulletin of the Imperial Institute," Vol. IV, Nos. 1 and 2.
"Scenery Preservation," the Government of New Zealand.

SELANGOR MUSEUM (per the Curator, Mr. H. C. Robinson);

"Catalogue of the Selangor Government Library."
"The Annals and Magazine of Natural History," Vol. XV, Nos. 86, 87, 89, 90, 91, 92, 93 and 94.

"SINGAPORE FREE PRESS" (per the Editor):

Complete Issue for the half of year for 1906.

SMITH, SENATOR THE HONOURABLE STANIFORTH:

"Report on the Federated Malay States and Java."

SMITHSONION INSTITUTION, U.S.A.:

"Bulletin of the United States National Museum," Nos. 54 and 55.
"Annual Report of the Smithsonion Institution," 1904.
"Proceedings of the United States National Museum," Vol. XXVIII and XXIX.
"Contributions from the United States National Herbarium," Vol. X, Parts 1 and 2.
"Contributions from the United States National Herbarium," Vol. XI.

"TIMES OF MALAYA" (per the Editor):

Complete Daily and Weekly Issues for 1906.

WEST INDIES, IMPERIAL DEPARTMENT FOR AGRICULTURE (per the Commissioner, Sir Daniel Morris):

"West Indian Bulletin for 1906."

LIST OF DONATIONS TO THE PERAK STATE MUSEUM FOR 1906.

AMAT TASEH, PENGHULU:

Wooden Shoes for a Child from Lower Perak.

ASSISTANT COMMISSIONER OF POLICE, PAHANG:

Buttons and Badges of Pahang Police.

BAILEY, INSPECTOR H.:

Three Samples of Scrap Para rubber.

BARNARD, MR. H. C.:

Malaccan Yellow-naped Woodpecker (*Chrysophlegma malaccensis*), Taiping.

Digitized by Google

LIST OF DONATIONS TO THE PERAK STATE MUSEUM FOR 1906—(*cont.*)

BIRCH, MR. E. W., C.M.G.:

A Peacock.

BIRD, MR. G. F.:

One Beetle (Cockchafer) from K. Kangsar.

BOURNE, THE REV. J. B.:

Three Female Kerringas from Taiping.
Water from a Mineral Spring, Ulu Bernam.

CAMPBELL, MRS. J. W.:

Snake (*Doliophis bivirgatus*).

CAMPBELL, MR. J. W.:

Two Caterpillars from Maxwell's Hill.
Fruit of the Calabash (*Crescentia cujete*) from Kuala Kangsar.

CHEAH KEE EE, MR.:

Micaceous Iron Oxide from Tambun, Kinta.

CHOO CHEENG KLAY, MR.:

Botanical specimens of the Anti-opium Plant (*Combretum sundiacum*) from Kuala Lumpur.

CHULAN, RAJA:

Silver Cup.

COMMANDANT, MALAY STATES GUIDES, THE:

Buttons and Badges of the Malay States Guides.

CUMMING, MR. C. E.:

Tin Vein in Granite, showing polished surface of slickensides.

CUMMING, MR. G.:

Tin Ore from Salak South, Selangor.

DAVIDSON, MRS.:

Covered Jar of Siamese Ware.

DIRECTOR OF POSTS AND TELEGRAPHS, FEDERATED MALAY STATES:

Two 1-cent Stamps (all green).
Two 3-cent Stamps (all brown).
Two 25-dollar Stamps.
Two F.-size Registration Envelopes.
Two G.-size ,, ,,

DISHMAN, MR. A.:

Specimens of Vivianite from Tanjong Malim.

FOSTER, MR. R.:

Thirteen Copper Coins.

GERRARD, DR. P. N.:

Elephant Beetle (*Xylotrupes gideon*, Linn.)
Grasshopper from Parit Buntar.
Caterpillar ,, ,,

GERVAIS, MR. E.:

Fluor Spar, Arsenical Pyrites and Tin Ore from Ayer Daun Sang, Lahat.
Tin Ore in Limestone from Lahat.
Calcite with Iron Pyrites, Lahat.
Tin Ore from Lahat.

GOWLAND, INSPECTOR H. J.:

Chinese Apparatus for Injecting Morphia.
Nine Counterfeit Dollars taken in Taiping.
One Counterfeit $5-Note taken in Taiping.
One Counterfeit $10-Note taken in Taiping.

GREIG, MR. G. E.:

Moth (*Antheraea sp.*), Kendong Valley near Grit.

HARPER, MASTER GREAME:

Beetle.

HOBSON, MR. S. G.:

Skeleton of Glass Sponge "Venus Flower Basket" (*Euplectella aspergillum*).

Digitized by Google

LIST OF DONATIONS TO THE PERAK STATE MUSEUM FOR 1906—(*cont.*)

HODSON, MR. A. W.:

Argus Pheasant from Bruas.
Mantis from Penang Hill.
Scorpion from Bruas.

HUME, MR. W. J. P.:

Hawk Moth (*Elibia dolichus*).
Pikat from Maxwell's Hill.

ISMAIL, HAJI:

Boyanese Basket.
Red Iron Oxide from Sungei Siput.
Javanese Silver Brooch and Earrings.

KEILICH, MR. D.:

Hawk Moth (*Calymnia panopus*).
Smaller Atlas Moth (*Attacus cynthia*).
Crested Goshawk (*Lophospizias trivirgatus*).
Five White Ant's Nests.

KNIGHT, MR. B. C. N.:

Snake (*Adeniophis intestinalis*).

KNOCKER, MR. F. W.:

Coloured Sleeping Mat.

LEE YEN FAT, MR.:

One Siamese Copper Coin.
Five Anam Copper Coins.
Four Cambodia Copper Coins.
Two Silver Indo-Chine Française Coins.
One $1 Indo-Chine Française Bank Note.
Ten Indo-Chine Française Copper Coins.
Six " " "
Two " " "

MACHADO, MR. A. D.:

One Sample of Betel Nuts.
" Copra (Sun-dried).
" Cotton.

MACHADO, MR. A. D.—(*cont.*)

One Sample of Silk Cotton.
Two Samples of Liberian Coffee.
" Pepper (Black and White).
One Sample of Patchouli.
" Coconut Oil.
Collection of Fibres.
" Medicinal Plants.
" Essential Oils.

MADDEN, MR. L. J. B.:

Nightjar's Egg.

MAIN, MR. T. W.:

Glass Jar of Latex of *Hevea braziliensis*.
Glass Jar of Seeds Pods of *Hevea braziliensis*.
Specimens of Para Sheet Rubber.
Specimens of Rambong Rubber.

MASTER-TAILOR, MALAY STATES GUIDES:

Obsolete Turban and Cap Badges of the Malay States Guides.

MATSOHO, O TITSAN:

Calc-Sinter from Hot Spring at Nagasaki, Japan.
Model Japanese Clogs.

METHODIST EPISCOPAL MISSION, KUALA LUMPUR:

Anti-opium Plant (*Combretum sundiacum*) from Seremban.

MOSS, MR. P.:

Smaller Atlas Moth (*Attacus cynthia*).
Butterfly (*Amathusia phidippus*) and other specimens.

NELSON, MRS. P. J.:

Snake (*Macrophisthodon flaviceps*).

Digitized by Google

LIST OF DONATIONS TO THE PERAK STATE MUSEUM FOR 1906—(*cont.*)

NELSON, MR. R.:

Columbite or Tantalite from Australia.

NG ANN THYE, MR.:

Malayan-pied Hornbill (*Anthracoceros malayana*).

NICHOLAS, MR. F. W.:

Large Spider.
Snake (*Coluber radiatus*).

SALISBURY, MR. E. R.:

Flying Lemur (*Galeopithecus volans*).

SAYERS, MR. W.:

Siamese Mango.

SECRETARY TO RESIDENT, PERAK:

Twelve framed Photographic Views of Taiping.

SELANGOR ANTI-OPIUM SOCIETY, KUALA LUMPUR:

Specimens of the Anti-opium Drug.

SELANGOR STATE MUSEUM:

Piece of Sandstone used for filing teeth.
Damar Chingal.
Two Tambourines made in Singapore by Tamils.
Old Chinese Plate.
Chinese Fighting Irons.
Small Chinese Fighting Irons.
Native Sulphur from Crater of a Volcano.
Large Bamboo Flageolet from Negri Sembilan.
Four Tobacco Pouches, made by Sakais under European supervision, from Batang Padang.

SELANGOR STATE MUSEUM—(*cont.*)

Pair of Rice Bags made by Sakais, Batang Padang.
Bullets found in the Fort, Kuala Selangor.
Two White Metal Buttons of Selangor Police.
Two White Metal Buttons of F.M.S. Police, Selangor.
Sapphires from Ceylon.
Verde Antique Marble from San Bernardin Co., California.
Fibrous Gypsum from Paris, France.
Petrified Shells, Twigs, etc., by deposit of Carbonate of Lime.
Gypsum from France.
„ Paris, France.
Encrinal Marble, Les Ecanssines, Belgique.
Selenite (Sulphite of Lime) San Joaquim Co., California.
Two Stalactites from Cave, Calaveras Co., California.
Skull of Simia Satyrus, Linn., the Orang Utan or Mias from Borneo.
Skull of Babirusa (*Babirusa alfurus*) from the Celibes.
Twenty-three Species Fossils from Paris, Basin.
One *Sterna dougalli*.
One *Cyanops ramsayi*.
One *Sterna melanauchen*.
One *Poliolimnus cinereus*.
One *Alophoixus phaeocephalus*.
One *Anthothreptes hypogrammica*.
One *Anuropsis malaccensis*.
One *Turdinulus humei*.
One *Rhipidura perlata*.
Obsidian Bombs from Kuantan, Pahang.
Mineral and Rock Specimens.

Digitized by Google

LIST OF DONATIONS TO THE PERAK STATE MUSEUM FOR 1906—(*cont.*)

SUMNER, MR. H.:

Two pairs of Brass Stirrups from Pekan.

STONEY, MR. B. O.:

Portrait of Sir Frank Swettenham.

TAYLOR, SIR W. T., K.C.M.G.:

Seventeen Dutch East Indian Coins of the Eighteenth Century.

TOH KHAY BENG, MR.:

Iron Pyrites from Pulau Langkawi.

TWISS, MR. F. R.:

Cicada.

UPTON, MR. H. S.:

Paddle from Port Dickson.

VADAMALIA THAMBY, MR.:

Lizard.

WAGNER, MR. C.:

One Cap Badge of the First Perak Sikhs.

One Worked Badge of the First Perak Sikhs.

WRAY, MR. CECIL:

Chert Rock from Benus, Bentong, Pahang.

Carbonate of Lead from the Duff Development Co., Kelantan.

Amang containing Monazite from Sungei Lima, Ulu Dong, Pahang.

Stanniferous Garnet Rock from Triang, Pahang.

WRAY, MR. LEONARD., I.S.O.:

Comb of Large Malay Bee.

YONG FOOK, MR.:

Lizard.
Four small Chinese Coins.

YOUNG, MR. C.:

Grasshopper.

GENERAL.

A gift of the following animals—a male grey white-handed Gibbon (*Hylobates lar*), collected by the Curator, Mr. Knocker, from Sakais in the Ulu Plus; a male Leopard Cat (*Felis bengalensis*); and also three Macaque Monkeys (*Macacus fascicularis*), an adult female with young and a young male—was made to the Zoological Society of London. These animals were taken to England by Mr. Knocker and arrived safely in the Society's Gardens by the end of March.

VISITORS.

The number of visitors during the year has exceeded those of all previous years. The figures for the last five years are as follows:

1902.	1903.	1904.	1905.	1906.
40,022 ...	46,685 ...	52,854 ...	55,103 ...	61,449

This shows yearly increases of 6,663, 6,169, 2,249 and 6,346 respectively.

Digitized by Google

The following table gives the details of admission:

Month.	Days open.	Maximum.	Minimum.	Total.	Daily average.
January ...	24	418	131	5,593	233.04
February ...	23	520	71	5,519	239.95
March	26½	246	110	4,405	166.22
April	21	1,445	107	5,300	252.38
May	26	343	100	5,276	202.92
June	23	343	150	4,697	204.21
July	24	390	119	4,221	175.87
August... ...	25	500	90	4,451	178.04
September ...	25	250	62	4,250	170.00
October ...	27	2,118	69	7,725	286.11
November ...	24	342	79	4,889	203.70
December ...	23	359	164	5,123	222.73
Mean ...	24.29	606.16	104.33	5,120.75	211.26

As the total number recorded by the turnstile was 61,449, and the number of days the Museum was open to the public was 291½, there was a mean daily average of 210.80 visitors. The greatest number of visitors for one month was 7,725, registered during October. The largest daily number was 2,118, this occurred on the 29th October, the opening of the newly erected Tanda-i-Thapani Temple at the Waterfall.

Other large daily attendances were recorded as shown below:

Hindu Festival, called Panguni Ootharam (7th April) ... 1,445
Chinese Festival, the 15th of the 8th moon (2nd October) 1,232
Hindu Festival, called Tai Pusum (8th February) ... 520
First day of Race Meeting (23rd August) 500

The Consul-General for Germany in the Straits and Federated Malay States visited the Museum on the 19th of January; the Earl and Countess of Carnarvon, the Countess of Lanesborough, and Mr. Kelway Bamber, the Ceylon Government Chemist, on the 5th of February; H.H. Tungku Mohamed, C.M.G., Yang di per Tuan of Negri Sembilan, H.H. Suleiman bin Almerhum Raja Musa, Sultan of Selangor, the British Resident of Selangor, and the Resident-General on the 12th of February; Professor Engler, Director of Botanical Gardens, Berlin, on the 24th of February; Senator the Honourable Stanniforth Smith, Commonwealth of Australia, on the 14th of March; H.S.H. Prince Heinrich Von Reuss on the 24th of March; Mr. T. Tanaka, the Acting Japanese Consul, on the 26th of March; Mr. Suen Tye Ting, the Chinese Consul-General, on the 6th of October; Phya

Digitized by Google

Sri Sahabheb, Vice-Minister for the Interior, Siam, and Mr. J. T. Westengard, Assistant Adviser, Siam, on the 27th of October; and Their Royal Highnesses Prince George and Prince Conrad of Bavaria and Baron Von Hacke on the 9th of December.

Some forty pupils from the Klian Pau Convent School paid a visit on the 3rd February. The boys of Standards II and III of the King Edward VII School, with Mr. Stainer, the Head-master, visited the Museum on the 9th and 14th March, and again during the month of May; Standard VII boys visited the Museum on the 9th; Standard III boys on the 16th; and Standard IV boys on the 31st.

STAFF.

Mr. Knocker, the Curator, left on the 1st of March on 13 months' leave.

Mr. E. Keilich, the Taxidermist, was appointed Acting Curator, and Mr. Yong Fook, the Assistant Taxidermist, Acting Taxidermist.

Mr. N. Bappoo, the Clerk and Caretaker, was transferred from this office on the 6th March to Tapah as Chief Clerk to the District Officer, and was succeeded by Mr. E. B. Carlos, who resigned on the 31st August. The post is now occupied by Mr. Ooi Khai Chong.

FINANCIAL.

The revenue collected amounted to $146. A saving of $884.11 was effected on the estimates, exclusive of personal emoluments. In consequence of the fixing of the dollar at 2*s.* 4*d.*, there was a saving of $378.65 on the compensation allowance. While there was a saving of $336.50 on the Curator's salary, this is also on account of the fixing of the dollar, and $117.75 on the Clerks' salaries; altogether a saving was effected on the establishments amounting to $832.90.

E. KEILICH,
Acting Curator.

REPORT ON THE SELANGOR STATE MUSEUM, 1906.

EXPENDITURE.

ON the vote of $6,439 for personal emoluments there was a saving of $1,880.15, owing to the rise in exchange and to the non-appointment of an Assistant Curator, as provided in the Estimates, until August.

Digitized by Google

2. Under other charges, annually recurrent expenditure, including a supplementary sum of $230, $3,880 was voted, which was spent as follows:

(1)	Collecting trips and transport	$698.72
(2)	Specimens	992.79
(3)	Taxidermist's outfit and stores	451.29
(4)	Preservatives, collecting and cleaning materials	325.89
(5)	Mounting birds and mammals...	179.64
(6)	Plates for "Museum Journal"	53.24
(7)	Books and periodicals	200.00
(8)	Postage and petty cash	78.86
(9)	Freight and insurance charges...	101.21
(10)	Repairs and sundries	159.12
(11)	Bonus to collectors	108.00
(12)	Folding ladder and case fittings	113.11
(13)	Uniforms	41.50

3. Including a supplementary provision of $500, $8,223 was provided to complete the furnishing of the Museum, and by the end of the year this work had been almost completed, all the wall and table cases for the two main galleries having been finished and glazed, while those for the central hall were well advanced.

The following charges were incurred on the vote:

(1)	Labour	$2,375.76
(2)	Plate glass	2,237.15
(3)	Painting and polishing	1,432.40
(4)	Metal work	491.16
(5)	Freight and handling charges	467.19
(6)	Timber	374.90
(7)	Glass-topped boxes	272.66
(8)	Catalogue cabinet	137.29
(9)	Office furniture	90.50
(10)	Tank in photographic room	25.00

4. Three insect cabinets by a leading London maker were purchased and installed at a total cost of $892.49.

5. The expenses of removal amounted to a sum of $165.02, on a total estimate of $500.

REVENUE.

The revenue realised from work done for private persons and sale of surplus specimens amounted to $142.18.

Under authority previously obtained $134.94, including a debit balance from 1905, was expended on ethnographical specimens, leaving a balance of $7.24 to the credit of the fund. The sale of unserviceable cases in the old Museum realised a net sum of $340.93.

Digitized by Google

VISITORS.

During the removal from the old Museum and the re-arrangement of the collections in the new buildings the Museum was closed to the public throughout the year.

LIBRARY.

A considerable proportion of the available sum of $200 was devoted to binding, but one or two important books were purchased, including Dr. Rudolf Martin's monographic work on the Sakai and Semang Tribes of the Malay Peninsula. As in previous years several contributions have been received from the Trustees of the British Museum, the United States National Museum and the Department of the Interior, Philippine Islands.

EXCHANGES.

A few reptiles were received from the British Museum in exchange for others, and a complete set of "Novitates Zoologicæ," a valuable publication containing many important monographs, from the Hon. Walter Rothschild, in return for some rare birds from the mountains of Selangor.

PUBLICATIONS.

One number of the "Journal of the Federated Malay States Museums" was published during the year while another was in the press. The preparation of the illustrated report on the Gunong Tahan Expedition was far advanced.

ADDITIONS.

I.—ZOOLOGICAL.

As in previous years the high mountains in the vicinity of the Pahang boundary were visited with very satisfactory results, several extremely rare species of birds having been obtained. In June ten days were spent on the island of Tioman and a large collection of small mammals formed, including most of the varieties collected by the American naturalist, Dr. Abbott, and several others in addition. This collection, as well as other specimens from the adjacent islands of Pemmangil, Aor and Tinggi, have been forwarded to the British Museum and will be reported on in due course.

The Dyak Collectors also visited Rantau Panjang in the Selangor low country jungle and Gunong Angsi in Negri Sembilan with satisfactory results.

The Curator's duties as Inspector of Fisheries enabled him to visit several of the small islands in the Straits of Malacca, and several interesting birds and animals were obtained on Pulau Jarak and the Pulau Sembilan, and a large collection of over 200 skins was formed

Digitized by Google

by the Assistant Curator in Pulau Jemor, one of the Aroa Islands, which includes several littoral birds hitherto unrepresented in the collection. A visit to Batu on the Selangor coast in November proved less successful.

The birds collected on Gunong Tahan in 1905 were returned by the authorities of the British Museum after a representative set had been selected by them, and, as was anticipated, add several species of extreme rarity to the local collection.

The following species are new to the collection, those marked with an asterisk being either new to science or hitherto unknown from the Malay Peninsula:

* Sphenocercus korthalsi
* Sphenocercus robinsoni
* Brachypteryx wrayi
* Muscicapula malayana
Siva malayana
Suya waterstradti
Pyrrhula waterstradti
Centropus rectunguis
Rhinomyias pectoralis
Pteruthius tahanensis
* Locustella lanceolata
Pnoepyga lepida
Erythrocichla bicolor
Cuculus poliocephalus
,, saturatus
Hierococcyx sp.
Nycticorax nycticorax
Gorsachius melanolophus
Sterna melanauchen
,, dougalli
,, anæstheta

II.—ETHNOLOGICAL.

A large number of Chinese plates of varying degrees of merit and antiquity were purchased, chiefly from Rembau and Sri Menanti, as well as some good examples of Malay silver and several fine weapons. As regards the southern portion of the Peninsula the collections of the Museum are now so extensive that it is only occasionally that a really desirable specimen is offered for sale and then at a price that is usually prohibitive.

The collection of stone implements was further extended, and several very uncommon types obtained.

At the end of the year a short expedition was made to the mountains of South Perak, and a representative collection made of the possessions of the local Sakai tribes, including sumpitans and quivers, bamboo comb, bark cloth and other specimen of primitive culture.

STAFF.

The work of the staff generally was satisfactory, though for jungle work it has been found impossible to employ Malays.

H. C. ROBINSON,
Curator.

Digitized by Google

ON MAMMALS COLLECTED BY Mr. H. C. ROBINSON ON TIOMAN AND AOR ISLANDS, S. CHINA SEA.

By OLDFIELD THOMAS, F.R.S.

I HAVE been entrusted by Mr. H. C. Robinson, of the Kuala Lumpur Museum, with a number of mammals collected by him during 1906 on certain of the smaller islands round the Malay Peninsula. The majority were obtained on the islands of Tioman and Aor, off the east coast of Johore; and in the present paper I confine myself to these, as those from other localities are of little special importance.

The mammals of Tioman and Aor have hitherto only been known from papers by Mr. G. S. Miller on the material collected by Dr. W. L. Abbott, and now in the U.S. National Museum. In his first paper on the subject * Mr. Miller gave a list of the species obtained on Tioman in 1899, while the Aor ones and some additional Tioman species are included in a later paper.†

Mr. Miller's Tioman list is as follows:

Macaca "cynomolgus" (= fascicularis)	Sciurus tenuirostris
Tupaia sordida	„ tenuis
Paradoxurus hermaphroditus	Mus stridens
Ratufa tiomanensis ‡	„ tiomanicus
	„ obscurus
	Tragulus rufulus

§ Mr. Robinson obtained all of these, with the exception of *Sciurus tenuis*, *Mus stridens* and *M. obscurus*, and, in addition, the following:

Pteropus hypomelanus lepidus	Rhinosciurus robinsoni, *sp. n.*
Galeopterus taylori, *sp. n.*	Mus surifer
Petaurista melanotus	Atherurus tionis, *sp. n.*

* "Mammals collected by Dr. W. L. Abbott on Islands in the South China Sea," P. Wash. Acad. Sci. ii. pp. 203-246 (1900).

† "Seventy new Malayan mammals," Smiths. Misc. Coll. xlv. pp. 1-73 (1903).

‡ In the faunal list on p. 246 accidentally called *tiomanicus*.

§ Tioman was again visited in Sept., 1907, when *Mus stridens*, *Sciurus tenuis*, and a form of *Sciurus bilimitatus* which may possibly prove distinct were obtained. Several bats were also collected, amongst them being *Cheiromeles torquatus* and an *Emballonura* very close to *E. peninsularis* which is widely distributed throughout the Peninsula and adjacent islands. The only species from the island which has not been secured is *Mus pullus*, Miller, a synonym of *Mus obscurus*, Miller, which is preoccupied in the genus. Dr. Abbott obtained a single specimen of it. The "species" is very doubtfully distinct from the form of *M. concolor*, Blyth, inhabiting the mainland.—H.C.R.

Digitized by Google

Of Dr. Abbott's Aor mammals no list was published, but all the species obtained by Mr. Robinson have been described in the second paper above quoted.

With regard to the vexed question as to whether binomial or trinomial names should be used for the various closely allied races of the same type, when isolated in islands, I am strongly of opinion that the balance of convenience is in favour of trinomials, at least in large genera such as *Sciurus* and *Mus*, where binomials give no idea of the relationship of the animals. In certain cases, however, where I am morally convinced that a subspecific rather than a specific name is advisable, and yet where I have not had the opportunity or material to work out the group for myself, I have adopted the compromise of inserting the parent name in brackets, and so indicating the alliance of the animal dealt with.

MACACA FASCICULARIS, RAFF.

♀ 298. Juara Bay, Tioman.

PTEROPUS HYPOMELANUS LEPIDUS, MILL.

♂ 280, 290 (yg.), 329. Juara Bay, Tioman.

I am informed by Dr. Andersen that this Fruit-bat, described as *P. lepidus* by Miller, should be considered as a local subspecies of the widely-spread *P. hypomelanus*.

"Not uncommon on this island and on Pulo Aor, but not flying in great flocks like *P. vampyrus*."—H. C. R.

GALEOPTERUS* AORIS, MILL.

♂ 278; ♀ 276, 277, 280. Pulo Aor.

These specimens are quite uniform in the size of their skulls and teeth, and differ markedly from the Tioman species. Two are in the grey phase and two in an intermediate phase between grey and rufous.

GALEOPTERUS TAYLORI, *sp. n.*

♂ 281 (imm.). Pulo Tioman. 13th June, 1906. B.M. No. 8. 1. 25. 3. *Type.*

"Very rare in this island."

Size greater than in *G. aoris*, about equalling that of the mainland species. Teeth very large.

Type in red phase. In colour and other external characters quite like a specimen of *G. tellonis*, Lyon, in the red phase. Hands and feet finely spotted with white.

Skull of the single specimen, although immature, already decidedly larger than in *G. aoris*, and almost equalling small examples of the mainland species, to the size of which when full-grown it might have

* Formerly *Galeopithecus*. See Thos. Ann. & Mag. Nat. Hist., March, 1908., p. 254.

Digitized by Google

attained. Teeth very large, much larger than in any of the northern members of the group, and only equalled by those of the very much larger Javan species.

DIMENSIONS OF THE TYPE (immature), measured in flesh:

Head and body, 338 mm.; tail, 179; hind foot, 49; ear, 16.

Skull: condylo-basal length, 66; basal length, 61.5; zygomatic breadth, 42.3; interorbital breadth, 17; tip to tip of postorbital processes, 31.5; palatal length, 31; breadth of mesopterygoid fossa, 12.3; length of upper tooth series, 35, of anterior maxillary tooth (p^2) 7.1, of second ditto (p^3) 5.8, of p^4 and the three upper molars together 15, of p_2 7.2, of p_3 7.5; three lower molars together 12.1.

HAB. and TYPE as above.

This species is characterised by the great proportionate size of its teeth, which considerably exceed those of any of the geographically neighbouring forms, and equal those of the much larger Javan animal.

At the suggestion of Mr. Robinson I have named this new Flying-lemur in honour of Sir W. T. Taylor, K.C.M.G., Resident-General, Federated Malay States, who rendered the exploration of these islands possible by permitting the use of the Government yacht "Meran" for the purpose.

TUPAIA SORDIDA, MILL.

T. c. p. 231.

♂321; ♀320. Juara Bay, Tioman.

Topotypes.

PARADOXURUS HERMAPHRODITUS, PALL.

♂297. Juara Bay, Tioman.

PETAURISTA MELANOTUS, GRAY.

♂294, 296; ♀295. Juara Bay, Tioman.

These specimens differ considerably in the size of their skulls, that of 294, being about as large as in examples from Malacca, while 295 is little longer than the small *P. nitidula* of the Natunas.

RATUFA (MELANOPEPLA) TIOMANENSIS, MILL.

P. Wash. Ac. ii. p. 130 (1900).

♂283, 286, 287, 288, 289; ♀284, 285. Juara Bay, Tioman.

Topotypes.

Several characters, external and cranial, are given by Mr. Miller for the distinction of the Tioman Ratufa, but the only one which this series confirms is the slightly shorter tail, and as his own measurements completely intergrade, I should certainly consider the animal as merely a subspecies of the mainland form.

Digitized by Google

SCIURUS (VITTATUS) TENUIROSTRIS, MILL.

P. Wash. Ac. ii. p. 221, fig. 18*c* (skull) (1900).

♂ 307, 309, 310, 312, 313, 314, 315, 316, 318; ♀ 308, 311, 317, 319. Juara Bay, Pulo Tioman.

Evidently the commonest species in Tioman. It is a larger form than the representative of the same group in Aor and Pemangil.

SCIURUS (VITTATUS) "AORIS," MILL.

Smiths. Misc. Coll. xlv. p. 10 (1903).

♂ 301, 303; ♀ 300, 302. Pulo Aor.

Topotypes.

Mr. Robinson also collected three Squirrels of this group on Pemangil Island, close to Aor, and these would represent Miller's *S. pemangilensis*, described just before *S. aoris*. I confess I fail to see any difference between the specimens from the two islands, though I provisionally use the name given to the Aor form.

RHINOSCIURUS ROBINSONI, *sp. n.*

♂ 340, 341, 343; ♀ 337, 338, 339, 342. Juara Bay, Pulo Tioman.

More allied to the Bornean *R. laticaudatus*, M. & S., than to the Malayan *R. tupaioides*, Gray*; the tail-hairs broadly washed with ochraceous.

General colour above about as in *R. tupaioides*, paler than in a specimen from N. Borneo, which I provisionally accept as *R. laticaudatus*.

Centre of back blackish, rump more ochraceous, especially on sides, the whole dorsal area less uniform than in *laticaudatus*. Flanks above line of demarcation little suffused with buffy, while the belly itself, as in *laticaudatus*, is buffy throughout, being more ochraceous buffy posteriorly. Crown dark grizzled olive. Ears with an inconspicuous light patch behind them. Limbs darkening terminally, becoming blackish on the hands and hind toes as in *R. laticaudatus*. Tail-hairs black basally and subterminally, the second and terminal rings buffy or ochraceous buffy, similar to each other, or the terminal ring even darker than the subbasal; in the other species the ends are lighter than the subbasal rings, buffy white in *laticaudatus* and nearly quite white in *tupaioides*.

Skull with rather smaller bullæ than in *R. laticaudatus*, much smaller than in *R. tupaioides*.

* I quote this name as of Gray and not Blyth, because I do not think that the names in the former's "List of Mammalia," 1843, can be considered technically as *nomina nuda* in the cases where a characteristic English name was appended to them. The plan of the book not including descriptions in the usual sense, Gray seems to have done his best to make up for them by applying names by which the animals could be identified, and no one could any more doubt as to the identity of the "Sharp-nosed Squirrel" (p. 195) than of those of the "Blackish-backed," "Ashy-headed," or "Grey-thighed" species referred to on p. 143.

Digitized by Google

Dimensions of the Type:

Head and body, 199 mm.; tail, 90; hind foot (s. u.), 37.

Skull: greatest length *, 53; basilar length, 43.5; zygomatic breadth, 25.5; nasals, 18.5 × 5.3; interorbital breadth, 12; breadth of brain-case, 20.5; diastema, 15.5; length of bulla, 10; length of upper tooth-series, 11.8.

Type.—Adult female. B.M. No. 8. 1. 25. 15. Original number 337. Collected 7th June, 1906, by H. C. Robinson.

This Long-nosed Squirrel differs very markedly from the Malayan *Rhinosciurus*, both in colour and skull-characters, and is clearly more nearly allied to the Bornean representative of the genus. The Museum had already received from Mr. Robinson a good example of *R. tupaioides*, collected by him in Pahang, and this shows well the white belly, buffy flanks, and white-washed tail which distinguish that animal from the insular forms.

I have much pleasure in naming this distinct species in honour of Mr. Robinson, its discoverer, to whom we are indebted for so much of our knowledge of the mammalian fauna of the Malay Peninsula and its islands.

MUS TIOMANICUS, Mill.

♂ 330, 333; ♀ 331, 332. Juara Bay, Tioman.

A member of the *neglectus* group.

MUS SURIFER, Mill.

♂ 335, 336; ♀ 334. Juara Bay, Pulo Tioman.

These specimens appear to be quite similar to those in the British Museum, obtained by Mr. C. B. Kloss and mentioned in Mr. Bonhote's paper on his collection.

ATHERURUS TIONIS†, *sp. n.*

♂ 324 (skull only), 325; ♀ 323. Juara Bay, Tioman.

Similar to the mainland *A. macrourus* in colour and in the detailed skull-characters which separate *A. zygomaticus* from that species, but markedly smaller, with shorter tail, the skull less inflated, and smaller throughout.

Skull lower and less inflated than in *macrourus*, but its shape otherwise very similar. Nasals rather larger in proportion, their size nearly equalling that found in the larger form. Molars smaller in all dimensions.

* The type is rather a small specimen; two other skulls measure 56 and 56.5 mm. in greatest length.

† The middle syllable of Tioman being long, as in all other Malay names thus making such a word as *tiomanicus* almost unpronounceable, I have permitted myself the liberty of abbreviating the name of the island.

Digitized by Google

DIMENSIONS OF THE TYPE (measured in flesh):

Head and body, 516 mm.; tail, 176; hind foot (s. u.), 60; ear, 35.

Skull: upper length, 91; basilar length, 77.5; greatest breadth, 48; nasals, 27 × 15; intertemporal breadth, 26; height of muzzle on diastema, 18.5; height of crown above palate, 25; palatilar length, 39; diastema, 28.5; length of upper tooth-series (crowns), 16.8.

TYPE.—Old male. B.M. No. 8. 1. 25. 21. Original number 325. Collected 13th June, 1906.

The specimen which I take as a characteristic example of the peninsular *macrourus* agrees closely in its skull-measurements with the one from Trong referred to by Miller in his description of *A. zygomaticus*. Of its skull, the upper length is 100 mm., the height of the muzzle 21, of the crown 29, and the length of the upper tooth-series is 18 mm. It was obtained at Jalor by Messrs. Robinson and Annandale.

This animal is clearly a small insular representative of *A. macrourus*, and does not show the peculiarities that distinguish the Aor Island form.

ATHERURUS ZYGOMATICUS, MILL.

♀ 326, 327. Pulo Aor.

Topotypes.

These specimens quite agree with Mr. Miller's description, both in the peculiar character of the zygomata and in the dark colour of their sides and bellies.

Among the Eastern *Atheruri* in the British Museum I find an example of this species which was purchased in 1881 from a dealer, and was labelled in Japanese writing "Fasciculated Porcupine—native name *Ten pku koku*—India."

TRAGULUS RUFULUS, MILL.

♂ 291, 293, 328 (skull only); ♀ 292. Juara Bay, Tioman.

Topotypes.

"Very common. Caught in fall-traps baited with jackfruit."—H. C. R.

These specimens differ from Mr. Miller's description by having their bellies more or less washed with fulvous, but appear to agree in all other respects.

They also entirely agree in colour with the type of Gray's *Tragulus stanleyanus*, a species whose exact locality has, to my knowledge, never been definitely determined; but their skulls are so far smaller that they cannot be referred to it.

Probably *T. stanleyanus* will prove to occur on the mainland and to bear much the same relation to *T. rufulus* that *Atherurus macrourus* does to *A. tionis*.

Digitized by Google

[*Extracted from the "Linnean Society's Journal"—Botany*, vol. xxxviii., pp. 301-336, *June, 1908.*]

ON A COLLECTION OF PLANTS MADE BY H. C. ROBINSON AND L. WRAY FROM GUNONG TAHAN, PAHANG.

By H. N. RIDLEY, M.A., F.R.S., F.L.S., assisted by other Botanists.

[Read 5th December, 1907.]

[IN 1905 the Trustees of the British Museum made a grant towards the expenses of Mr. H. C. Robinson's expedition to Gunong Tahan in the Malay Peninsula, on condition that the whole collection made by the expedition should be sent to the Natural History Museum and that the first set should become the property of the Trustees. An account of the expedition will shortly be published in the "Journal of the Federated Malay States Museums." *

The plants, numbering about 250 specimens, were collected from May to July, 1905, by Mr. Robinson and Mr. L. Wray, Director of Museums, Federated Malay States. As Mr. H. N. Ridley, who is specially interested in the botany of the Peninsula, was home on leave during last year, I asked him to prepare an account of the collection. He agreed, but having to return to Singapore early in January, left his paper in an unfinished state; with Mr. E. G. Baker's assistance I have compared it with the specimens in the study set at the British Museum, annotated, and prepared it for the press. The account of the Ferns and Mosses is largely the work of Mr. A. Gepp, and that of the Fungi and Lichens has been prepared by Miss A. Lorrain Smith.

(A. B. Rendle.)]

The mountain Gunong Tahan lies in the north of Pahang, on the east coast of the Malay Peninsula, and was formerly believed to be by far the highest mountain in the Peninsula. It proves, however, to be by no means so lofty as was at first supposed, being only 7,100 feet in altitude.

Several attempts were made to explore this mountain on previous occasions. The first of these was undertaken by the author of this paper, accompanied by Mr. W. Davison, Curator of the Raffles Museum, Singapore, and Lieut. Kelsall, R.E., in 1891. The position of the mountain was then unknown, and owing to the limited time allowed, the failure of the commissariat, the extremely unhealthy character of the Tahan Valley, and the unsettled state of Pahang, then on the eve of the rebellion which broke out the following year, the expedition failed to reach its goal. A good collection of plants, however, was made, an account of which was published in the "Transactions of this Society," ser. 2, iii. p. 267, and an itinerary of the trip in the "Journal of the Royal Asiatic Society," Straits Branch, vol. xxv. p. 33. This expedition attempted to reach the mountain by travelling up the Pahang

* Vol. III. (Feb., 1908).

Digitized by Google

River, then up the Tembeling and Tahan Rivers, which latter stream is reported to spring from the base of the mountain.

In 1893 Mr. H. M. Becher again attempted to reach the mountain by the same route, but perished in a spate of the Tahan River about five miles above the point at which the first expedition stopped. A few plants were added to the collections at Singapore Botanic Gardens by the Gardens' plant-collector, who accompanied Mr. Becher's ill-fated expedition.

In 1899 Mr. W. W. Skeat, who went with the Cambridge expedition to explore the north of the Peninsula, made a hasty trip to the mountain from the north, and after much difficulty and risk reached it.

In 1901 Mr. John Waterstradt reached the mountain in a trip made chiefly for the purpose of collecting birds. An account of his expedition was published in the "Journal of the Royal Asiatic Society," Straits Branch, vol. xxxvii. (1902) pp. 1-27.

The collection of plants made by Messrs. Robinson and Wray is one of considerable interest, and contains a number of remarkable additions to the knowledge of the Flora of the Malay Peninsula. It has long been known that the floras of the east and west coasts are very different, the eastern side showing a number of Australian and eastern Asiatic types not met with on the western side, the flora of which is more accessible and has been more thoroughly studied.

The greatest interest centres round the plants, the geographical distribution of which is further extended. Two of these are specially noteworthy—viz., *Pentaphylax malayana*, n. sp., and *Gentiana malayana*: the former is the second representative of a Chinese monotypic genus of Ternstrœmiaceæ previously known only from Hongkong; the latter is closely allied to a Bornean species occurring on Mt. Kinabalu and to a Javan species.

A curious new genus of Melastomaceæ allied to *Dissochæta*, which I have called *Oritrephes*, is also an important addition. The genus *Xyris* is represented in the Peninsula by several sea-shore species, but is seldom met with inland or at any altitude; it is absent, so far as is known, from the Perak Hills and Mount Ophir, but one species, *X. Ridleyi*, was found by me on Kedah Peak at about 3,000 feet elevation. Two species occur on Gunong Tahan, one identical with that from Kedah Peak, the other, *X. grandis*, n. sp., perhaps the largest species of the genus, conspicuous from its stiff sword-like leaves resembling those of *Cladium Maingayi*, C. B. Clarke, of Mount Ophir.

There are, as usual in such collections, several species of *Didymocarpus*, including two new to science, and a number of Orchids, a good proportion of which are also new.

Among the previously described plants it is interesting to find several of those known only from Father Scortechini's collections and distributed without any specific locality. It is probable that as they

Digitized by Google

have not been met with on the western slopes of the Perak Hills, Scortechini must have collected them on the eastern watershed of the main range. Such are *Gordonia imbricata*, King, *Polyosma coriacea*, King, and *Calophyllum venustum*, King.

SPERMATOPHYTA.

DICOTYLEDONES.

POLYPETALÆ.

DILLENIACEÆ.

ACROTREMA COSTATUM, *Jack, in Mal. Misc.* i. (1820) No. v. 36 (*p. 303*).*

Kuala Teku, 500-1,000 ft. (5536.)

Distrib.—Common in most hill regions of the Straits Settlements at that altitude and occasionally at lower elevations.

POLYGALACEÆ.

POLYGALA MONTICOLA, *n. sp.* (*p. 303*).

Frutex circa bipedalis, basi nuda lignosa, superne haud ramosa. Folia 3-4 poll. longa, 1½ poll. lata, lanceolata utrinque acuminata, petiolata, glabra aut raro pilis translucentibus parce munita, nervis primariis ad 8 paria, petiolo ½ poll. longo. Racemus subterminalis strictus erectus densus. Flores albi, carinis roseis, ¼ poll. longis; pedicellis brevissimis. Sepala externa ovata rotundata pubescentia. Petala oblonga, carina cristata. Capsula immatura reniformis biloba ferme ¼ poll. in diametro.

Gunong Tahan, 5,000-6,000 ft. A small shrub; flowers white; column edged with yellow, pinkish above; sepals edged with purple. (5456.) At 4,000-5,000 ft.; about 2 feet high. Flower white when first opened, afterwards turning pink; leaf-stalks tinted pink. (5384).

Forma MAJOR, foliis 6 poll. longis, 2 poll. latis, glabris, petiolis pollicaribus; racemo 9 poll. longo.

Flowers tipped rose-red, calyx and flower-stalks white; mid-ribs of leaves tinted with red. At 5,000 ft. (5333.)

Though this has been several times collected in the mountains of the Malay Peninsula by different collectors, it seems to have been confused with *P. venenosa*, Juss. Its smaller flowers on very short pedicels, as well as its dwarf stem and dense erect raceme, make it very distinct from the great spreading half-shrub which is common in the lower damp forests; and it is difficult to see how it could be considered a variety of *P. venenosa*, which is really much less variable than would appear from the number of varieties of it recorded.

* To facilitate citation the original pagination is quoted in italics after each species. Ed.

Digitized by Google

PITTOSPOREÆ.

PITTOSPORUM, *sp.* A small tree 10-15 feet high, with light-coloured boughs and opposite subcoriaceous lanceolate leaves glaborus with impressed nerves above, strongly reticulate above and beneath, petioles pubescent. Fruit solitary, oval, $\frac{1}{4}$ inch long, on a slender peduncle $1\frac{1}{2}$ inch long.

Gunong Tahan, 5,000-6,000 ft. (5444.)

Too incomplete to describe, but I cannot identify it with any Asiatic species. The only species hitherto recorded from the Peninsula is *Pittosporum ferrugineum*, Dryand.

GUTTIFERÆ.

CALOPHYLLUM SPECTABILE, *Willd., in Ges. Naturf. Fr. Berl. Mag.* v. (1811) 80 (*p. 304*).

In fruit, Gunong Tahan, 3,300 ft. A medium-sized tree 50-60 feet high. (5344.)

Distrib.—A common and widely dispersed species, occurring from the Andamans eastward to the Society Islands.

C. VENUSTUM, *King, in Journ. As. Soc. Beng.* lix. (1890) 180 (*p. 304*).

Gunong Tahan, 4,000-5,000 ft. A small tree with white flowers. (5340, 5395.)

Distrib.—Perak. Only once previously collected.

TERNSTRŒMIACEÆ.

ANNESLEA CRASSIPES, *Hook. ex Choisy, in Mém. Soc. Phys. Gen.* xiv. (1855) 129 (*p. 304*).

Gunong Tahan, 3,300 ft. A small tree; calyx bright red. (5322.)

Distrib.—Found also on Mt. Ophir, and Gunong Batu Puteh and other mountains of Perak; also Philippine Is.

ADINANDRA VILLOSA, *Choisy, l. c.* 12 (*p. 304*).

Gunong Tahan, 5,000-5,500 ft. Tree 30-40 feet high; flowers white. (5517.)

Distrib.—Tavoy and Perak at high elevations.

A. ANGULATA, *n. sp.*

Arbor 40-50-pedalis, ramis compressis, ramulis complanatis angulatis validis, alabastris parce sericeis. Folia elliptica obtuse acuminata coriacea, 4-7 poll. longa, 2-4 poll. lata, siccitate flavescentia, nervis ad 20 paria conspicue reticulatis, petiolo $\frac{1}{2}$ poll. longo crasso. Flores non visi. Bracteæ 2 parvæ ovatæ. Sepala ovata rotundata crassa glabra, $\frac{1}{4}$ poll. longa. Ovarium globosum $\frac{3}{4}$ poll. longum, stylo æquilongo coronatum. Fructus in pedicello 3 poll. longo, superne incrassato.

Gunong Tahan, 5,000-5,500 ft. (5518.) A very remarkable species, with the foliage of one of the large Garcinias, and quadrate stems with a narrow wing running along each edge. The very large fruits are in pairs.

Digitized by Google

TERNSTRŒMIA JAPONICA, *Thunb., in Trans. Linn. Soc.* ii. (1794) 335 (*p. 304*).

Gunong Tahan, 3,300 ft. Bush; flowers white; leaves pale green beneath. (5328.) 5,000-6,000 ft. Shrub 2-3 feet high; flowers greenish white; anthers brown. (5501.)

Distrib.—An addition to the Flora of the Malay Peninsula. *Ternstræmia japonica* taken in a large sense is a widely spread species in Eastern Asia, and as *T. aneura*, Miq. (the type of which these specimens closely resemble), occurs in Banka.

GORDONIA IMBRICATA, *King, in Journ. As. Soc. Beng.* lix. (1890) 204 (*p. 305*).

Gunong Tahan, 6,000 ft. A small tree; the flower cream-colour, $\frac{3}{4}$ inch across. (5436 and 5406.)

Distrib.—A rare plant, only collected once in Perak by Scortechini.

SCHIMA NORONHÆ, *Reinw. ex Blume, Bijdr.* 130.

Gunong Tahan, 5,000-5,500 ft. A small tree 20-25 feet high, or a shrub 4-6 feet high; flower white, stamens yellow. (5508, 5525.)

Distrib.—Common and variable at high altitudes, occurring also in Burma and the Malay Archipelago.

PENTAPHYLAX MALAYANA, *n. sp.* (*p. 305*).

Frutex vel arbor parva, ramis nigris. Folia coriacea glabra ovata obtusa, basi rotundata, nervis inconspicuis, 2 poll. longa, 1 poll. lata, siccitate flavescentia. Spicæ 1 poll. longæ densæ. Bracteæ ovatæ 4, marginibus ciliatis. Sepala ovata rotundata ciliata. Petala linearia oblonga retusa alba. Stamina quam petala breviora, filamentis oblongis, apicibus acuminatis. Stylus cylindricus brevis; stigma planum brevissime 5-lobum. Capsula breviter pedicellata, $\frac{1}{4}$ poll. longa. Semina linearia curva, 2 in quoque loculo.

Gunong Tahan, 3,300-5,000 ft. Bush with white flowers. (5325, 5339, 5405.)

A very fine addition to the Flora of the Malay Peninsula, the only other known species, *P. euryoides*, Gardn. & Champ., being a native of Hongkong. Specimens of obviously the same species were some years ago brought by Mr. Barnes from K'luang Terbang in Pahang (Journ. Roy. As. Soc., Straits Branch, xxxix. (1903) 1-18). These specimens were in fruit, and the description of the fruit is taken from them. *P. malayana* differs from *P. euryoides* in its smaller, more thickly coriaceous, blunt leaves, and its shorter and thicker flower-spikes.

TILIACEÆ.

ELÆOCARPUS MONTICOLA, *n. sp.* (*p. 305*).

Frutex foliis ovato-lanceolatis integris glabris coriaceis, 3 poll. longis, 2 poll. latis, nervorum 6 paribus, petiolis pollicaribus

Digitized by Google

Racemi breviusculi, 2 poll. longi, foliis breviores. Flores parvi dissiti pedicellati, $\frac{1}{4}$ poll. longi. Sepala 4 ovata pubescentia roseo-brunnea. Petala vix longiora quam sepala, oblonga, fimbriata, viridescenti-alba, pubescentia. Stamina 12, filamentis brevibus, antheris linearibus, sine barbis seu aristis. Ovarium globosum, stylo brevius. Torus crassus undulatus. Drupa globosa, plus quam $\frac{1}{2}$ poll. longa, rugosa.

Gunong Tahan, 5,000-5,500 ft. Shrub 10-12 feet high. Sepals pinkish brown; petals greenish white. (5523.)

Near *Elæocarpus punctatus*, King, in Journ. As. Soc. Beng. lx. ii. (1891) 139 (Malay Peninsula, Java, and Sumatra), but differs in the more fimbriate petals, longer style, and entire leaves. The fruit is very different from that of *E. punctatus* and resembles that of *E. parvifolius*, Wall.

RUTACEÆ.

EVODIA SIMPLICIFOLIA, *n. sp.* (*p. 306*).

Frutex 7-pedalis ramosus. Folia opposita elliptica obtusa, basi subcuneata vel rotundata, coriacea integra, nervis primariis sæpe 16, nervulis reticulatis, 3-3$\frac{3}{4}$ poll. longa, 1$\frac{3}{4}$ poll. lata, siccitate pallida, petiolis $\frac{1}{2}$ poll. longis. Paniculæ petiolo vix longiores in axillis foliorum summorum dispositæ. Flores non visi. Capsulæ 4-lobatæ $\frac{1}{2}$ poll. latæ rugosæ glabræ.

Gunong Tahan, 5,000-6,000 ft. A shrub 7 feet high. In fruit (5492.)

Much resembles *E. pachyphylla*, King, a native of Perak, but is very distinct in its simple unifoliolate leaves and glabrous capsules.

CELASTRACEÆ.

SALACIA PERAKENSIS, *King, in Journ. As. Soc. Beng.* lxv. ii. (1896) 364, e descript (*p. 306*).

Gunong Tahan, 5,000 ft. A small tree; flowers dull red. (5332.) I have seen no authentic specimen.

Distrib.—Originally collected in Perak by Scortechini, who gave no exact locality.

ROSACEÆ.

PHOTINIA DUBIA, *Lindl., in Trans. Linn. Soc.* xiii. (1821) 104, t. 10 (*p. 306*).

Gunong Tahan, 5,000-6,000 ft. Small shrub 8-15 feet high; fruit brownish red. (5486.)

Not recorded in the "Flora of the Malayan Peninsula"; it was collected by Griffith at Bukit China, a low hill close to Malacca, and by myself on rocks by the river in the Dindings, where it is a low straggling bush.

Distrib.—North India.

Digitized by Google

PYRUS GRANULOSA, *Bertol., in Mem. Accad. Sc. Bologn.*; ser. 2, iv. (1864) 312 (*p. 306*).

Gunong Tahan, 5,000-5,500 ft. Tree 15-25 feet. (5520.)

Distrib.—Khasia, Burma, and Sumatra.

SAXIFRAGACEÆ.

WEINMANNIA BLUMEI, *Planch., in Hook. Lond. Journ. Bot.* vi. (1847) 470 (*p. 306*).

Gunong Tahan. Tree; flowers red; leaves green, stalks red. (5319.)

Distrib.—Higher mountains of the Peninsula.

POLYOSMA CORIACEA, *King, in Journ. As. Soc. Beng.* lxvi. II. (1897) 300 (*p. 307*).

Gunong Tahan, 4,000-5,000 ft. Bush; flowers white. (5388.) A small tree 20-30 feet high; flowers yellowish-white. (5493.)

Distrib.—Perak and Kedah Peak.

P. LÆTE-VIRENS, *Griff. ex King, l. c.* 303.

Small tree at 5,000-6,000 ft. (5462.)

Distrib.—Malay Peninsula.

HAMAMELIDEÆ.

RHODOLEIA TEYSMANNI, *Miq., in Versl. en Med. K. Akad. Wetensch.* vi. (1857) 123 (*p. 307*).

Gunong Tahan, 5,000-6,000 ft. Large shrub 10 feet high, or tree 18 inches in diameter; flower rosy pink. (5482, 5506.)

Distrib.—Hill-ranges of Malay Peninsula and in Sumatra.

RHIZOPHOREÆ.

CARALLIA EUGENOIDEA, *King, in Journ. As. Soc. Beng.* lxvi. II. (1897) 320 (*p. 307*).

Gunong Tahan, 3,300 ft. Small tree.

Distrib.—Perak. Hitherto only known from Scortechini's collection.

MYRTACEÆ.

BÆCKEA FRUTESCENS, *Linn., Sp. Pl.* 358 (*p. 307*).

Gunong Tahan, 3,300 ft. (5311.)

Distrib.—Common on all hills at this elevation; also Malay Archipelago.

LEPTOSPERMUM FLAVESCENS, *Sm.*, var. COMMUNE, *Benth., Fl. Austral.* iii. 104 (*p. 307*).

Gunong Tahan, 4,000-5,000 ft., on ridges. Trunk up to 2 feet in diameter, but short and twisted. (5409.)

Distrib.—Common on the hills at this elevation in the Malay Peninsula, and throughout the Archipelago to Australia.

Digitized by Google

RHODAMNIA TRINERVIA, *Blume, Mus. Bot. Lugd.-Bat.* i. 79 (*p. 307*).

Gunong Tahan, 5,000-6,000 ft. (5500.) A mountain form with coriaceous ovate acuminate leaves, densely white woolly beneath, less so above, but with silky white pubescence on the upper face and pubescent fruit.

Distrib.—Malayan Archipelago and Philippines to Australia; Burma.

EUGENIA PAHANGENSIS, *n. sp.* (*p. 307*).

Arbor 20-pedalis cortice albescente. Folia coriacea crassa elliptica petiolata obtusa, costa superne depressa subtus elevata, nervis plurimis gracilibus subparallelis, 3-4 poll. longa, 2 poll. lata. Panicula brevis terminalis densiflora, 2 poll. longa, ramis paucis crassis angulatis. Flores flavescentes parvi congesti sessiles vix ¼ poll. longi. Sepala brevissima crassa, triangularia acuta. Petala parva caduca orbicularia. Stamina breviuscula. Ovarium obconicum angulatum.

Gunong Tahan, 5,000-6,000 ft. Small tree 20 feet high; flowers pale yellowish. (5454.)

Belongs to the same group as *Eugenia subdecussata*, Duth., but is very distinct in its foliage.

EUGENIA VIRIDESCENS, *n. sp.* (*p. 308*).

Frutex. Folia coriacea sessilia glabra obovata, apicibus late rotundatis vix apiculatis, versus basin angustata, basibus subretusis, 2½-3 poll. longa, 1½ poll. lata, nervis copiosis tenuibus approximatis, costa crassiuscula. Paniculæ quam folia breviores, terminales, 2 poll. longæ, pedunculis brevibus ramulis validulis. Flores inter minores, ¼ poll. longa. Calyx campanulatus, margine subintegro undulato. Petala 4 calyptram formantia rotundata. Stamina brevia, calycem paullo superantia.

Gunong Tahan, 5,000 ft. A bush; flowers pale green, leaves and young wood tinged with purple. (5338.)

Allied to *E. subdecussata*, Duth., but differs in the form of the leaves, which narrow towards the base and end in a truncate retuse manner. They are less stiff than those of *subdecussata*, drying of a yellowish colour, and the margins curling back. The nervation is very fine and close and hardly distinguishable.

MELASTOMACEÆ.

MELASTOMA MALABATHRICUM, *Linn., Sp. Pl.* 559 (*p. 308*).

Gunong Tahan, 5,000-5,500 ft. Flower pinkish. (5514.)

A very large-flowered form of this variable species, the petals being nearly as large as those of *M. decemfidum*, Roxb., but otherwise there is very little difference between this and typical *M. malabathricum* of the plains.

Distrib.—India to China and North Australia.

Digitized by Google

SONERILA HETEROSTEMONA, *Naud., in Ann. Sci. Nat.* sér. 3, xv. (1851) 326 (*p. 308*).

Kuala Teku, 800-1,000 ft. (5538.)

Distrib.—Common in the woods of the plains. Malay Peninsula, Sumatra to Borneo.

S. SUFFRUTICOSA, *Stapf & King, in Journ. As. Soc. Beng.* lxix. ii. (1900) 29.

Gunong Tahan, 3,300 ft. Flowers white or tinted with pink; leaves dull green with white hairs, beneath crimson with white hairs. (5315, 5347.)

Distrib.—Perak, Gunong Bubu (previously collected by Wray).

S. PARADOXA, *Naud., l. c.* 321.

Gunong Tahan, 3,300 ft. Leaves bright green with metallic blue lights, beneath crimson, hairs on both sides crimson; flowers pale pink. (5362.) The very hairy form common at higher elevations.

Distrib.—Penang.

ANERINCLEISTUS FRUTICOSUS, *n. sp.* (*p. 309*).

Suffrutex multi-ramosus, cortice fusco. Folia subcoriacea lanceolata acuminata glabra, 1-3 poll. longa $\frac{1}{2}$ poll. lata, subtus glauca, apicibus obtusis, basibus acuminatis. Flores solitarii vel 3-4 umbellati, pedunculo $\frac{1}{2}$ poll. longo. Calycis tubus vix dilatus glaber. Sepala subulata acuminata glabra, $\frac{1}{4}$ poll. longa. Petala 4, rosea lanceolata acuminata ferme subulata. Stamina 8, antheris elongatis $\frac{1}{4}$ poll. longis inæqualibus, basi obscure emarginatis, nec appendiculatis, antheris sterilibus rubris. Capsula obconica $\frac{3}{8}$ poll. longa $\frac{1}{4}$ poll. lata.

Gunong Tahan, 5,000-6,000 ft. Small shrub; flower pale pink; anthers pale yellow. (5453.)

Allied to *A. macranthus*, King, but more glabrous with smaller leaves and more woody.

ORITREPHES, *n. gen.*

Frutex; foliis oppositis ellipticis acuminatis, basi cuneatis, trinerviis. Panicula terminalis pauciflora, floribus majusculis. Calyx leprosus obconicus, apice constricto, lobis 4 brevibus connatis, dentiformibus. Petala 4 obovata unguiculata alba. Stamina 8, æqualia, similia, antheris elongatis versus apices attenuatis, poro terminali, basibus breviter hastatis, appendicibus et setis nullis, dorso processu parvo circulari onustis. Stylus longus, stigmate punctiformi. Ovarium 4-loculatum ellipticum, ferme ad basin tubi calycis liberum, vertice depresso-concavum. Fructus baccatus. Semina plura, placentis axillaribus suffulta; adhuc immatura.

Digitized by Google

O. PULCHRA, *n. sp.*

Frutex ramosus; foliis superne glabris inferne rufescenti-lepidotis, nervis tomento rufo tectis, primariis tribus subtus elevatis, secundariis horizontalibus circa 26 paribus, 2-5 poll. longis, 1-2 poll. latis, petiolo pollicari. Pedunculus 3 poll. erectus, glaber. Flores 4-6. Calyx in pedicello æquilongo, $\frac{1}{4}$ poll. longus, lobis brevibus connatis. Petala obovata retusa unguiculata, alba roseo-tincta. Stamina petalis æquilonga, filamentis pubescentibus, antheris flavis. Fructus leprosus immaturus $\frac{1}{2}$ poll. longus.

Gunong Tahan, 5,000-5,500 ft. Petals white tipped with pink. (5509.)

Closely allied to *Dissochæta* and *Anplectrum*. Remarkable for its 8 similar stamens without hairs or appendages.

MEDINILLA CLARKEI, *King, in Journ. As. Soc. Beng.* lxix. II. (1900) 63 (*p. 309*).

Gunong Tahan, 3,300 ft. Small-sized tree. (5312.)

Distrib.—Malay Peninsula.

MEDINILLA PAHANGENSIS, *n. sp.* (*p. 310*).

Frutex epiphyticus, cortice albo verrucoso. Folia verticillata lanceolata subobtusa vel oblanceolata, basi angustata, coriacea enervia, 2 poll. longa $\frac{3}{4}$ poll. lata, petiolo $\frac{1}{4}$ poll. Flores in cymis 1 poll. longis, pentameri, albi, $\frac{1}{2}$ poll. longi. Calyx cupuliformis, granulatus, obscure 5-dentatus. Petala obovata rotundata. Stamina 10, filamentis sinuatis glabris, antheris æquilongis curvis, processibus 2 anticis ad basin corniformibus, unoque dorsali.

Gunong Tahan, 4,000-5,000 ft. Growing on trees; flowers white. (5396.)

In general appearance resembles *M. Hasseltii*, Blume, but is pentamerous.

PACHYCENTRIA TUBERCULATA, *Korth., Ver. Nat. Gesch. Bot.* 246, t. 63 (*p. 310*).

Gunong Tahan, on trees at 3,300 ft. Flowers white, each petal tinted rosered at the base; flower-stalks, fruit, and mid-ribs of leaves beneath coral-red. (5237.)

Distrib.—Malay Peninsula, Burma, Borneo. Common at all altitudes.

MEMECYLON GARCINIOIDES, *Blume, Mus. Bot. Lugd.-Bat.* i. 358 (*p. 310*).

Gunong Tahan, 3,300 ft. Flowers white; anthers violet. (5352.)

ib.—Borneo and Sumatra.

GAYI, *C. B. Clarke, in Hook. fil. Fl. Brit. Ind.* ii. 557.

ig Tahan, 5,000-6,000 ft. Creeper; fruit chrome-yellow. 57.)

).—Malay Peninsula.

Digitized by Google

BEGONIACEÆ.

BEGONIA SINUATA, *Wall., List*, No. 3680 (*p. 310*).

Kuala Teku, 500-1,000 ft. Flowers pale pink; stamens chrome-yellow; stalks purplish pink, leaves beneath reddish purple. (5539.)

Distrib.—Burma, Malay Peninsula.

B. HERVEYANA, *King, in Journ. As. Soc. Beng.* lxxi. II. (1902) 63.

Kuala Teku, 500-1,000 ft. (5546.)

Distrib.—Malacca.

GAMOPETALÆ.

RUBIACEÆ.

ARGOSTEMMA MUSCICOLA, *n. sp.* (*p. 310*).

Herba parva erecta vel suberecta, hispidula, 2 poll. alta. Folia æqualia anguste lanceolata acuta basi cuneata herbacea, glabra, nervis tribus et marginali pilis albescentibus munitis exceptis, 1-1½ poll. longa, ½ poll. lata; petiolo brevi. Flores 1-2 terminales pedunculati, albi, inter majores generis, ½ poll. lati. Bracteæ lanceolatæ, et cum pedicellis hirsutæ. Sepala lanceolata acuta. Petala lanceolata acuta.

Gunong Tahan, 5,000-6,000 ft. Small herb on mossy rocks by streams. (5461.)

The number of Argostemmas in the Peninsula is large and increases with every mountain explored, as in the case of *Sonerila*. This little erect species belongs to the set with equal leaves, but has somewhat the habit of *A. involucratum*, Hemsl.

ARGOSTEMMA ALBOCILIATUM, *n. sp.* (*p. 311*).

Herba reptans, gracilis, hispida, 3-7 poll. longa. Folia æqualia ovata apicibus subacutis vel rotundatis, breviter petiolata, dense hispida, ½ ad poll. longa, ¼-½ poll. lata. Stipulæ breves ovatæ. Flores 1-4 in pedunculo gracili hispido, 2 poll. longo. Bracteæ minutæ lanceolatæ lineares. Calyx hispidus, lobis brevibus hispidis. Petala lanceolata acuminata, hispidula, ¼ poll. longa.

Gunong Tahan, 3,300 ft. Flowers white; leaves pale green, covered with white hairs. (5229.)

A curious creeping species with ovate hairy leaves.

A. YAPPII, *King, in Journ. As. Soc. Beng.* lxxii. II. (1903) 145.

Gunong Tahan, 5,000-6,000 ft. Flowers white; anthers yellow. (5491.)

Distrib.—Perak.

A. HOOKERI, *King, l. c.* 45.

Gunong Tahan, 3,300 ft. Leaves dark green, with broad irregular stripe of light silvery green in centre. (5376.)

Distrib.—Malay Peninsula. Frequent on the hills.

Digitized by Google

A. PICTUM, *Wall., in Roxb. Fl. Ind. ed. Carey & Wall.* ii. 327.

Kuala Teku, 500-1,000 ft. Flowers white. (5543.)

Distrib.—Malay Peninsula. Common in hill-forests.

OPHIORRHIZA MUNGOS, *Linn., Sp. Pl.* 150 (*p. 311*).

Kuala Teku, 500-1,000 ft. (5534.)

Distrib.—India, Malaya. A variable species common all over the Peninsula.

HEDYOTIS PATENS, *n. sp.* (*p. 311*).

Frutex parvus subrepens ramosus. Folia lanceolata carnosula acuta æqualia, basibus cuneatis, glabra, 2-3 poll. longa, $\frac{1}{2}$-$\frac{3}{4}$ poll. lata. Stipulæ late triangulares carnosæ acutæ persistentes. Panicula laxa patens, 6-8 poll. longa, sæpe 6 poll. lata, ramis trichotomis patentibus trifurcatis, gracilibus. Flores parvi singuli pedicellati in apicibus ramulorum. Calyx obconicus, lobis triangularibus acutis. Petala linearia alba. Stamina gracilia longe porrecta corollam multo superantia. Stylus longus porrectus. Capsula obovoidea $\frac{1}{12}$ poll. longa.

Gunong Tahan, 4,000-5,000 ft. Bush; flowers pale green. (5393.) At 5,000-6,000 ft. Shrub somewhat creeping in habit; flowers greenish. (5475.)

Allied to *Hedyotis Maingayi*, Hook. fil., of Mount Ophir, and *H. pedunculariis*, King, of Kedah Peak, but much more branched than either. This group of *Hedyotis* is very characteristic of our high elevations, and the species are usually confined to one mountain-top.

TIMONIUS MONTANUS, *n. sp.* (*p. 312*).

Frutex 8-pedalis. Folia elliptica vel elliptico-lanceolata acuminata basi cuneata, glabra, $2\frac{1}{2}$-3 poll. longa, 1-$1\frac{1}{2}$ poll. lata, nervis circa 6 paribus, in pagina inferiore conspicuis, breviter petiolata. Stipulæ lanceolatæ acuminatæ. Flores 2-3 in pedunculo brevi vix $\frac{1}{4}$ poll. longo, sessiles, glabri, flavi. Calyx campanulatus pubescens, lobis acutis triangularibus. Corollæ tubus longus cylindricus glaber, $\frac{1}{2}$ poll. longus, lobis oblongis obtusis. Stamina inclusa, antheris linearibus. Flores fœminei et fructus non visi.

Gunong Tahan, 5,000-6,000 ft. Shrub 8 feet high; petals pale yellow; anthers rich chrome-yellow; corolla-tube reddish externally. (5499).

Resembling in habit some forms of *T. jambosella*, Thw., but distinguished by its long glabrous corolla and short peduncle.

LASIANTHUS CHINENSIS, *Benth., Fl. Hongk.* 160 (*p. 312*).

Gunong Tahan, 5,000-5,500 ft. Shrub 10-11 feet; fruit brownish. (5524.)

Distrib.—Perak, Hongkong, Formosa.

Digitized by Google

L. CORONATUS, *King & Gamble, in Journ. As. Soc. Beng.* lxxiii. II. (1904) 120.

Gunong Tahan, 5,000-6,000 ft. Shrub; flowers white. (5503, 5438.)

Distrib.—Perak.

CAMPANULACEÆ.

PENTAPHRAGMA GRANDIS, *n. sp.* (*p. 312*).

Herba 1-2-pedalis, caule fistuloso, $\frac{1}{4}$ poll. crasso. Folia alterna remota elliptica obovata obtusa denticulata, basi inæquilatera, superne glabra, 5 poll. longa, $2\frac{3}{4}$ poll. lata, subtus præcipue in venis pilosula deinde glabrescentia, petiolo 1 poll. longo. Flores 6-7 axillares, aggregati, $\frac{3}{4}$ poll. longi, sordide albi. Bracteæ ovarium subæquantes, scariosæ, caducæ. Calyx tubulosus, lobis lanceolatis oblongis obtusis, omnino lanuginoso-pubescens. Petala sepalis subæqualia, apicibus recurvis pubescentibus. Stamina linearia. Stylus validus, basi pubescens; stigma cylindricum crassum canaliculatum.

Gunong Tahan, 4,000-5,000 ft. 1-2 feet high; flowers dirty white; leaves bright green fleshy, pale beneath. (5408.)

A large plant for the genus, remarkable for its tall fistular stem and large flowers.

VACCINIACEÆ.

VACCINIUM PUBICARPUM, *n. sp.* (*p. 313*).

Frutex 4-pedalis terrestris. Folia tenuiter coriacea lanceolata acuminata acuta glabra obscure serrulata, 2 poll. longa, $\frac{3}{4}$ poll. lata, nervis primariis 6, petiolo $\frac{1}{5}$ poll. longo. Racemi foliis breviores 2 poll. longi laxi. Bracteæ minutæ lineares. Flores pedicellati, pedicellis $\frac{1}{4}$ poll. longis, cum calyce pubescentibus. Calyx cupulatus, lobis acutis triangularibus. Corolla omnino pubescens. Staminum filamentis brevibus, antheris linearibus oblongis, processibus 2 apicalibus rectis cylindricis, antheras æquantibus, omnino glabra. Stylus cylindricus crassiusculus, apice plano. Bacca parva globosa pubescens sepalis coronata, $\frac{1}{4}$ poll. longa.

Gunong Tahan, 5,000-6,000 ft. Shrub 4 feet high, in shady ravines. (5443.)

Resembles *V. malaccense*, Wight, which is common in the lowlands of the Peninsula, but differs in the long acuminate leaves and pubescent fruit.

V. LONGIBRACTEATUM, *n. sp.*

Frutex ramis fuscis hirtis, pilis albis. Folia alterna ovata subcordata obtusa coriacea inferne pubescentia superne glabra, 1-$1\frac{1}{2}$ poll. longa, $\frac{3}{4}$-$1\frac{1}{4}$ poll. lata, petiolis pubescentibus $\frac{1}{5}$ poll. longis. Racemi terminales longiusculi, rhachidibus pubescentibus. Bracteæ foliaceæ coriaceæ lanceolatæ acutæ pubescentes, flores multo

Digitized by Google

superantes, ½-1 poll. longæ, ¼ poll. latæ. Flores desunt. Baccæ ⅛ poll. longæ globosæ pubescentes, pedicellis ¼ poll. longis pubescentibus; lobis calycis triangularibus acutis 5, inflexis.

Gunong Tahan, 3,300 ft. (5326.)

Remarkable for its pubescence and the large lanceolate bracts. The leaves are close-set and very coriaceous, hairy beneath with conspicuous ascending nerves.

V. TEYSMANNI, *Miq., Fl. Ind. Bat.* ii. 1062.

Gunong Tahan, 3,300 ft. Flowers crimson; leaves rusty beneath. (5053).

Distrib.—Perak; Java.

ERICACEÆ.

PIERIS OVALIFOLIA, *D. Don, in Edinb. Phil. Journ.* xvii. (1834) 159 (*p. 313*).

Gunong Tahan, 5,000-6,000 ft. Small tree 15-20 feet; flowers whitish. (5476.)

Distrib.—Himalayas to Japan.

RHODODENDRON MALAYANUM, *Jack, in Mal. Misc.* ii. (1822) No. VII. 17 (*p. 313*).

Gunong Tahan, 3,300 ft. Small tree. (5323.)

Distrib.—Common on hills in Malay Peninsula; Malaya.

RHODODENDRON WRAYI, *King & Gamble, in Journ. As. Soc. Beng.* lxxiv. II. (1906) 75 (*p. 314*).

Gunong Tahan, 4,000-5,000 ft. (5387.)

Distrib.—Occurs also in the Kedah, Selangor, and Perak Hills.

R. LONGIFLORUM, *Lindl., in Journ. Hort. Soc.* iii. (1848) 88.

Gunong Tahan, 4,000-5,000 ft. Growing on trees; flowers salmon-pink. (5382.)

Distrib.—Perak, Borneo, and Sumatra.

R. ELEGANS, *n. sp.*

Epiphytica, ramis tenuibus undulatis. Folia opposita vel 5-verticillata elliptico-lanceolata obtusa basi cuneata parva, coriacea, glabra, ¾-1 poll. longa, ½ poll. lata, nervis inconspicuis, subtus crebre punctata superne nitida, petiolis brevissimis ⅒ poll. longis. Flores rubri singuli terminales, ½ poll. longi, ⅜ poll. lati, pedicellis æquilongis pubescentibus gracilibus. Calyx cupularis parvus, lobis brevissimis ovatis. Corolla parva recta crassa cylindrica rubra pubescens, lobis rotundatis brevibus. Stamina 8, filamentis pubescentibus. Ovarium hirtum. Stylus cylindricus crassiusculus haud exsertus; stigma clavatum.

Gunong Tahan, 5,000 ft. Flowers bright red; leaves dark shining green; growing on trees. (5429.)

A very elegant little slender-branched plant with small flowers. I know nothing exactly like it.

Digitized by Google

EPACRIDEÆ.

LEUCOPOGON MALAYANUS, *Jack, in Mal. Misc.* i. (1820) No. v. 20 (*p. 314*).

Gunong Tahan. Small tree. (5316.)

Distrib.—Common on all the hills and on sandy coasts of the Peninsula. Occurs also in Borneo and Banka, with a variety in Tenasserim.

MYRSINEÆ.

ARDISIA ROSEA, *King & Gamble, in Journ. As. Soc. Beng.* lxxiv. II. Extr. (1906) 150 (*p. 314*).

Gunong Tahan, 5,000-6,000 ft. Small tree; flowers white, stalks purplish. (5467.) Shrub; flowers white, flower-stalks red; leaves and young wood tinged with red. (5334.)

Distrib.—Perak, on most hill-ranges at high elevations.

A. BINIFLORA, *n. sp.*

Frutex validus, ramis pallidis densis. Folia coriacea lanceolata obtusa basibus cuneatis, glabra, 2½ poll. longa, 1 poll. lata, carina subtus crassiuscula, nervis copiosis, petiolo ¼ poll. longo. Flores axillares bini vel terni in pedunculo 1 poll. gracili, foliis breviores. Bracteæ ad basin pedunculi et pedicellorum foliaceæ parvæ ovatæ. Sepala rotundata brevia haud imbricata marginibus glanduloso-dentatis. Petala lanceolata acuta, glandulosa, glandulis magnis, ¼ poll. longa. Antheræ lanceolatæ apiculatæ.

Gunong Tahan, in ravines, 5,000-6,000 ft. Shrub 10-15 feet high; flower reddish pink; anthers brownish. (5460.)

A shrub with the habit of *Ardisia littoralis*, Andr., but with very stiff, closely-veined, entire, obscurely gland-dotted leaves, and flowers in pairs on axillary peduncles.

ARDISIA RETINERVIA, *n. sp.* (*p. 315*).

Frutex 10-12 ped. alt., ramis validis brunneis, omnino glaber. Folia coriacea elliptica, apice rotundata, basi cuneata, 4-4½ poll. longa, 2 poll. lata, crebre glandulose-punctata in utraque pagina, costa superne depressa subtus elevate crassiuscula; nervis superne inconspicuis, subtus elevatis horizontalibus numerosis valde reticulatis usque ad margines; margines integri, glandulis marginalibus nullis; petiolo valido brevi, ½-1 poll. longo. Cymæ paucifloræ axillares breves. Flores desunt; pedicelli fructiferi subangulati, ½ poll. longi. Sepala 5 ovata obtusa haud glandulifera glabra brevia. Drupa globosa multi-sulcata, ¼ poll. longa; stylo brevi.

Gunong Tahan, 5,000-6,000 ft. Shrub 10-15 feet high. (5502.)

Remarkable chiefly for its stiffly coriaceous, strongly reticulated leaves. The drupe, which is large for the genus, is marked with narrow ridges and grooves.

Digitized by Google

STYRACEÆ.

SYMPLOCOS ADENOPHYLLA, *Wall. ex G. Don, Gen. Syst.* iv. 3 (*p. 315*).

Gunong Tahan, 3,300 ft. (5320.)

Distrib.—Malay Peninsula and Archipelago.

S. SCORTECHINII, *King & Gamble, in Journ. As. Soc. Beng.* lxxiv. II. Extr. (1906) 250.

Gunong Tahan, 4,000-5,000 ft. Tree; flowers white, tinged near the ends of the petals with pink, veins of flowers red. (5392.)

Distrib.—Perak. I have seen no authentic specimen of this plant, which has only once been collected, by Scortechini.

ASCLEPIADACEÆ.

PENTASACME CAUDATUM, *Wall., in Wight, Contrib.* 60 (*p. 315*).

Kuala Teku, 500-1,000 ft. (5533.)

Distrib.—Common in streams at high altitudes in the eastern side of the Peninsula; North India, Burma.

DISCHIDIA COCCINEA, *Griff. Notulæ*, iv. 45 (*p. 315*).

Gunong Tahan, 3,300 ft. On trees; flowers red; leaves dull crimson. (5410.)

Distrib.—Malay Peninsula; common at high altitudes.

DISCHIDIA ALBIDA, *Griff. Notulæ*, iv. 46 (*p. 316*).

Gunong Tahan. On trees; flowers pale yellow. (5399.)

Distrib.—Malay Peninsula.

GENTIANACEÆ.

GENTIANA MALAYANA, *n. sp.* (*p. 316*).

Herba pusilla 1-3 poll. alt. Folia carnosa congesta acuta lanceolata sessilia integra glabra, $\frac{1}{4}$-$\frac{1}{2}$ poll. longa. Flos terminalis $\frac{1}{3}$ poll. longus. Calyx tubulosus, lobis acuminatis tubum corollæ superantibus. Corolla azurea tubulosa, lobis brevibus subspathulatis apicibus rotundatis, plicis integris. Stamina antheris longius hastatis prædita. Ovarium stipitatum; stylo brevi, stigmatibus brevibus.

Gunong Tahan, 5,000-6,000 ft. Flowers deep sky-blue. Growing among moss in damp places (5473); on wet rocks (5479).

The addition of the genus *Gentiana* to the Flora of the Malay Peninsula is an interesting one. The species is closely allied to *G. borneensis*, Hook. fil., from Kinabalu, differing chiefly in the quite entire leaves, rounded tips of the petals and entire, not lobed, folds between them. The anthers are narrower and more acute.

The plants collected under the two numbers seem specifically identical, but the specimens of No. 5473 are very much smaller than those of 5479.

Digitized by Google

CANSCORA TRINERVIA, *n. sp.* (*p. 316*).

Herba 3-5 poll. alta, caulibus pluribus. Folia glabra ovata vel ovato-lanceolata herbacea utrinque acuminata trinervia, $\frac{1}{3}$-1 poll. longa, $\frac{1}{2}$-$\frac{3}{4}$ poll. lata. Flores in axillis superioribus, albis. Calyx tubulosus superne angustatus $\frac{1}{2}$ poll. longus, costis 8 elevatis, alternis bifurcatis, lobis acuminatis. Corolla irregularis alba, tubo quam sepala paullo longiore, lobis 4 oblongis rotundatis marginibus crispis, uno multo latiore, $\frac{1}{4}$ poll. longis. Stamina fertilia 3, antheris oblongis, uno sterili filiformi. Stylus sat longus; stigmatibus 2 linearibus elongatis.

Gunong Tahan, 5,000-5,500 ft. Herb by stream; flowers white. (5507.)

There are two species of this genus recorded by C. B. Clarke in his description of the family in the "Materials for a Flora of the Malayan Peninsula," one of which—*C. diffusa*, a common Indian species—is recorded as belonging to this region only on the authority of a specimen collected by Lobb in Singapore and undoubtedly wrongly localised, the other—*C. pentanthera*, C. B. Clarke, an endemic species—occurs usually at high elevations; it has five complete stamens and a regular corolla, while *C. trinervia* has three complete stamens only and a staminode and an irregular corolla.

OLEACEÆ.

OLEA CAPITELLATA, *n. sp.* (*p. 317*).

Frutex 3-4-pedalis. Folia opposita coriacea glabra elliptica obtusa petiolata, basi angustata, 2 poll. longa, 1 poll. lata, nervis 8 primariis. Stipulæ nullæ. Flores in capitulis parvis axillaribus petiolis brevioribus. Bracteæ ovatæ rotundatæ, marginibus ciliatis. Pedicelli breves pubescentes. Sepala ad basin connata, lobis ovatis pubescentibus. Corollæ tubus brevissimus; lobis rotundatis pubescentibus. Stamina 2, in ore tubi adnata, corollam multo superantia; filamentis linearibus, antheris bilocularibus ellipticis, loculis ad basin paullo divergentibus. Stylus erectus simplex quam tubus corollæ brevior.

Gunong Tahan, 5,000-6,000 ft. Small shrub 3-4 feet high; flowers yellowish. (5489.)

A very curious plant with densely set coriaceous elliptic leaves, closely minutely dotted, and small axillary heads or more strictly umbels of very small flowers, subtended by 2 rounded ciliate bracts. I know no species of the genus which at all resembles this singular plant.

LOGANIACEÆ.

GAERTNERA RAMOSA, *n. sp.* (*p. 317*).

Frutex 10-pedalis ramosus. Folia lanceolata acuminata acuta glabra basi in petiolum brevem attenuata, 6 poll. longa, $1\frac{1}{2}$ poll. lata, petiolo $\frac{1}{4}$ poll. longo. Stipulæ amplexicaules per paria connatæ superne bidentatæ. Cymæ terminales, laxæ, 2-3 poll. longæ,

Digitized by Google

ramis paucis brevibus, rami breves 1-3-flori. Calyx cupulatus $\frac{n}{10}$ poll. longus, dentibus 4, brevissimis. Corolla $\frac{1}{2}$ poll. longa pubescens, lobis 6 lanceolatis carnosis apicibus inflexis, pilis sericeis densis in ore tubi infra antheras prædita. Stamina 6, antheris linearibus oblongis, connectivo in cornua minuta producto, filamentis brevibus pilis sericeis celatis.

Gunong Tahan, 5,000-6,000 ft. Shrub 10 feet high; flowers white. (5458.)

G. OBLANCEOLATA, *King & Gamble, in Journ. As. Soc. Beng.* lxxiv. II. (1907) 624.

Gunong Tahan, 3,300 ft. Bush; flowers white. (5343.)

Distrib.—Perak.

LENTIBULARIACEÆ.

UTRICULARIA NIGRICAULIS, *n. sp.* (*p. 317*).

Folia et utriculæ non visæ. Caulis filiformis tripollicaris ater, raro ramosus, squamis paucis lanceolatis subacutis haud infra productis. Flores perparvi 2-3 breviter pedicellati, bracteis 2 oblongis pedicello multo brevioribus. Sepala late oblonga obtusa, corollæ tubum longe superantia, purpurascentia. Corollæ labium superius brevius, inferum longius; calcar breve incurvum conicum. Capsula ovata orbicularis calyce tecta.

Gunong Tahan, 5,000-6,000 ft.; in damp moss on rocks. Colour purplish-blue, stem black. (5447.)

Apparently near *U. minutissima*, Vahl, but has larger flowers.

UTRICULARIA ORBICULATA, *Wall. ex A. D C. Prodr.* viii. 18. (*p. 318*).

Gunong Tahan, 5,000-6,000 ft. Flowers blue, mouth of tube yellow. Growing among wet moss. (5477.)

Distrib.—India, Malaya, South China.

GESNERACEÆ.

DIDYMOCARPUS SALICINA, *Ridl., in Trans. Linn. Soc.* ser. 2, *Bot.* iii. (1893) 329 (*p. 318*).

Kuala Teku, 500-1,000 ft. Flowers pale pink; anthers and pistil deeper pink.

Distrib.—Originally found in the Tahan Valley.

D. FLAVOBRUNNEA, *Ridl., l. c.*

Gunong Tahan, 3,000-3,300 ft. Leaves dark green; hairs on stalk red; flowers yellow lined with dull red, becoming confluent in the tube. (5367.)

Distrib.—Occurs in the same locality as the last.

D. GRANDIFOLIA, *n. sp.*

Planta valida acaulis, radice crassa lignosa. Folia oblanceolata magna, apice acuto, basi in petiolum decurrente, margine crenulato, superne glabra punctata, inferne glabra, 9 poll. longa, $3\frac{1}{2}$ poll. lata, nervis pubescentibus ad 17 paria subtus elevatis, ner-

Digitized by Google

rulis reticulatis, petiolo 2 poll. longo. Pedunculi validi 8-9 poll. longi pubescentes parce ramosi, ramis brevibus 1 poll. longis. Sepala ¼ poll. longa lanceolata acuminata acuta hispidula. Corollæ delapsæ. Capsula teres acuminata glabra, 3 poll. longa.

Gunong Tahan, 3,300 ft. Leaves green with the bracts, fruit, and stalk dull purple. (5369.)

Unfortunately there are no corollas on the specimens. It is evidently a fine plant with unusually large leaves for an acaulescent species.

D. ROBINSONII, *n. sp.*

Suffrutex ramosus ultra-pedalis hispidus. Folia opposita subæqualia lanceolata utrinque acuminata acuta crenulata superne hispidula inferne subglabra, nervis pubescentibus exceptis, 2 poll. longa, ¾ poll. lata, petiolo hirto, ¼ poll. longo. Flores axillares in pedicellis pubescentibus, 2 poll. longis. Sepala lanceolata linearia $\frac{1}{12}$ poll. longa, glanduloso-hirta. Corolla longa infundibuliformis pubescens purpurascens albostriata, macula flava in ore tubi notata, ¾ poll. longa. Capsula gracilis cylindrica acuminata, 2½ poll. longa.

Gunong Tahan, 5,000-6,000 ft. Flowers purplish streaked with white, with yellow at top of tube. (5470.)

This species is allied to *D. hispida*, Ridl. It is unusually branched and woody for its group.

LOXOCARPUS INCANA, *R. Br., in Benn. Pl. Jav. Rar.* 120 (*p. 319*).

Gunong Tahan, 5,000 ft. Flowers pale violet, darker in the throat. (5430.)

Distrib.—Malay Peninsula.

L. ANGUSTIFOLIA, *n. sp.*

Herba acaulis, foliis lanceolatis acutis subfalcatis plurimis, basibus in petiolis attenuatis sericeis, ¾-2 poll. longis, ¼-½ poll. latis. Pedunculus tenuis erectus sericeus, 2 poll. longus. Flores 2-3. Sepala lanceolata hispido-sericea, $\frac{1}{12}$ poll. longa. Corollæ $\frac{5}{12}$ poll. longæ, tubus crassus brevis, lobi rotundati, labium inferius longius, pallide purpureum. Capsula cornuta curva acuminata, pilis viscidis tecta.

Gunong Tahan, 5,000-6,000 ft. (5504.)

A very distinct plant with narrow lanceolate oblique leaves.

PARABOEA PYROLIFLORA, *Ridl., in Journ. Roy. As. Soc. Straits Br.* No. xliv. (1905) 67 (*p. 319*).

Kuala Teku, 300-1,000 ft. (5545.)

Distrib.—Originally found in the Tahan Valley.

P. RUBIGINOSA, *n. sp.*

Radix crassa lignosa, 6 poll. longa; caudex brevis, 1 poll. longus, lignosus, tomento multo rufo tectus vel nullus. Folia rosulata

Digitized by Google

vel opposita oblanceolata obtusa basin versus angustata rotundata, margine dentato, nervis 10 paribus, superne atroviridia hispida, præsertim in marginibus, subtus crebre punctata glabra, nervis et costa rubiginoso-tomentosis exceptis. Pedunculi 3 vel plures, graciles, 6-8 poll. longi, rubropubescentes. Bracteæ minutæ lineares pubescentes. Sepala linearia brevia, vix $\frac{1}{12}$ poll. longa. Corolla alba colore roseo tincta campanulata, $\frac{1}{4}$ poll. longa, lobis rotundatis. Stamina brevia 2, antheris subglobosis. Capsula lanceolata acuminata, $\frac{3}{4}$ poll. longa.

Gunong Tahan, 4,000-5,000 ft.; on rocks. Leaves dark velvety green; flowers white tinged with pink. (5398.)

Flowers resembling those of *P. pyroliflora*, Ridl., but the style is much shorter. The foliage is very different and more resembles that of *Didymocarpus heterophylla*, Ridl.

CYRTANDRA CUPULATA, *Ridl., in Journ. Linn. Soc., Bot.* xxxii. (1896) 527 (*p. 319*).

Kuala Teku, 500-1,000 ft. (5540.)

Distrib.—Malay Peninsula.

ÆSCHYNANTHUS, *sp.* (*p. 320*).

Gunong Tahan, 5,000-6,000 ft. Creeper very fleshy, reddish. (5483.)

A rather woody plant with pale bark and oval fleshy leaves $\frac{1}{2}$ an inch long. There are no flowers (only pods already dehisced) and no seed. Doubtless an undescribed species, but the material is insufficient.

APETALÆ.

NEPENTHACEÆ.

NEPENTHES BONGSO, *Korth., Verh. Nat. Gesch. Bot.* 19, t. 14 (*p. 320*).

Gunong Tahan, 5,000 ft. Flowers dull red-brown; cups white tinted pale green at base and spotted with pink. (5411.)

The original plant was obtained on Merapi mountain in Sumatra. The Tahan plant seems to resemble it very closely, but the fruit is much larger than it is in Korthal's figure. The male flowers are small, with 4 oblong obtuse pubescent petals $\frac{1}{10}$ inch long, the pedicels of the flowers $\frac{1}{4}$ inch. The raceme is lax and about 6 inches long. The lid of the pitcher is densely glandular. The capsules are three-quarters of an inch long.

N. GRACILLIMA, *n. sp.*

Caulis gracillimus $\frac{1}{10}$ poll. in diametro. Folia remota sessilia anguste lanceolata acuminata, lamina 2-3 poll. longa $\frac{1}{2}$ poll. lata glabra coriacea; petiolulo 5-pollicari; amphora subcylindrica angusta, 4 poll. longa, $\frac{3}{4}$ poll. in diametro, superne glandulosa paullo constricta, annulo angusto, obscure costato. Operculum

Digitized by Google

orbiculare $\frac{1}{2}$-$\frac{3}{4}$ poll. longum, cervice et lamina pubescentibus, cornibus ad basin operculi duobus $\frac{1}{10}$ poll. longis, glandulæ nullæ. Racemus masculus gracilis plus quam 6 poll. longus. Flores parvi dissiti, pedicellis $\frac{1}{10}$ poll. longis. Bracteæ lineares graciles. Petala 4 oblonga obtusa glabra. Racemus fructiferus circa 6 poll. longus; capsulæ $\frac{3}{4}$ poll. longæ glabræ, pedicellis $\frac{1}{2}$ poll. longis, valvæ utrinque angustatæ.

Gunong Tahan, 3,300 ft. Pitchers pale green, tinted in places with dull crimson, and mottled with dull purple; lid of cup brighter green lined with dull crimson. (5309.)

Allied to *N. gracilis*, Korth., but is a much slenderer plant; the stem is rounded and not angular, the leaves are not decurrent, the peristome is faintly ribbed on the lower surface, the cup is differently coloured, and the lid is not glandular.

LAURACEÆ.

DEHAASIA LANCIFOLIA, *n. sp.* (*p. 320*).

Arbor 25-pedalis. Folia coriacea lanceolata obtusa (siccitate rufa), breviter petiolata glabra, nervorum 9-11 paribus prædita; nervis ascendentibus in margine arcuatis, costa crassiuscula, $4\frac{1}{2}$-$7\frac{1}{2}$ poll. longa, $1\frac{1}{2}$-2 lata. Paniculæ elongatæ patentes 7-8 poll. longæ, ramulis paucis brevibus pubescentibus. Flores 6-7 perparvi in cymulas in apicibus ramulorum virescentes dispositi, pedicellis brevibus pubescentibus. Sepala 3 minuta ovata obtusa. Petala alterna ovata obtusa cucullata pubescentia, quam sepala multo majora. Stamina 9 filamentis brevissimis, antheris ovatis. Stylus quam stamina longior crassus; stigma magnum rotundatum crassum atrum. Drupa elliptica $1\frac{1}{2}$ poll. longa, pedunculo haud multum incrassato.

Gunong Tahan, 5,000-6,000 ft. Tree 11 inches in diameter, 25 feet high, flowers greenish (5468). Shrub 8-10 feet, in fruit (5526).

This fine plant is represented by two specimens, one in flower and one in fruit, which evidently belong to the same species. The leaves are bright brown when dry. The main nerves ascend and curving upwards at the margin connect with each other by a loop, and the intermediate nervules are conspicuously reticulated. The long lax panicle of short branches is not like that of any other species known to me. The flowers are quite those of a *Dehaasia*, some unisexual and some bisexual. The stigma is remarkably thick and rounded for the genus.

LINDERA CÆSIA, *Reinw. ex Vill., in Blanco, Fl. Philipp.* ed. 3, *Nov. App.* 181, e descript (*p. 321*).

Gunong Tahan, 5,000-6,000 ft. Small shrub. (5455.)

Distrib.—Philippines to Borneo.

Digitized by Google

LORANTHACEÆ.

LORANTHUS PULCHER, *DC. Prod.* iv. 295 (*p. 321*).

Gunong Tahan, 5,500 ft. Shrub; flowers carmine; calyx and flower-stalks dull red; leaves very thick and fleshy. (5387.) The leaves are more oval in outline and more fleshy than usual. Not rare in the hill-region.

Distrib.—Penang.

L. LOBBII, *Hook. fil., Fl. Brit. Ind.* v. 204.

Gunong Tahan. (5485.) Common in the hill-regions.

Distrib.—Penang.

L. GLOBOSUS, *Roxb., Fl. Ind.* i. 550.

Gunong Tahan, 4,000-5,000 ft.; on trees. Flowers bright orange-red; leave red above and dull green beneath. (5404.)

Distrib.—North India, Malay Peninsula, Java.

SANTALACEÆ.

HENSLOWIA VARIANS, *Blume, Mus. Bot. Lugd.-Bat.* i. 244 (*p. 322*).

Gunong Tahan, 3,300 ft. Climber; fruit green, tinted dull red. (5349.)

Distrib.—Tenasserim, Malacca, Borneo.

H. LOBBIANA, *A. DC. Prod.* xiv. 631.

Gunong Tahan, 5,000-6,000 ft. Creeper; berries reddish. (5484.)

Distrib.—Malay Peninsula.

EUPHORBIACEÆ.

CHORIOPHYLLUM MONTANUM, *n. sp.* (*p. 322*).

Frutex ramosus, foliis oppositis coriaceis, ellipticis, basibus angustatis, apicibus retusis, superne nitidis, subtus pallidioribus 2 poll. longis, $\frac{3}{4}$ poll. latis, breviter petiolatis, petiolo $\frac{1}{10}$ poll. longo. Flores non visi. Capsula tricocca globosa, coccis bivalvibus $\frac{1}{3}$ poll. longis. Semina $\frac{1}{4}$ poll. longa rufo-castanea polita elliptica subobliqua, arillo bilobo, semen semitegente, lobis subacutis triangularibus.

Gunong Tahan, 3,300 ft. (5434.) Flowers yellow.

Very distinct from *Ch. malayanum*, Benth., in its much smaller, elliptic, very coriaceous leaves.

MYRICACEÆ.

MYRICA FARQUHARIANA, *Wall. Tent.* 61 (*p. 322*).

Gunong Tahan, 5,000-5,500 ft. Shrub 10-12 feet high; flowers reddish-brown. (5519.)

Distrib.—India, Malaya.

Common in the low country near the sea. This is referred to *M. Nagi*, Thunb., in the "Flora of British India," v. 597, but I cannot think it is identical with that Japanese plant.

Digitized by Google

CUPULIFERÆ.

QUERCUS RASSA, *Miq., Fl. Ind. Bat. Suppl.* 350 (*p. 322*).

Gunong Tahan, 6,000 ft. (5440.) One of the very few oaks which are to be met with at an elevation of over 3,000 ft.

Distrib.—Malay Peninsula and Archipelago.

MONOCOTYLEDONES.

ORCHIDEÆ.

OBERONIA (§ Caulescentes) CONDENSATA, *n. sp.* (*p. 322*).

Caules congesti, 1-2 poll. longi, radicibus densis tenuibus ad bases præditi. Folia carnosa decidua linearia acuta, $\frac{3}{4}$ poll. longa, $\frac{1}{8}$ poll. lata. Racemus pollicaris ad basin florifer. Bracteæ lanceolatæ longe acuminatæ, ad racemi basin longiores, superne minores. Flores citrini, poll. $\frac{1}{4}$ in diametro. Sepala ovata obtusa. Petala lanceolata multo angustiora; labellum æquilongum, integrum elongato-triangulare, basi lato. Columna stelidiis brevibus instructa, anthera ovata alba.

Gunong Tahan, 5,000-6,000 ft.; on rocks. (5487.)

A very curious little plant, remarkable for its stiff short stem, its short, erect raceme, and its quite simple lip.

PLATYCLINIS GRACILIS, *Hock. fil., Fl. Brit. Ind.* v. p. 708 (*p. 323*).

Gunong Tahan, 5,000-6,000 ft. Flowers pale greenish, with two broad stripes on the lip not reaching to the tip. (5498.) A form with a very long rhizome and stout distant bulbs.

Distrib.—Perak.

P. KINGII, *Hook. fil., l. c.*

Gunong Tahan; on rocks at 6,000 ft. Flowers yellow. (5434.)

Distrib.—Perak and Borneo.

DENDROBIUM LONGIPES, *Hook. fil., l. c.* 713 (*p. 323*).

Summit of Gunong Tahan, 7,100 ft. Flowers yellow faintly lined with brown, lip and lobes mottled with crimson. (5529.)

Distrib.—Hill-ranges of the centre of the Peninsula.

D. KELSALLI, *Ridl., in Journ. Linn. Soc., Bot.* xxxii. (1896) 237.

Gunong Tahan, 3,000-6,000 ft.; on trees. (5496.)

Distrib.—All the hills of the central range.

D., *sp.*, with rather long bulbs, slender stems and terete acuminate leaves. "Flower pale yellow, lip spotted and veined with reddish-brown and with reddish hairs."

Gunong Tahan, 5,000-6,000 ft. (5481.)

This appears to be allied to *D. gracile*, Lindl., but there are no flowers on the specimens.

Digitized by Google

D. UNIFLORUM, *Griff. Notulæ*, iii. 305.

Gunong Tahan, 5,000-6,000 ft. (5497.) At 3,300 ft. (5342, 5306.) On trees; creamy white, lip tinted with green and three brown lines down the centre.

In No. 5306 the leaves are over 2 inches long and half an inch wide, of thinner texture than those of the other two specimens. The leaves of No. 5497 are those of the Mount Ophir form, short, thick and oblong.

The Dendrobiums of the section *Distichophyllæ*, of the *D. uniflorum* and *D. revolutum* series, require critical study both in the Malay Peninsula and in Borneo, where they are also abundant on the upper parts of the hill-ranges. There is considerable variation in the form and texture of the leaf and also in the height and habit of the plant, though the flowers seem to be much less variable.

DENDROBIUM BIFARIUM, *Lindl., Gen. & Sp., Orch.* 81 (*p. 324*).

Gunong Tahan, 5,000-5,500 ft. Lip creamy white with orange blotches; petals and sepals pale coffee-brown, much darker at the base. (5505.)

I cannot distinguish this from the well-known lowland plant, on which Lindley based his species, though Mr. Robinson's note as to the colour of the flower (which is usually creamy with a green lip) shows some variation from the normal. The species occurs both in the lowlands and the hill-region of the Malay Peninsula and Borneo.

D. (§ Pedilonum) CORNUTUM, *Hook. fil., Fl. Brit. Ind.* v. 730.

Gunong Tahan, 5,000 ft.; on trees. Flowers bright magenta, stalks and bracts the same colour; a yellow spot on the lip. (5431.)

Distrib.—Perak.

This species is closely allied both to *D. Kuhlii*, Lindl., and *D. Haseltii*, Lindl., of Java and Sumatra. It differs but little from the latter, chiefly in the narrower acute sepals.

D. (§ Pedilonum) SUBFLAVIDUM, *n. sp.*

Caules plures graciles teretes, 18 poll. longi, $\frac{1}{8}$ poll. crassi, internodiis bipollicaribus. Folia anguste lanceolata acuminata acuta, 3 poll. longa $\frac{1}{2}$ poll. lata, conspicue 5-nervia, apicibus inæqualibus. Pedunculi e caulibus defoliatis $\frac{3}{4}$ poll. longi biflori. Bracteæ ovatæ. Pedicelli cum ovariis gracilibus $\frac{3}{4}$ poll. longi. Flos $1\frac{1}{2}$ poll. longus ab apice sepali usque ad apicem menti. Sepalum posticum lanceolatum $\frac{1}{4}$ poll. longum; sepala lateralia subtriangularia multo latiora, mentum cornutum 1 poll. longum, apice curvo. Labellum lanceolatum, ungue longo et anguste, limbo integro obtuso, 1 poll. longum $\frac{1}{3}$ poll. latum. Columnæ parte libera brevi lata, alis alte elevatis.

Gunong Tahan, 3,300 ft. Flowers yellow. (5317.) At roots of trees; flowers pale greenish-yellow, lip yellow, spotted with crimson

Digitized by Google

near the base on either side; leaves tinged with dull crimson on the under face. (5300.)

Evidently allied to *D. megaceras*, Hook. fil., a little known plant collected by Maingay in Malacca and not since found. It differs chiefly in the lip being quite entire and the limb lanceolate. *D. Anthrene*, Ridl., of Borneo is also allied.

BULBOPHYLLUM GALBINUM, *Ridl., in Journ. Linn. Soc., Bot.* xxxii. (1896) 267 (*p. 324*).

Gunong Tahan, 3,300 ft.; on trees. (5305.)

Distrib.—Perak.

BULBOPHYLLUM (§ Sestochilus) MICROGLOSSUM, *n. sp.* (*p. 325*).

Caulis longe repens $\frac{1}{12}$ poll. crassus, internodiis $\frac{1}{4}$ poll. longis; pseudobulbis conicis ascendentibus $\frac{1}{2}$ poll. longis $\frac{1}{4}$ poll. latis ad bases. Folia elliptica obtusa, breviter petiolata coriacea $1\frac{3}{4}$ poll. longa $\frac{1}{2}$ poll. lata. Pedunculus gracilis $1\frac{3}{4}$ poll. longus. Sepalum posticum ellipticum cucullatum, sep. lateralia ovata-lanceolata falcata obtusa $\frac{1}{2}$ poll. longa. Petala lata oblongo-lanceolata obtusa fere subæqualia. Labellum minimum, basi late emarginato, apice decurvo, carnosum lateraliter compressum vix $\frac{1}{4}$ poll. longum. Columna cum pede longo sursum curvo libero, alis in margine pedis elongatis, stelidia obscura.

Gunong Tahan, 4,000-5,000 ft.; on trees. Flowers dull yellow, lined and spotted with red, movable lip pink. (5327.)

Rather small-flowered for the section and with a very small lip which is flattened sideways and narrow, the base dilated and deeply emarginate. In the column, the side wings are well developed along the edge of the foot, forming rather large flanges running from the top of the column nearly to the point at which the foot becomes free from the sepals.

B. (§ Monanthaparva) TITANIA, *n. sp.*

Rhizoma longe repens, pseudobulbis arcte appressis tectum. Pseudobulbi oblongi apicibus ascendentibus ut in *B. catenario*, ferme $\frac{1}{2}$ poll. longis. Folia lanceolata $\frac{1}{2}$ poll. longa $\frac{1}{8}$ poll. lata, basi angustato. Pedunculus gracilis capillaris $1\frac{1}{2}$ poll. longus. Bracteæ infundibuliformes, $\frac{1}{8}$ poll. longæ. Sepala lanceolata $\frac{3}{16}$ poll. longa, 6-nervia, lateralia latiora. Petala minuta $\frac{1}{4}$ longitudinis sepali æquantia, lanceolata uninervia. Labellum linguiforme, in medio flexum $\frac{3}{4}$ longitudinis sepali æquans, carnosum flavum. Columna validula, stelidiis setiformibus longis.

Gunong Tahan, 5,000-6,000 ft.; growing among moss in gullies. Flowers and stalks orange, deeper on lip and column. (5471.)

Very near *B. catenarium*, but with larger flowers and pseudobulbs. The lip is yellow and not purple, and the stelidia are as long as the body of the column.

Digitized by Google

B. (§ Racemosæ) VIRIDESCENS, *n. sp.*

Rhizoma longum tenue, pseudobulbis nullis. Folia breviter petiolata, petiolo crasso, lamina elliptica 1 poll. longa $\frac{3}{8}$ poll. lata crassa carnosa obtusa. Scapi filiformes 2 poll. longi, floribus paucis remotis. Bracteæ lanceolatæ acuminatæ ovaria æquantes $\frac{1}{6}$ poll. longæ. Flores pallide virides, $\frac{1}{6}$ poll. longi, carnosi. Sepalum posticum lanceolatum obtusum, sep. lateralia ad bases gibbosa sublanceolata subobtusa. Petala linearia falcata obtusa. Labellum sepalo æquale carnosum crassum linguiforme obtusum profunde canaliculatum brunneum papillosum. Columna minima, stelidiis obscuris.

Gunong Tahan, 3,300 ft. ; on trees. Flowers pale green, lip brown. (5313.)

Remarkable for the absence of pseudobulbs and the thick fleshy leaves, unusual in this section.

ERIA NUTANS, *Lindl., Bot. Reg.* (1840) *Misc.* 83 (*p. 326*).

Gunong Tahan, 6,000 ft. Flowers white, lip and two inner petals tipped with yellow ; sepals tinged with pink ; bracts pale dull red. (5439.)

Distrib.—A common plant all over the Peninsula.

E. (§ Hymeneria) CARUNCULATA, *n. sp.*

Pseudobulbi carnosi crassi subteretes, 2 poll. longi. Folia coriacea lanceolata ad basin angustata, apicibus acutis, 5 poll. longa, 1 poll. lata. Racemus ad basin florifer 5 poll. longus. Flores copiosi parvi congesti, $\frac{1}{8}$ poll. longi. Bracteæ ovatæ reflexæ, $\frac{1}{12}$ poll. longæ. Rhachis cum pedicellis rufo-tomentosa. Sepalum posticum ovatum, sep. lateralia triangularia ovata obtusa, omnia pubescentia, mentum breve rotundatum sepali limbo æquale. Petala ovata, apicibus rotundatis. Labellum sepalis longius trilobum, lobis lateralibus ovato-lanceolatis, marginibus appressis carnosis quasi callos formantibus, lobo medio cum ungue angusto et limbo trilobo obovato, lobulis rotundatis vix distinctis. Columna brevis lata subquadrata.

Gunong Tahan, 5,000-6,000 ft. ; on rocks. Flower pallid brownish-white, lip edged with flesh-colour. (5445.)

Allied to *E. Maingayi*, Hook. fil. The lip is rather curious in form, the side-lobes meet by their inner faces over the claw of the mid-lobe, and being very fleshy almost form a callus-like mass.

E. LONGIFOLIA, *Hook. fil., Fl. Brit. Ind.* v. 790.

Gunong Tahan, 5,000-5,500 ft. ; on trees. Flowers white, lip purple, edge of petals spotted with purple. (5515.)

Distrib.—Not rare on the central hill-ranges.

E. TERETIFOLIA, *Griff. Notulæ*, iii. 298.

Gunong Tahan, 5,000-5,500 ft. ; on trees. Flowers creamy white, base of lip pink ; sweet-scented. (5527.)

Digitized by Google

Distrib.—Common on trees at from 2,000 feet upwards in the Peninsula and Borneo.

E. FEROX, *Bl., Mus. Bot. Lugd.-Bat.* i. 184.

Gunong Tahan, 5,000-5,500 ft.; on the ground. Flowers creamy white, lip mottled with purple. (5516.)

Distrib.—Malay Peninsula, Java, Borneo.

ERIA (§ Dilochiopsis) SCORTECHINII, *Hook. fil., Fl. Brit. Ind.* v. 809 (*p. 327*).

Gunong Tahan, 5,000 ft. Stalks up to 8 feet high; bracts white, flowers white, tinted with pink. (5433.)

Distrib.—Hill-ranges of the Peninsula.

E. (§ Acridostachya) REPTANS, *n. sp.*

Rhizoma longe repens validum lignum, radicibus tenuibus. Pseudobulbi ascendentes, pollicem distantes, cylindrici pollicares, cum vaginis argenteis involutis. Folium in quoque pseudobulbo singulum anguste lanceolato-lineare subacutum valde coriaceum 6 pollices longum $\frac{1}{3}$ pollices latum. Scapus 12-pollicaris, basi (7 poll.) nudo rufo-tomentoso cum bracteis paucis ovatis dissitis vix $\frac{1}{12}$ poll. longis. Racemus densus 4 poll. longus, omnino rufo-tomentosus. Bracteæ minimæ ovatæ. Ovarium cum pedicello $\frac{1}{4}$ poll. longum. Sepalum posticum oblongum cucullatum, sep. lateralia ovata falcata triangularia subacuta tomentosa. Mentum $\frac{1}{3}$ poll. longum rectum cylindricum subclavatum. Petala lata ovata lanceolata glabra. Labellum oblongum rotundatum integrum, marginibus undulatis vix ad basin angustatum, fascia media incrassata minute papillosa. Columna parte libera brevi; rostellum rotundatum subemarginatum.

Gunong Tahan, 5,000-6,000 ft.; on rocks. Flowers pale yellow. (5446.) Rather a striking plant for its section with its long creeping rhizomes, distant bulbs, and long wiry roots.

E. (§ Acridostachya) CRASSIPES, *n. sp.*

Pseudobulbi in rhizomate crasso ligneo congesti conici rugosi vaginis atrobrunneis coriaceis pollicaribus tecti. Folia bina coriacea lineari-lanceolata acuta, 5 poll. longa, $\frac{1}{2}$ poll. lata. Scapus 12 poll., dimidio inferiore nudo, argenteo-tomentosus. Racemus densus rufo-argenteo-tomentosus. Bracteæ sparsæ minimæ lanceolatæ acutæ. Sepala ovata obtusa pubescentia, lateralia semiorbicularia. Mentum breve rectum clavatum. Petala parva angusta lanceolata curva. Labellum brevius tenue integrum oblongum flabellulatum, apice rotundato undulato. Capsula oblanceolata in uno latere fissa.

Gunong Tahan, 5,000 ft. (5336.) Allied to *E. brunnea*, Ridl., but with a different lip. The specimens are nearly out of flower.

Digitized by Google

CERATOSTYLIS GRACILIS, *Blume, Bijdr.* 306 (*p. 327*)

Gunong Tahan, 5,000-5,500 ft. (5528.)

Distrib.—Common all over the Peninsula and Java.

PHREATIA LISTROPHORA, *Ridl., in Journ. Linn. Soc., Bot.* xxxii. (1896) 307 (*p. 327*).

Gunong Tahan, 5,000-6,000 ft. Flowers white, strongly scented. (5469.)

Distrib.—Malay Peninsula.

NEPHELAPHYLLUM PULCHRUM, *Blume, Bijdr.* 373 (*p. 328*).

Gunong Tahan, 3,300 ft.; on ground among dead leaves. Lip white, lined in the centre with green and outside with dull crimson; petals dull crimson-red; leaves resembling a dead leaf. (5302.)

Distrib.—Java.

TAINIA SPECIOSA, *Blume, Bijdr.* 354 (*p. 328*).

Gunong Tahan, 3,300 ft.; on the ground. Flowers dull pale green lined with crimson, point of lip yellow; stalks and pseudobulbs dull purple. (5308.)

Distrib.—Not rare at high elevations all over the Peninsula, also Java.

T. VEGETISSIMA, *n. sp.*

Rhizoma breviter repens, pseudobulbis approximatis $\frac{1}{2}$-$\frac{1}{3}$ poll. longis, vaginis papyraceis reticulatis tectis. Folium ovatum acutum margine incrassato, breviter petiolatum, $1\frac{1}{4}$-$1\frac{1}{2}$ poll. longum pollicem latum, lucidum purpurascens, nervis parallelis 6, petiolo kermesino. Scapus lateralis pseudobulbo approximatus gracilis 9 poll. longus, bracteis vaginantibus reticulatis 2 ad basin proximis, superne uno lineari circa $\frac{1}{3}$ poll. longo. Racemus laxus triflorus; bracteæ floriferæ lanceolatæ acutæ $\frac{1}{4}$ poll. longæ. Pedicellus gracilis cum ovario $\frac{1}{4}$-$\frac{2}{3}$ poll. longus. Sepala anguste lanceolata acuminata $\frac{1}{2}$ poll. longa $\frac{1}{16}$ poll. lata, inferiora basi gibba. Petala quam sepala latiora et breviora trinervia. Labellum obovato-orbiculare $\frac{1}{2}$ poll. longum, $\frac{1}{4}$ poll. latum integrum, disco kermesino margine flavo, callis semi-orbicularibus duobus ad basin instructo. Columna elongata curva gracilis, rostello rotundato integro, alis distinctis rotundatis.

Gunong Tahan, 3,300 ft.; on the ground. Flowers pale yellow closely lined with crimson, lip edged with yellow, centre crimson; leaves shining purplish-brown, stalks crimson. (5314.)

A very distinct and pretty plant allied to no species very distinctly, but in some points approaching *T. grandiflora*, Ridl. Like that plant its stem and leaves suggest an affinity with *Nephelaphyllum* and there is also some similarity in the column, but the absence of the spur prevents its being referred to that genus.

Digitized by Google

SPATHOGLOTTIS AUREA, *Lindl., Paxt. Fl. Gard.* i. (1850) 16 (*p. 328.*)

Gunong Tahan, 5,000 ft. (5441.)

The usual big form described as *S. Wrayi*, Hook. fil., Fl. Brit. Ind. v. 813.

Distrib.—Malay Peninsula, Borneo.

ARUNDINA SPECIOSA, *Blume, Bijdr.* 401 (*p. 328*).

Gunong Tahan, 5,000-6,000 ft.; among brushwood in ravines. Petals pale pink, lip magenta ribbed with yellow. (5448.) Common in all our hill-ranges.

Distrib.—From India to Java.

CALANTHE CECILIÆ, *Reichenb. f., in Gard. Chron.* ser. II. xix. (1883) 432 (*p. 329.*)

Kuala Jelai, 500-1,000 ft. Flowers pure white; bracts pale green; column and lip tinged with sulphur-yellow. (5542.)

Distrib.—Common in the Peninsula in some localities.

CŒLOGYNE CARNEA, *Hook. fil., Brit. Ind.* v. 838 (*p. 329*).

Gunong Tahan, 5,000-6,000 ft.; on low stems in shady thickets. Flowers white, lip and column streaked with yellow. (5451.)

Distrib.—Perak.

C. STENOCHILA, *Hook. fil., l. c.* 837.

Gunong Tahan, 5,000 ft.; on trees. Flowers pale red-brown veined with brown on the sides of the lip. (5432.)

Distrib.—Perak.

C. CYMBIDIOIDES, *n. sp.*

Rhizoma crassum ligneum, pseudobulbis cylindricis 3-pollicaribus. Folia lanceolata acuminata longe petiolata basi cuneata, 14-poll. longa $2\frac{1}{2}$ poll. lata; nervis conspicuis elevatis 3, cum 2 minus elevatis, petiolo 3 poll. longo. Racemus longus pendulus. Flores remoti magni. Bracteæ oblongæ truncatæ papyraceæ pallide brunneæ, 1 poll. longæ, persistentes. Pedicelli $\frac{3}{4}$ poll. longi. Sepala anguste lanceolata acuta, $1\frac{1}{4}$ poll. longa, $\frac{1}{4}$ poll. lata. Petala quam sepala paullo breviora. Labellum late obovatum trilobum, lobis lateralibus magnis rotundatis, lobo medio parvo rotundato, nervis tres medianis alte cristatis præcertim ad basin, undulato-cristatis in disco et cristato-carnosis in lobo medio. Columna longa curvula, marginibus clinandrii ovatis lobatis, lobulis obtusis inæqualibus. Anthera galeata elongata cum lateribus excisis, quam clinandrium brevior, apice lato obtuso. Rostellum crassum rotundatum emarginatum.

Gunong Tahan, 5,000-6,000 ft. Flowers whitish, stalks pale brown, lip striped with brown, white, and yellow. (5465.)

A handsome species, allied to *C. Dayana*, Reichenb. f., but differing in the narrower pseudobulb, laxer spike, and long narrow petals and sepals.

Digitized by Google

PHOLIDOTA PARVIFLORA, *Hook. fil., Ic. Pl.* 1891 (*p. 329*).

Summit of Gunong Tahan, 7,100 ft. Leaves glaucous green; flower-stalks greenish, flowers white. (5531.)

Var. PUMILA, *n. var.* Pseudobulbi congesti conico-oblongi, $\frac{1}{2}$ poll. longi. Folium ovatum, $\frac{3}{4}$ poll. longum, $\frac{5}{12}$ poll. latum. Racemus 2 poll. longus. Flores ferme $\frac{1}{4}$ poll. longi.

Gunong Tahan, 7,100 ft. (5530.)

So different in habit from the typical form as to appear at first sight a very distinct species. As, however, the flowers are similar, I conclude that it is merely a condensed form due to its habitat.

BROMHEADIA ALTICOLA, *Ridl., in Journ. Linn. Soc., Bot.* xxviii. (1891) 338 (*p. 330*).

Gunong Tahan, 3,300 ft. Flowers creamy white. (5428.) Common at high and low altitudes on trees.

Distrib.—Selangor, Singapore.

THRIXSPERMUM SCORTECHINII, *Ridl., Fl. Mal. Pen., Monocot.* i. 183 (*p. 330*).

Gunong Tahan, 5,000-5,500 ft.; on trees. (5512.)

Distrib.—Malay Peninsula.

APPENDICULA RUPESTRIS, *Ridl., in Journ. Linn. Soc., Bot.* xxxii. (1896) 391 (*p. 330*).

Kuala Tahan, 500-1,000 ft. Flowers yellowish-white; top of column pink. (5537.) From the type-locality.

ACRIOPSIS JAVANICA, *Blume, Bijdr.* 337 (*p. 330*).

Gunong Tahan, 4,000-5,000 ft. (5412.) Fruiting specimen only.

Distrib.—Malay Peninsula, Tenasserim, Sumatra, Java.

HETÆRIA ELEGANS, *n. sp.* (*p. 330.*)

Caulis 3 poll. longus. Folia ovata acuminata acuta trinervia, 3 poll. longa 1 poll. lata, glabra, petiolo vaginante $1\frac{1}{2}$ poll. longo. Pedunculus cum racemo 18-pollicari, basi (12 poll.) nudo. Racemus multiflorus, laxiusculus; rachis albopubescens. Flores vix plus quam $\frac{1}{12}$ poll. longi, pedicello cum ovario $\frac{1}{4}$ poll. longo. Bracteæ lanceolatæ acuminatæ. Sepala ovata obtusa glabra. Petala anguste linearia apicibus dilatatis. Labellum quam sepala brevius oblongum ovatum saccatum, cum proceessibus carnosis clavatis pluribus in sacco; carunculo carnoso in apice labelli. Columna basi angusta, superne dilatata. Rostellum late excisum, lobis latis obtusis.

Gunong Tahan, 5,000-6,000 ft. Flowers greenish. (5466.)

Near *H. elata*, Hook. fil., of Batang Padang, but differs in having a laxer spike, narrower petals, and a different lip.

HABENARIA ZOSTEROSTYLOIDES, *Hook. fil., Fl. Brit. Ind.* vi. 155 (*p. 330*).

Gunong Tahan, 5,000-6,000 ft. Flowers greenish. (5480.)

Distrib.—Also occurs on Mt. Ophir and other hills in the Peninsula.

Digitized by Google

CYPRIPEDIUM BARBATUM, *Lindl., Bot. Reg.* (1841) *Misc.* 53 (*p. 330*).

Gunong Tahan, 5,000-6,000 ft. Leaves chequered pale green and white; lateral petals spotted with black-purple terminally. (5442.) Specimen in fruit only; determination doubtful.

Distrib.—Malay Peninsula, Siam.

APOSTASIACEÆ.

APOSTASIA NUDA, *R. Br., in Wall. Pl. As. Rar.* i. 76 (*p. 330.*)

Gunong Tahan, 3,300 ft. Flowers white. (5318.)

Distrib.—Common in the Peninsula; also North-East India; Sumatra, Java.

ZINGIBERACEÆ.

HEDYCHIUM COLLINUM, *Ridl., in Journ. Roy. As. Soc. Straits Br.* xxxii. (1899) 103 (*p. 331*).

Gunong Tahan, 5,000-5,600 ft. Flowers white, stamens brownish; strongly scented. (5513.) Apparently the same species as I obtained on Kedah Peak, but a bigger and taller plant about 5 feet high. I had only one rather stunted plant from a somewhat exposed precipice. The calyx and corolla-tube are pubescent in this plant.

ZINGIBER GRACILE, *Jack, in Mal. Misc.* i. (1820) No. i. 1 (*p. 331*).

Gunong Tahan, 3,300 ft. (5365.) Exactly the ordinary form as far as the specimen goes, but the field-note says: "Flowers pale yellow, bracts yellow, lower ones streaked with green; flower-stalk dull red." The bracts of this species are normally dull red.

CAMPTANDRA PARVULA, *Ridl., l. c.* 104 (*p. 331*).

Kuala Teku, 500-1,000 ft. Flowers white, throat yellow. (5532.)

Distrib.—Malay Peninsula.

CONAMOMUM UTRICULOSUM, *Ridl., l. c.* 122 (*p. 331*).

Gunong Tahan, 3,300 ft. Flowers yellow. (5424.)

Distrib.—Perak Hills.

GEOSTACHYS ELEGANS, *Ridl., l. c.* 160 (*p. 331*).

Gunong Tahan, 5,000-5,500 ft. Flowers yellow, the sides of the lip mottled with red, the lower surface of the leaves purple. (5511.)

Distrib.—Mount Ophir.

This is quite like the Mount Ophir plant, but the stamen in the one perfect flower I was able to examine has a distinct little lacerate crest.

LILIACEÆ.

DRACÆNA PORTERI, *Baker, in Journ. Bot.* xi. (1873) 262 (*p. 331*).

Gunong Tahan, 3,300 ft. Flowers white, leaves green; about 3 feet high. (5371.)

Distrib.—Common all over the Peninsula; Singapore, Siam.

Digitized by Google

BURMANNIACEÆ.

BURMANNIA DISTICHA, *Linn., Sp. Pl.* 287 (*p. 331*).

Gunong Tahan, 4,000-5,000 ft. Flowers light green; bracts pale violet. Growing among low scrub, on ridges (5383.) On damp places in open (5449.) Common at high elevations.

Distrib.—India, Sumatra, China, Australia.

B. LONGIFOLIA, *Becc. Malesia*, i. 244.

Gunong Tahan, 3,300 ft. Flowers and bracts white, petals tinted on edges pale blue. (5230.) Usually with the last.

Distrib.—Malay Peninsula, Borneo.

XYRIDACEÆ.

XYRIS GRANDIS, *n. sp.* (*p. 332*).

Herba valida; foliis magnis late ensiformibus acuminatis equitantibus subcoriaceis, 24 poll. longis, $\frac{3}{4}$ poll. latis. Scapus brevior, 19 poll. longus, teres. Capitulum obovatum magnum $\frac{1}{2}$ poll. in diametro. Bracteæ exteriores lanceolatæ acutæ $\frac{1}{2}$ poll. longæ, atrobrunneæ lucidæ. Sepala 3 inæqualia, lanceolata acuta cartilaginea atrobrunnea. Petala 3 cuneato-oblonga, marginibus laceratis, flava. Stamina oblonga glabra. Stylus cum brachiis 3 elongatis extrusis.

Gunong Tahan, 3,300 ft. Flowers yellow, leaves green tinted with red, brown at the base. (5341.)

This is the finest *Xyris* I know; the great sword-like leaves recall those of *Cladium Maingayi*, C. B. Clarke, of Mt. Ophir, and are quite unlike those of any other species.

X. RIDLEYI, *Rendle, in Journ. Bot.* XXXVII. (1899) 505.

Gunong Tahan, 5,000-6,000 ft., in damp places on rocks. Flowers bright cadmium-yellow, turning white. (5450.)

Distrib.—Kedah Peak.

The original specimen from Kedah Peak is somewhat taller with slightly larger heads, but the plants from the two localities are evidently conspecific (A. B. R.).

ARACEÆ.

SCINDAPSUS SCORTECHINII, *Hook. fil., Fl. Brit. Ind.* vi. 541 (*p. 332*).

Gunong Tahan, 3,300 ft., climbing on trees. Whole flower pale yellow. (5307.)

Distrib.—Common in all the hill districts in the Peninsula.

ERIOCAULONACEÆ.

ERIOCAULON MACROPHYLLUM, *Ruhl., in Engl. Pflanzenr., Erioc.* 77 (*p. 332*).

Gunong Tahan, 5,000-5,000 ft. Flower-heads greyish-white. (5510.)

I take this to be a form of the Javan plant described by Ruhland, but have seen no type. Plants collected by Horsfield at Rawa Diyang seem to be the same thing.

Digitized by Google

GYMNOSPERMÆ.

CONIFERÆ.

AGATHIS LORANTHIFOLIA, *Salisb., in Trans. Linn. Soc.* viii. (1807) 312 (*p. 332*).

Gunong Tahan, 5,000-6,000 ft. Tree from 35-40 feet high, in sheltered gullies. (5488.)

Distrib.—Malay Peninsula and Archipelago.

DACRYDIUM ELATUM, *Wall. ex Hook., Lond. Journ. Bot.* ii. (1843) 144 (*p. 333*).

Gunong Tahan, 3,300 ft. Tree 60-80 feet tall. (5380.)

Distrib.—Common at high altitudes in the Peninsula and Archipelago.

PODOCARPUS CUPRESSINA, *R. Br. ex Mirb., in Mém. Mus. Par.* xiii. (1825) 75 (*p. 333*).

Gunong Tahan, 3,300 ft. Tree 50-60 feet high. (5354.)

Distrib.—Common at such altitudes in the Peninsula and Islands.

P. BRACTEATA, *Blume, Enum.* i. 88.

Gunong Tahan, 5,000-6,000 ft. Tree 20 feet high, branches at right angles to the stem. (5452.)

Distrib.—Not previously recorded from the Malay Peninsula; Java.

PTERIDOPHYTA.

(With A. GEPP, M.A., F.L.S.)

GLEICHENIA DICARPA, *R. Br., Prodr.* 161 (*p. 333*).

Gunong Tahan, 4,000-5,000 ft. (5407.)

G. NORRISII, *Mett. ex Kuhn, in Linnæa*, xxxvi. (1869-70) 165.

Gunong Tahan, 3,300 ft.; climbing fern. Leaves bluish-white beneath. (5358.)

CYATHEA BRUNONIS, *Wall. ex Hook., Sp. Fil.* i. 15 (*p. 333*).

Gunong Tahan. (5379.)

ALSOPHILA KINGI, *C. B. Clarke, ex Bedd. Handb. Ferns Brit. Ind.* 475 (*p. 333*).

Gunong Tahan, 3,300 ft. Tree-fern, stem abont 4 feet high. (5425.)

MATONIA PECTINATA, *R. Br., in Wall. Pl. Asiat. Rar.* i. t. 16 (*p. 333*).

Gunong Tahan, 3,300 ft. (5351.)

LECANOPTERIS CARNOSA, *Blume, Enum. Pl. Jav.* 120 (*p. 333*).

Gunong Tahan, 4,000-5,000 ft.; growing on trees on ridges. (5389.)

HYMENOPHYLLUM POLYANTHOS, *Sw., in Schrad. Journ.* 1800, 102 (*p. 333*).

Gunong Tahan, 3,300 ft.; growing in damp places on trees. (5422.)

Digitized by Google

TRICHOMANES PALLIDUM, *Blume, Enum. Pl. Jav.* 225 (*p. 333*).
Gunong Tahan, 5,000-6,000 ft.; on damp shady rocks. (5474.)

T. DIGITATUM, *Sw., Syn. Fil.* 370, 422.
Gunong Tahan, 4,000-5,000 ft.; growing on rocks. Pale olive-green. (5401.)

T. PLUMA, *Hook., Ic. Pl.* t. 997.
Gunong Tahan, 3,300-5,000 ft. (5359, 5385.)

TRICHOMANES APIIFOLIUM, *Presl, Hymenoph.* 16, 44 (*p. 334*).
Gunong Tahan, 3,300 ft.; growing in damp places. (5421.)

T. RADICANS, *Sw., in Schrad. Journ.* 1800, 97.
Gunong Tahan, 3,300 ft.; growing in damp places. (5419.) Specimen in very shrivelled condition, but apparently this species.

HUMATA PEDATA, *J. Smith, in Hook. Journ. Bot.* iii. (1841) 416 (*p. 334*).
Gunong Tahan, 5,000-6,000 ft.; growing on trees. (5437, 5472.)

DAVALLIA PINNATA var. GRACILIS, *Hook. and Bak., Syn. Fil.* 98 (*p. 334*).
Gunong Tahan, 3,300 ft. (5377.)

LINDSAYA RIGIDA, *J. Smith, l. c.* 415 (*p. 334*).
Gunong Tahan, 5,000 ft. (5547.)

L. CULTRATA, *Sw., Syn. Fil.* 119.
Gunong Tahan, 5,000-5,500 ft.; on rocks. (5521.)

L. SCANDENS, *Hook., Spec. Fil.* i. 205.
Gunong Tahan, 3,300 ft.; climbing fern on trees. (5368, 5418.)

L. FLABELLULATA, *Dryand., in Trans. Linn. Soc.* iii. (1797) 41.
Gunong Tahan, 3,300 ft. (5372.)

L. DIVERGENS, *Wall. ex Hook. & Grev. Ic. Fil.* t. 226.
Gunong Tahan, 3,300 ft. (5373.)

OLEANDRA NERIIFORMIS, *Cav., in Anal. Hist. Nat.* i. (1799) 115 (*p. 334*).
Gunong Tahan, 3,300 ft.; climbing fern. (5357.)

DIPTERIS HORSFIELDII, *Bedd., Ferns Brit. Ind.* t. 321 (*p. 334*).
Gunong Tahan, 3,300 ft. (5350.)

POLYPODIUM HIRTUM, *Hook., Spec. Fil.* iv. 170 (*p. 334*).
Gunong Tahan, 5,000-6,000 ft.; growing on trees. (5478.)

P. STREPTOPHYLLUM, *Baker, in Journ. Bot.* xvii. (1879) 42.
Gunong Tahan, 4,000-5,000 ft.; growing on rocks. (5394.)

P. CUCULLATUM, *Nees & Blume, in Nova Acta,* xi. (1823) 121.
Gunong Tahan, 5,000-5,500 ft.; on rocks. (5522.)

Digitized by Google

P. VENULOSUM, *Blume, Enum. Pl. Jav.* 128.
Gunong Tahan, 5,000-6,000 ft.; growing on trees. (5463.)

P. (Phymatodes) STENOPHYLLUM, *Blume, Enum. Pl. Jav.* 124.
Gunong Tahan, 4,000-5,000 ft.; growing on trees. (5386.)

POLYPODIUM WRAYI, *Baker, in Journ. Bot.* xxv. (1887) 206 (*p. 335*).
Gunong Tahan; growing on rocks at 5,000-6,000 ft. (5494.)

P. LACINIATUM, *Blume, Enum. Pl. Jav.* 131.
Gunong Tahan, 5,000-6,000 ft.; growing on damp rocks. (5459.)

VITTARIA FALCATA, *Kunze, in Bot. Zeit.* vi. (1848) 198 (*p. 335*).
Gunong Tahan, 3,300 ft.; growing on trees. (5301.)

TÆNITIS BLECHNOIDES, *Sw., Syn. Fil.* pp. 24, 220 (*p. 335*).
Gunong Tahan, 3,300 ft.; growing on the ground. (5345.)

ELAPHOGLOSSUM LATIFOLIUM, *J. Smith, in Hook. Lond. Journ. Bot.* i. (1842) 197 (*p. 335*).
Gunong Tahan, 5,000-6,000 ft.; growing on trees. (5464.)

SCHIZÆA MALACCANA, *Baker, Syn. Fil.* 428 (*p. 335*).
Gunong Tahan, 4,000-5,000 ft.; growing on the ground and on trees. (5403.)

LYCOPODIUM CASUARINOIDES, *Spring, Monogr. Lycop.* i. 94 (*p. 335*).
Gunong Tahan, 4,000-5,000 ft.; climbing among high bushes, etc. (5398.)

L. NUMMULARIFOLIUM, *Blume, Enum. Pl. Jav.* ii. 263.
Kuala Teku, 500-1,000 ft. (5541.)

SELAGINELLA PLUMOSA, *Baker, in Journ. Bot.* xxi. (1883) 144 (*p. 335*).
Gunong Tahan, 3,300 ft.; growing on the earth in jungle. (5361.)

S. WALLICHII, *Spring, Monogr. Lycop.* ii. 143.
Gunong Tahan, 3,300 ft. Stalks dull red. (5414.)

S. ATROVIRIDIS, *Spring, l. c.* 124.
Gunong Tahan, 3,300 ft. Green, stalks dull red. (5366.)

BRYOPHYTA.

(By A. GEPP, M.A., F.L.S.)

SPHAGNUM JUNGHUHNIANUM, *Doz. & Molk., Bryol. Jav.* i. 27 (*p. 335*).
Gunong Tahan, 6,000 ft. Pale green, the tops pale reddish-brown. (5435.)

EUCAMPTODON MACROCALYX, *C. Müll., Syn. Musc.* i. 346 (*p. 335*).
Gunong Tahan, 5,000-5,500 ft.; growing on 5527 (*Eria teretifolia*).

LEUCOBRYUM CHLOROPHYLLOSUM, *C. Müll., Syn. Musc.* ii. 535 (*p. 335*).
Gunong Tahan, 3,300 ft.; growing on trees. (5420.)

Digitized by Google

TRICHOSTELEUM SCABRELLUM, *Jaeg. & Sauerb., Sp. & Gen. Musc.* ii. 484 (*p. 335*).

Gunong Tahan, 3,300 ft.; growing on small tree. (5417.)

MNIODENDRON DIVARICATUM, *Lindb., in Öfv. Vet.-Akad. Förh. Stockh.* xviii. 1861 (1862) 375 (*p. 336*).

Gunong Tahan, 5,000-6,000 ft. Fruit yellowish. (5490.)

MASTIGOBRYUM, *sp.* (*p. 336*).

Gunong Tahan, 3,300 ft. (5374.)

LEPIDOZIA WALLICHIANA, *Gottsche, Syn. Hepat.* 204 (*p. 336*).

Gunong Tahan, 3,300 ft.; on dead tree. Delicate pale green. (5360.)

LICHENES.

(By Miss A. LORRAIN SMITH, F.L.S.)

STEREOCAULON CORALLOIDES, *Fries, Sched. Crit.* iv. 24, var. (*p. 336*).

Gunong Tahan, 3,300 ft.; growing amongst moss. Colour very pale sea-green. (5348.)

USNEA DASYPOGA, *Nyl. ex Stiz. in St. Gall. Nat. Ges.* (1876) 202 (*p. 336*).

Gunong Tahan, 3,300 ft.; growing on branches of trees. Dull; very pale green. (5353.)

CLADONIA MACILENTA, *Hoffm. Deutschl. Fl.* 126 (*p. 336*).

Gunong Tahan, 4,000-5,000 ft.; on trees. Pale dull green; fruiting tops bright red. (5402.)

C. RANGIFERINA, *Hoffm., l. c.* 114.

Gunong Tahan, 5,000 ft.; growing on the ground. White, slightly tinged with green. (5331.)

FUNGI.

(By Miss A. LORRAIN SMITH, F.L.S.)

HEXAGONIA TENUIS, *Fries, Epicr.* 498 (*p. 336*).

Gunong Tahan, 3,300 ft.; on dead wood. Shaded with warm brown above, brown powdered with white beneath. (5423.)

LACHNOCLADIUM BRASILIENSE, *Sacc., Syll. Fung.* vi. 738 (*p. 336*).

Gunong Tahan, 3,300 ft.; on dead wood. Very pale brown. (5416.)

PANUS, *sp.* (*p. 336*).

Gunong Tahan, 3,300 ft.; on dead wood. White shaded with warm brown above, pure white beneath. (5310.)

CLAVARIA FUSIFORMIS, *Sowerby, Engl. Fungi*, t. 234 (*p. 336*).

Gunong Tahan, 3,300 ft.; growing among moss, etc. Whole plant ochre-yellow. (5346.)

Digitized by Google

NEW MAMMALS FROM THE MALAY PENINSULA REGION.

By C. BODEN KLOSS, F.Z.S.,

Curator, Selangor State Museum.

IN the collections of the Selangor State Museum there are examples of several Mammals from the Peninsular Region [1] which have not hitherto received the recognition that the distinctness of their characters requires. Descriptions of four of them are now published.

PARADOXURUS (HERMAPHRODITUS) MILLERI, *sp. nov.*

Type.—Adult female (skin and skull), No. 2821/07, Selangor Museum. Collected on Tioman Island, East Coast, Malay Peninsula, 9th October, 1907, by H. C. Robinson. Original number 18.

Characters.—Smaller than *Paradoxurus hermaphroditus* and paler throughout, with brown, not black, markings. Dorsal stripes practically obsolete and upper proximal half of tail like back except mesially.

Colour.—General colour above a pale silvery drab-grey, slightly suffused with pale-buff posteriorly: hairs with ashy-brown bases and brown tips. Dorsal region with irregular rows of undefined brown spots, forming on back of neck an indistinct dull mottling and disappearing on sides with which chest and abdomen are concolorous. Centre of abdomen suffused with buff. Limbs brown, slightly grizzled with silvery except on feet. Muzzle, below eyes, cheeks, chin and throat, crown, ears and behind ears, brown; crown and throat grizzled. A distinct pale brow-band which extends below ears to sides of neck. A few white hairs below eyes and on chin. Proximal half of tail like rump above, buffy below; distal portion blackish-brown, extending towards the base along the median line of the dorsal surface: extreme base of tail below grizzled brown.

Skull and Teeth.—When compared with skulls of *Paradoxurus hermaphroditus* from the Peninsula that of *P. milleri* shows several essential differences. The least breadth between the maxillaries on the rostrum is much greater, while the posterior extension of the maxillaries is less: the constriction behind the post-orbital processes commences more suddenly and is far shorter, giving increased length to the brain-case. There is a far greater posterior extension of the palate; the audital bullæ are less dilated and truncated, but are somewhat flattened on the outer sides, while the anterior extremities are elongated into distinct spinous processes. Viewed laterally the upward flare or curvature of the zygomatic arches is much less pronounced. The teeth are too worn for comment.

[1] Post, p. 147.

Digitized by Google

MEASUREMENTS.—Collector's external measurements: head and body, 495 (533)[1]; tail, 432 (452); hind-foot, 72 (111); ear, 45 (44). Cranial measurements: greatest length, 100 (113); basal length, 95 (105.5); henselion to posterior edge of bony palate, 44 (48.5); distance from transverse line joining posterior edge of last molars to end of bony palate, 7 (4.5); posterior extension of maxillary to posterior surface of postorbital process on rostrum, 10.5 (8.5); constriction in front of postorbital processes, 18 (20.5); constriction behind postorbital processes, 11 (12.5); least breadth between external edges of frontal bone on rostrum, 8 (6.5); zygomatic breadth, 59 (67).

SPECIMENS EXAMINED.—One, the type.

REMARKS.—The principal characters of this musang, as exhibited in an adult female obtained on Tioman Island by Messrs. Abbott and Kloss in 1899, were first noted by Mr. Gerrit S. Miller (Proc. Washington Acad. Sci., 1900, p. 228), after whom, now that its distinctness has been proved by the two further examples taken by Mr. H. C. Robinson (one in the British and one in the Selangor Museum), I have much pleasure in naming the species.

SCIURUS (BILIMITATUS) MICRORHYNCHUS, *sp. nov.*

Sciurus bilimitatus, Miller; Smith. Misc. Coll., vol. LXV., p. 8 (part).

TYPE.—Adult male (skull and skin), No. 2575/07, Selangor Museum. Collected on Tioman Island, Southern China Sea, 14th October, 1907, by H. C. Robinson. Original number 69.

CHARACTERS.—Generally resembles *Sciurus bilimitatus*, Miller, (type from Trengganu), but smaller and duller; skull less robust with rostral region slenderer.

COLOUR.—Upper surface a fine speckle of black and pale buff, the latter slightly brighter and somewhat in excess on top of face, sides of neck, shoulders, thighs and feet. Ears, a ring round eyes, cheeks muzzle and chin ochraceous. Under-parts grizzled bluish-grey. Ventral area tinged ochraceous. Tail, above coarsely annulated black and buff-white, forming distinct bands on terminal portion; below yellower. Sides striped whitish buff and black.

SKULL.—As in *Sciurus bilimitatus*, but with proportionately slenderer rostrum; the greatest combined breadth of the nasal bones being decidedly less than half their median length, while in *Sciurus bilimitatus* they are never less than half. The audital bullæ are perhaps a little narrower and the basioccipal a trifle broader.

MEASUREMENTS.—Collector's external measurements: head and body, 183; tail, 155; hind-foot, 39; ear, 18. Cranial measurements; greatest length, 47; basal length, 38; zygomatic breadth, 28.5; cranial breadth, 22; palatal length, 20; diastema, 12; upper tooth-row, 9:

[1] Measurements in parentheses are those of an adult male, *Paradoxurus hermaphroditus*, from Kuala Kangsar, Perak (S. M. No. 1257/08).

Digitized by Google

median length of nasals, 14; greatest breadth of both nasals, 6.75; interorbital breadth, 17.

SPECIMENS EXAMINED.—Three from the type locality.

REMARKS.—An insular form somewhat smaller than that occurring on the adjacent mainland, and further characterised by slightly paler and bluer colouration, slenderer rostrum and generally less robust skull.

MUS (SURIFER) MICRODON, *sp. nov.*

TYPE.—Adult female (skin and skull), No. 2549/07, Selangor Museum. Collected at Juara Bay, Tioman Island, 14th September, 1907, by E. Seimund. Original number 57.

CHARACTERS.—Like *Mus surifer* but more tawny: centre of abdomen washed with buff-ochraceous; a tawny band across chest and white of under-parts not continued to hind-foot. Skull like that of the mainland race but with longer nasals, lachrymal bones more developed and palatal foramina larger. Molars greatly reduced in size.

COLOUR.—Above ochraceous-tawny, plentifully sprinkled with a black element which is strongest down the centre of the back, where it forms almost a dark stripe expanding on the rump. Cheeks, sides of neck, back of neck behind ears, shoulders, thighs and sides along the line of demarcation almost clear tawny. Under-parts white except the chest, which is crossed by a band of pale tawny about 18 m.m. wide, and the fore and hind legs, which are completely encircled with the same colour, extending almost to their junction with the trunk. Centre of abdomen washed with clear buff (in some specimens deep ochraceous). Upper surfaces of feet whitish. Tail bicolored with terminal portion white.

SKULL AND TEETH.—The skull does not differ consistently from typical *surifer* except in the larger rostrum, broader palatal foramina and inter-pterygoid space. The mandible is, however, less robust, and the crowns of all the molars are much reduced, the last upper molar in the insular animal being scarcely half the area of the same tooth in skulls of equal size from the Peninsula.

MEASUREMENTS.—Collector's external measurements of type: head and body, 178; tail, 163; hind-foot, 38; ear, 25. Cranial measurements of type: greatest length, 45; basal length, 35.5; palatal length, 19.5; breadth between anterior molars, 4.75; length of palatal foramina, 7; breadth of combined foramina, 4; diastema, 12.75; length of molar-row, 6.5; length of nasals, 17.5; interorbital breadth, 7; cranial breadth, 16.

Measurements of an adult male from the type locality: (Sel. Mus. No. 2551/07). Head and body, 180 (200)[1]; tail, 190 (190); hind-foot, 40 (40); ear, 24. Cranial measurements: greatest length, 46.5 (46.5); palatal length, 21 (20.5); diastema, 13.5 (13.25); length of

[1] Measurements in parentheses those of an adult male, Sel. Mus. No. 2490/07, from the Sembrong River, East Johore.

Digitized by Google

upper molar-row, 6.7 (7); length of lower molar-row, 6.5 (7); length of palatal foramina, 6.75 (6.5); combined breadth of foramina, 4.75 (3.75); breadth of palate between anterior molars, 5 (5); medium length of nasals, 18.5 (17); interorbital breadth, 7.75 (7); cranial breadth, 17 (17.5); zygomatic breadth, 20 (20).

SPECIMENS EXAMINED.—Eight from the type locality.

REMARKS.—This insular form is strikingly characterised by the great reduction that has taken place in the crowns of the molars. The change, however, does not yet appear to have affected the roots of the teeth, although the smaller size of the molar-row, combined with the broader foramina and inter-pterygoid space, causes the palate to appear wider: the mandible also, though proportionately less robust and powerful, and with the various processes somewhat atrophied, is not reduced in length. Compensation for these diminutions has been given in the form of a larger and heavier rostrum.

MUS VILLOSUS, *sp. nov.*

TYPE.—Adult male (skin and skull), No. 1348/08, Selangor Museum. Collected in the Botanical Gardens, Singapore, 12th July, 1908, by C. Boden Kloss.

CHARACTERS.—A large member of the *Muelleri* group, externally somewhat like *Mus validus*, Miller, but smaller, duller and less shaggy, and with colour of under-parts distinctly margined on sides. Fur long and moderately soft, devoid of spines, but thickly sprinkled with long coarse bristles. The skull like that of *Mus validus* except that the audital bullæ are exceedingly large and dilated, most nearly resembling in this respect that of the smaller *Mus annandalei*, Bonh.

COLOUR.—General colour above a grizzle of black and deep buff (pale ochraceous buff), darker posteriorly owing to the prevalence of the long black-tipped bristles which are everywhere present and which attain on the rump to a length of 40 m.m. Sides and limbs paler and duller, due to the grey under-fur showing through and to the absence of dark annulations to the hairs. Top of head and face and also below eye blackish, distinctly darker than cheeks and neck. Below pure buffy-white, sharply separated from the upper-parts, extending to the wrists and to the upper lip behind and below whiskers, but not to the ankles which are like the outer side of thigh. Along the sides of the abdomen a narrow stripe about 4 m.m. broad of pure buff. Hands and feet clothed with short dark-brown hairs. In males a brown prescrotal patch. Tail stout and unicolour, black, longer than head and body. Ear rounded.

SKULL.—Skull like that of *Mus validus*, but less robust and slenderer. Audital bullæ deeper anteriorly than posteriorly: much larger, rounder and more dilated than those of any other local rat.

MEASUREMENTS.—Collector's external measurements: head and body, 222; tail, 251; hind-foot, 41; ear, 23. Cranial measurements:

Digitized by Google

greatest length, 52; basal length, 45; palatal length, 25; least palatal breadth, 4.75; diastema, 15; length of upper molar-row, 9; length of palatal foramina, 8.25; combined breadth of foramina, 3.25; median length of nasals, 20; interorbital breadth, 7; cranial breadth, 18; zygomatic breadth, 24; greatest length of bullæ, 8.5; greatest depth of bullæ from highest point in inferior edge of squamous bone, 9; anterior breadth of basi-occipital, 5 m.m.

SPECIMENS EXAMINED.—Four, all from Singapore Island.

REMARKS.—Though allied to *Mus validus* this rat may be immediately distinguished by the abruptness of the line of demarcation between the colours of the sides and abdomen. Its skull notably differs in the larger bullæ and less developed post-orbital ridges.

A PROVISIONAL LIST OF THE MAMMALS OF THE PENINSULAR REGION.

BY C. BODEN KLOSS.

THE last and most complete account of the Mammals of the Malay Peninsula previously drawn up was that of Mr. Stanley S. Flower (P.Z.S., 1900, pp. 338-351), in which about one hundred and forty species are recorded from our area. The work of naturalists during the last ten years, during which period there has been a great revival of interest in the Zoology of the Peninsula, has added considerably to the amount, which has been further increased by the discovery of a number of geographical races in the adjacent small islands that had hitherto remained unvisited, so that at the moment of writing, and disregarding reports shortly forthcoming on recent collections, the mammal fauna is now swollen to a total of nearly two hundred and twenty.

The Peninsular Region as treated here may be defined as containing the Malay Peninsula south of the Isthmus of Kra and all the small islands closely adjacent, of which the principal are:—Junkceylon, the entire Langkawi group, Penang, Pulo Jarak, Singapore, the Tioman and Tinggi chains, the Redangs and the group of islands off the Bandon Bight: but not the Rhio Archipelago, the fauna of which is more nearly related elsewhere than to the Peninsula.

ORDER PRIMATES.

APES, MONKEYS AND LEMURS.

1. Symphalangus *sp.*
2. Hylobates lar (*Linn.*).
3. Hylobates agilis, *F. Cuvier.*
4. Presbytes cristatus (*Raffles*).
5. Presbytes obscurus (*Reid*).
6. Presbytes femoralis (*Horsf.*).
7. Presbytes albocinereus (*Canior*).
8. Macaca fascicularis (*Raffles*).
9. Macaca nemestrina (*Linn.*).

9*a*. Macaca nemestrina adusta, *Miller.*

10. Macaca rufescens, *Anderson.*
11. Nycticebus malayanus (*Anderson*).

Digitized by Google

Order CARNIVORA.

CATS, CIVETS, MONGOOSES, DOGS, MARTENS, WEASELS, OTTERS AND BEARS.

12. Felis tigris, *Linn.*
13. Felis pardus, *Linn.*
14. Felis nebulosa, *Griffith.*
15. Felis marmorata, *Martin.*
16. Felis bengalensis, *Kerr.*
17. Felis temmincki, *Vig. & Horsf.*
18. Felis planiceps, *Vig. & Horsf.*
19. Viverra zibetha, *Linn.*
20. Viverra megaspila, *Blyth.*
21. Viverra tangalunga, *Gray.*
22. Viverricula malaccensis, *Gmel.*
23. Hemigale hardwickii (*Gray*).
24. Prionodon maculosus, *Blanford.*
25. Paradoxurus hermaphroditus, *Pallas.*

25*a*. Paradoxurus hermaphroditus macrodus, *Gray.*

26. Paradoxurus (hermaphroditus) milleri, *Kloss.*
27. Paradoxurus niger, *Desm.*
28. Paradoxurus minor, *Bonhote.*
29. Paradoxurus leucomystax (*Gray*).
30. Paradoxurus leucomystax robustus, *Miller.*
31. Arctogalidia leucotis, *Blyth.*
32. Arctogalidia major, *Miller.*
33. Arctictis binturong (*Raffles*).
34. Cynogale bennetti, *Gray.*
35. Herpestes mungo (*Gmel.*).
36. Herpestes brachyurus, *Gray.*
37. Herpestes javanicus (*Geoffr.*).
38. Cyon rutilans (*S. Müll.*).
39. Mustela flavigula peninsularis, *Bonhote.*
40. Putorius nudipes (*F. Cuvier*).
41. Lutra cinerea, *Illiger.*
42. Lutra sumatrana, *Gray.*
43. Lutra macrodus, *Gray.*
44. Ursus malayanus, *Raffles.*

Order UNGULATA.

ELEPHANTS, RHINOCEROSES, TAPIRS, CATTLE, GOATS, DEER, MOUSE-DEER AND PIGS.

45. Elephas maximus, *Linn.*
46. Rhinoceros sondaicus, *Cuv.*
47. Rhinoceros sumatrensis, *Cuv.*
48. Tapirus indicus, *Cuv.*
49. Bos gaurus hubbacki, *Lydekker.*
50. Bos sondaicus butleri, *Lydekker.*
51. Nemorhædus swettenhami, *Butler.*
52. Cervulus muntjac grandicornis, *Lydekker.*
53. Cervus unicolor equinus, *Cuv.*
54. Tragulus canescens, *Miller.*
55. Tragulus (canescens) umbrinus, *Miller.*
56. Tragulus (canescens) rufulus, *Miller*
57. Tragulus ravus, *Miller.*
58. Tragulus (ravus) lancavensis, *Miller.*
59. Tragulus (ravus) ravulus, *Miller.*
60. Sus jubatus, *Miller.*

60*a*. Sus (jubatus) jubatulus, *Miller.*

61. Sus peninsularis, *Miller.*

Order RODENTIA.

SQUIRRELS, RATS, BAMBOO-RATS AND PORCUPINES.

62. Petaurista melanotus, *Gray.*

62*a*. Petaurista (melanotus) terutaus, *Miller.* [1]

63. Petaurista punctata (*Gray*).
64. Iomys horsfieldi (*Waterhouse*).

[1] The validity of forms marked *a* appears to be questionable. Sub-species are indicated by trinomials but insular races have the typical specific name placed in parentheses.

Digitized by Google

SQUIRRELS, RATS, BAMBOO-RATS AND PORCUPINES—(*cont.*)

65. Iomys davisoni (*Thomas*).
66. Pteromyscus pulverulentus (*Günth.*).
67. Sciuropterus tephromelas (*Günth.*).
68. Sciuropterus spadiceus, *Blyth.*
69. Ratufa melanopepla, *Miller.*
69*a*. Ratufa (melanopepla) tiomanicus, *Miller.*
70. Ratufa affinis (*Raffles*)
71. Ratufa affinis aureiventer, (*Geoff.*).
72. Ratufa pyrsonota, *Miller.*
73. Sciurus prevosti, *Desm.*
74. Sciurus prevosti humei, *Bonhote.*
75. Sciurus hippurus, *Is. Geoffr.*
76. Sciurus castaneoventris griseopectus, *Blyth.*
76*a*. Sciurus castaneoventris rubeculus, *Miller.*
77. Sciurus erythraeus, *Pallas.*
78. Sciurus caniceps, *Gray.*
79. Sciurus (caniceps) lancavensis, *Miller.*
80. Sciurus (caniceps) adangensis, *Miller.*
81. Sciurus caniceps epomorphus, *Bonhote.*
82. Sciurus caniceps concolor, *Blyth.*
83. Sciurus bilimitatus, *Miller.*
84. Sciurus (bilimitatus) microrhynchus, *Kloss.*
85. Sciurus vittatus, *Raffles.*
86. Sciurus (vittatus) tenuirostris, *Miller.*
87. Sciurus (vittatus) permangilensis, *Miller.*
88. Sciurus (vittatus) aoris, *Miller.*
89. Sciurus tenuis, *Horsf.*
89*a*. Sciurus tenuis surdus, *Miller.*
90. Sciurus tenuis tahan, *Bonhote.*
91. Sciurus robinsoni, *Bonhote.*
92. Sciurus macclellandi novemlineatus, *Miller.*
93. Funambulus jalorensis, *Bonhote.*
94. Funambulus jalorensis peninsulæ, *Miller.*
95. Funambulus rufigenis belfieldi, *Bonhote.*
96. Rhinosciurus tupaioides, *Gray.*
97. Rhinosciurus, *sp.*
98. Rhinosciurus robinsoni, *Thomas.*
99. Hapalomys longicaudatus, *Blyth.*
100. Chiropodomys gliroides, *Blyth.*
101. Mus vociferans, *Miller.*
102. Mus (vociferans) lancavensis, *Miller.*
103. Mus (vociferans) stridens, *Miller.*
104. Mus ciliatus, *Bonhote.*
105. Mus surifer, *Miller.*
106. Mus (surifer) flavidulus, *Miller.*
107. Mus (surifer) butangensis, *Miller.*
108. Mus (surifer) microdon, *Kloss.*
109. Mus pellax, *Miller.*
110. Mus jerdoni bukit, *Bonhote.*
111. Mus cremoriventer, *Miller.*
112. Mus asper, *Miller.*
113. Mus klossi, *Bonhote.*
114. Mus inas, *Bonhote.*
115. Mus ferreocanus, *Miller.*
116. Mus validus, *Miller.*
117. Mus villosus, *Kloss.*
118. Mus annandalei, *Bonhote.*
119. Mus jalorensis, *Bonhote.*
120. Mus (jalorensis) jarak, *Bonhote.*
121. Mus (jalorensis) tiomanicus, *Miller.*
122. Mus (jalorensis) pannosus, *Miller.*
123. Mus concolor, *Blyth.*
123*a*. Mus pullus, *Miller.*
124. Mus rufescens, *Gray.*
125. Mus griseiventer, *Bonhote.*

Digitized by Google

SQUIRRELS, RATS, BAMBOO-RATS AND PORCUPINES—(*cont.*)

126. Mus decumanus, *Pallas.*
127. Mus musculus, *Linn.*
128. Gunomys varius, *Thomas.*
129. Gunomys varius varillus, *Thomas.*
130. Rhizomys sumatrensis (*Raffles*).
131. Acanthion brachyurum (*Linn.*).
132. Atherurus macrourus (*Linn.*).
133. Atherurus (macrourus) zygomaticus, *Miller.*
134. Atherurus (macrourus) tionis, *Thomas.*
135. Atherurus (macrourus) terutaus, *Lyon.*
136. Trichys lipura, *Günther.*

ORDER INSECTIVORA.

TREE-SHREWS, GYMNURAS, SHREWS AND FLYING-LEMURS.

137. Tupaia ferruginea, *Raffles.*
138. Tupaia ferruginea belangeri, *Wagn.*
139. Tupaia (ferruginea) sordida, *Miller.*
140. Tupaia (ferruginea) pulonis, *Miller.*
141. Tupaia malaccana, *Anderson.*
142. Ptilocercus lowi, *Gray.*
143. Gymnura raffllesi, *Vig. and Horsf.*
144. Hylomys suillus, *Müll. and Schleg.*
145. Crocidura murina (*Linn.*).
146. Crocidura murina cærulea (*Kerr*).
146*a*. Crocidura fuscipes, *Peters.*
147. Crocidura fuliginosa (*Blyth*).
148. Galeopterus temmincki, *Waterhouse.*
149. Galeopterus (temmincki) pumilus (*Miller*).
150. Galeopterus (temmincki) aoris (*Miller*).
151. Galeopterus (temmincki) taylori, *Thomas.*

ORDER CHIROPTERA.

BATS (152-207.)

(*Vide* post pp. 151-161.)

ORDER CETACEA.

WHALES, DOLPHINS AND PORPOISES.

208. Balænoptera indica, *Blyth.*
209. Physeter macrocephalus, *Linn.*
210. Phœcana phœcanoides, *Cuv.*
211. Orcella brevirostris (*Owen*).
212. Steno plumbeus, *Duvaumier.*
213. Sotalia sinensis (*Gmel.*).
214. Delphinus delphis (*Erxl*).

ORDER SIRENIA.

DUGONGS.

215. Halicore dugong, *Illiger.*

ORDER EDENTATA.

216. Manis javanica, *Desm.*

Digitized by Google

A LIST OF THE BATS OCCURRING IN THE PENINSULAR REGION WITH A KEY TO THE GENERA.

By C. BODEN KLOSS.

SO far as I am aware I have enumerated in the following list all the bats known to us at present from the Malay Peninsula and its islands. Whilst, however, on the one hand, further investigation may prove that two or three of the species included will have to be finally omitted, continued collecting will undoubtedly result in further additions to the fauna as we are now acquainted with it, for the geographical distribution of several species occurring in surrounding regions indicates that they should eventually be recorded from the Peninsula also, where a large extent of country, almost untouched, may still preserve forms yet undiscovered.

The keys given have been compiled with reference to Peninsular genera only. There is at present nowhere in the East any collection of Malayan bats sufficiently complete to work out upon it a key to the species.

With regard to the abbreviations used:—

(Miller) following generic titles, refers to the most recent work on the subject. "The Families and Genera of Bats," by Gerrit S. Miller, Jr., 1907.

Blanford.—"The Fauna of British India. Mammalia," by W. T. Blanford, 1891.

Dobson.—"Monograph of the Asiatic Chiroptera," by G. E. Dobson, 1876.

Fas. Mal. Zool.—"Fasciculi Malayenses," of N. Annandale and H. C. Robinson, Zoology, Part 1. Mammals.

P. A. N. S. P.—Proceedings of the Academy of Natural Sciences, Philadelphia.

P. W. A. S.—Proceedings of the Washington Academy of Science.

P. Z. S.—Proceedings of the Zoological Society of London.

A. M. N. H.—Annals and Magazine of Natural History, London.

J. A. S. B.—Journal of the Asiatic Society of Bengal.

P. A. S. B.—Proceedings of the Asiatic Society of Bengal.

J. S. B. R. A. S.—Journal, Straits Branch, of the Royal Asiatic Society.

J. F. M. S. M.—Journal of the Federated Malay States Museums.

CHIROPTERA.

KEY TO THE SUB-ORDERS.

A. Neither nose-leaf nor tragus; margin of ear forming an unbroken ring; mandible with angular process practically absent or broad and low ... ... *Megachiroptera.*

B. Either nose-leaf or tragus, or both; margin of ear interrupted at base; mandible with angular process well developed, long and narrow *Microchiroptera.*

Digitized by Google

Sub-order MEGACHIROPTERA.

Family PTEROPIDÆ.

KEY TO THE SUB-FAMILIES.

A. Tongue moderate; inner margin of nostril projecting; upper surface of mandibular symphysis forming conspicuous angle with alveolar line ... ... *Pteropinæ.*

B. Tongue very long; no projecting margin to nostril; upper surface of mandibular symphysis parallel with alveolar line ... ... *Kiodotinæ.*

Sub-family PTEROPINÆ.

KEY TO THE GENERA.

A. Neck and shoulders much more warmly coloured than rest of back: size larger, head and body much more than 150 mm. ... *Pteropus.*

B. Neck and shoulders not more brilliant than rest of back: size smaller, head and body always less than 150 mm.

a. Five upper and six lower cheek-teeth aside *Rousettas.*

b. Four upper and five lower cheek-teeth aside.

a^1. Two pairs of lower incisors ... ... *Cynopterus.*

b^1. One pair of lower incisors.

a^2. Tail present; rostrum nearly straight above ... ... *Ptenochirus*

b^2. Tail absent; rostrum strongly concave above ... ... *Megærops.*

Genus PTEROPUS (Miller, p. 56).

152. Pteropus edulis, *Geoff.*

Pteropus vampyrus, Linn.

Blanford, p. 259. Dobson, p. 20.

Throughout the Peninsular area except the islands of Tioman, Permangil and Aor.

152*a*. Pteropus nicobaricus, *Fitzinger.*

Blanford, p. 260. Dobson, p. 17.

A female Fruit-bat from Great Redang Island, off Tringanu, has been identified by Bonhote (P.Z.S., 1900, p. 875) as *P. nicobaricus*, and the species is therefore included. Further confirmation is desired. *P. condorensis*, Peters, another dark Fruit-bat, may eventually be discovered.

152*b*. Pteropus medius, *Temm.*

Pteropus giganteus, Brünnich.

Blanford, p. 257. Dobson, p. 18.

Digitized by Google

Miller (P.A.N.S.P., 1898, p. 316) doubtfully refers a young adult female from Trang to this species. Not otherwise recorded.

153. PTEROPUS (HYPOMELANUS) LEPIDUS, *Miller*.

Miller, P.W.A.S., 1900, p. 237.

Islands of Tioman, Permangil and Aor.

154. PTEROPUS (HYPOMELANUS) TOMESI, *Peters*.

Tomes, P.Z.S., 1858, p. 536.

A single male in the Selangor Museum from Pulo Rumpia, off the mouth of the Perak River, has been thus identified by Andersen.

GENUS ROUSETTAS (MILLER, p. 54).

155. ROUSETTAS AMPLEXICAUDATA (*Geoff.*).

Xantharpyia amplexicaudata, Blanford, p. 26.

Cynonycteris amplexicaudata, Dobson, p. 29.

The Peninsula.

GENUS CYNOPTERUS (MILLER, p. 47).

156. CYNOPTERUS MONTANOI, *Robin*.

Cynopterus marginatus (Geoff.); Thomas, P.Z.S., 1886, p. 73; Blanford, p. 263; Dobson, p. 24.

Cynopterus sphinx (Vahl.); Bonhote, P.Z.S., 1900, p. 875; Fas. Mal. Zool. vol. I., p. 14.

The Peninsula and Islands.

157. CYNOPTERUS ANGULATUS, *Miller*.

Miller, P.A.N.S.P., 1900, p. 316.

The Peninsula (type from Trang). Doubtfully distinct from the preceding species: smaller and projection at base of outer margin of ear pointed.

GENUS PTENOCHIRUS (MILLER, p. 51).

158. PTENOCHIRUS LUCASI (*Dobson*).

Cynopterus lucasi, Dobson, A.M.N.H., August, 1880, p. 163.

Thomas, A.M.N.H., 1898, p. 361; Bonhote, P.Z.S., 1900, p. 875.

The Peninsula and Singapore.

GENUS MEGÆROPS (MILLER, p. 51).

159. MEGÆROPS ECAUDATA (*Temm.*).

Cynopterus ecaudatus, Dobson, p. 29; Bonhote, Fas. Mal. Zool. vol. I., p. 15.

The Peninsula; Bidor, South Perak.

SUB-FAMILY KIODOTINÆ.

KEY TO THE GENERA.

A. A claw on index-finger; tail rudimentary ... *Kiodotus*.

B. No claw on index-finger; tail distinct ... *Eonycteris*.

Digitized by Google

GENUS KIODOTUS (MILLER, p. 70).

160. KIODOTUS MINIMUS (*Geoff.*).

Carponycteris minima, Blanford, p. 265.

Macroglossus minimus, Dobson, p. 34.

Bonhote, P.Z.S., 1900, p. 875; Fas. Mal. Zool. vol. I., p. 15.

The Peninsula, Patani and North Perak.

GENUS EONYCTERIS (MILLER, p. 69).

161. EONYCTERIS SPELÆA, *Dobson*.

Blanford, p. 266. Dobson, p. 33.

The Peninsula.

SUB-ORDER MICROCHIROPTERA.

KEY TO THE FAMILIES.

A. Nose-leaf absent, tragus present.

a. Second bone of middle finger folded back towards the upper surface of the wing in repose; tail perforating its membrane on the upper surface, or considerably produced beyond a much truncated membrane ... *Emballonuridæ*.

b. Second bone of middle finger extended in repose; tail contained within membrane or very little produced beyond it ... ... *Vespertilionidæ*.

B. Nose-leaf present.

a. Tragus absent ... ... *Rhinolophidæ*.

b. Tragus present ... ... *Nycteridæ*.

FAMILY EMBALLONURIDÆ.

KEY TO THE SUB-FAMILIES.

A. Tail slender, much longer than the slender legs and emerging above near the margin of the narrow membrane; index finger with two distinct joints; upper incisors weak; postorbital processes absent ... *Rhinopominæ*.

B. Tail slender, much shorter than the slender legs and emerging above near the centre of the broad membrane; index finger with no joint; upper incisors weak; postorbital processes present ... ... *Emballonurinæ*.

C. Tail stout, not shorter than the stout legs and produced far beyond the membrane, which it leaves at the margin; index finger with one indistinct joint; upper incisors strong; postorbital processes absent ... ... *Molossinæ*.

Digitized by Google

SUB-FAMILY RHINOPOMINÆ.

GENUS RHINOPOMA (MILLER, p. 81).

162. RHINOPOMA MICROPHYLLUM, *Geoff.*

Blanford, p. 351. Dobson, p. 174.

Rhinopoma hardwickii, Gray; Cantor, J.A.S.B., 1846.

The Peninsula, Ghirbi.

SUB-FAMILY EMBALLONURINÆ.

KEY TO THE GENERA.

A. Two pairs of upper and three pairs of lower incisors; size smaller, head and body less than 50 mm. ... ... *Emballonura.*

B. One pair of upper and two pairs of lower incisors; size larger, head and body more than 75 mm. ... ... *Taphozous.*

GENUS EMBALLONURA (MILLER, p. 86).

163. EMBALLONURA PENINSULARIS, *Miller.*

Miller, P.A.N.S.P., 1898, p. 323.

Bonhote, Fas. Mal. Zool., vol. I., p. 18.

? Emballonura semicaudata, Blanford, p. 345.

The Peninsula and Singapore (type from Trang).

GENUS TAPHOZOUS (MILLER, p. 93).

164. TAPHOZOUS MELANOPOGON, *Temm.*

Blanford, p. 347. Dobson, p. 167. Flower, P.Z.S., 1900, p. 349.

The Peninsula; Islands of Langkawi, Penang and Singapore.

165. TAPHOZOUS LONGIMANUS, *Hardwicke.*

Blanford, p. 348. Dobson, p. 170.

Taphozous longimanus albipennis, Thomas, A.M.N.H., ser. 7, vol. II., p. 246.

The Peninsula.

166. TAPHOZOUS SACCOLÆMUS, *Temm.*

Blanford, p. 350. Dobson, p. 172. Cantor, J.A.S.B., 1846.

The Peninsula, Penang, Singapore.

167. TAPHOZOUS AFFINIS, *Dobson.*

Dobson, A.M.N.H., 1875, p. 232.

Dobson, p. 173.

A single example from Singapore is recorded by Ridley (J.S.B.R.A.S., No. 31, p. 104).

Digitized by Google

SUB-FAMILY MOLOSSINÆ.

KEY TO THE GENERA.

A. Ears more or less united on forehead before eyes; body clothed with hair; two pairs of lower incisors ... ... *Chærephon.*

B. Ears widely separated; body essentially naked; one pair of lower incisors ... ... *Cheiromeles.*

GENUS CHÆREPHON (MILLER, p. 244).

168. CHÆREPHON PLICATUS (*Buchanan*).

Nyctinomus plicatus, Blanford, p. 354; Dobson, p. 183.

Nyctinomus tenuis, Horsf., Cantor, J.A.S.B., 1846.

The Peninsula and Singapore. ... ...

169. CHÆREPHON JOHORENSIS (*Dobson*).

Dobson, P.A.S.B., Jan., 1873. Dobson, p. 183.

A single specimen is known from South Johore.

GENUS CHEIROMELES (MILLER, p. 240).

170. CHEIROMELES TORQUATUS, *Horsf.*

Dobson, p. 177. Flower, P.Z.S., 1900, p. 350.

Peninsula; Singapore and Penang.

FAMILY VESPERTILIONIDÆ.

KEY TO THE SUB-FAMILIES.

A. Tail shorter than head and body ... ... *Vespertilioninæ.*

B. Tail not shorter than head and body ... ... *Kerivoulinæ.*

SUB-FAMILY VESPERTILIONINÆ.

KEY TO THE GENERA.

A. Only one pair of upper incisors ... ... *Pachyotus.*

B. Two pairs of upper incisors.

a. Upper and lower cheek-teeth six aside ... *Myotis.*

b. Upper and lower cheek-teeth five aside.

a^1. Fifth finger only slightly longer than the largest bone of fourth and middle fingers ... ... *Pterygistes.*

b^1. Fifth finger longer than the largest and next bone together of fourth and middle fingers.

a^2. Outer upper incisor curved backwards *Pipistrellus.*

b^2. Outer upper incisor curved outwards... *Glischropus.*

Digitized by Google

c. Upper and lower cheek-teeth four and five aside, respectively.

a^1. Skull noticeably flattened, occipital depth less than one-third greatest length; outer upper incisor level with inner ... ... *Tylonycteris*.

b^1. Skull not noticeably flattened, occipital depth more than one-third geatest length; outer upper incisor directly behind inner *Hesperoptenus*.

GENUS PACHYOTUS (MILLER, p. 219).

171. PACHYOTUS KUHLI (*Leach*).

Nycticejus kuhli, Blanford, p. 320.

Scotophilus temminckii, Dobson, p. 120.

Peninsula and Islands.

172. PACHYOTUS CASTANEUS (*Horsf.*).

Nycticejus kuhli, Flower, P.Z.S., 1900, p. 346.

Scotophilus castaneus, Bonhote, Fas. Mal. Zool., vol. I., p. 17.

Peninsula and Penang.

GENUS MYOTIS (MILLER, p. 200).

173. MYOTIS HASSELTI (*Temm.*).

Vespertilio hasselti, Blanford, p. 330; Dobson, p. 126.

The Peninsula.

174. MYOTIS ADVERSUS (*Horsf.*).

Vespertilio adversus, Blanford, p. 330; Dobson, p. 128; Hanitsch, Rep. Raffles Mus. and Libr., 1897, p. 11.

Singapore.

175. MYOTIS OREIAS (*Temm.*).

Vespertilio oreias, Dobson, Cat. Chir. B.M., p. 305.

Singapore.

176. MYOTIS MURICOLA (*Temm.*).

Vespertilio muricola, Blanford, p. 337; Dobson, p. 134.

The Peninsula, Penang and Singapore.

177. MYOTIS EMARGINATUS (*Geoff.*).

Vespertilio emarginatus, Dobson, p. 142. Bonhote, P.Z.S., 1900, p. 876.

The Peninsula, Biserat (Bonhote).

GENUS PTERYGISTES (MILLER, p. 207).

178. PTERYGISTES NOCTULA (*Schreb.*).

Vesperugo noctula, Blanford, p. 308; Dobson, p. 88.

The Peninsula and Singapore.

Digitized by Google

GENUS PIPISTRELLUS (MILLER, p. 204).

179. PIPISTRELLUS ABRAMUS (*Temm.*).

Vesperugo abramus, Blanford, p. 313; Dobson, p. 97.

The Peninsula, Jalor; Singapore; Penang.

180. PIPISTRELLUS IMBRICATUS (*Horsf.*).

Vesperugo imbricatus, Dobson, p. 93; Flower, P.Z.S., 1900, p. 34.

The Peninsula, Malacca.

181. PIPISTRELLUS TENUIS (*Temm.*).

Vesperugo tenuis, Dobson, p. 98.

Kirivoula tenuis, Cantor, J.A.S.B., 1846.

Penang.

182. PIPISTRELLUS RIDLEYI, *Thomas*.

Thomas, A.M.N.H., ser. 7, vol. I., p. 361.

Selangor (type from Kepong).

GENUS GLISCHROPUS (MILLER, p. 205).

183. GLISCHROPUS TYLOPUS (*Dobson*).

Vesperugo tylopus, Dobson, P.Z.S., 1875, p. 473. Dobson, p. 114.

The Peninsula, Jalor (Bonhote, P.Z.S., 1900, p. 876).

GENUS TYLONYCTERIS (MILLER, p. 212).

184. TYLONYCTERIS PACHYPUS (*Temm.*).

Miller, P.A.N.S.P., 1898, p. 321.

Vesperugo pachypus, Blanford, p. 307; Dobson, p. 115.

The Peninsula, Trang (Miller).

GENUS HESPEROPTENUS (MILLER, p. 211).

185. HESPEROPTENUS BLANFORDI, *Dobson*.

Vesperugo blanfordi, Dobson, J.A S.B., XLVI., p. 312; Blanford, p. 317.

The Peninsula, Selangor, Johore (Anderson, Cat. Mam. Ind. Mus., pt. 1, p. 133).

186. HESPEROPTENUS TOMESI, *Thomas*.

Thomas, A.M.N.H., ser. 7, vol. XVI., p. 575.

The Peninsula (type from Malacca).

SUB-FAMILY KERIVOULINÆ.

GENUS KERIVOULA (MILLER, p. 232).

187. KERIVOULA PICTA (*Pallas*).

Blanford, p. 339. Dobson, p. 146.

Kirivoula picta, Cantor, J.A.S.B., 1846.

The Peninsula; Penang (Cantor).

Digitized by Google

188. KERIVOULA MINUTA, *Miller.*

Miller, P.A.N.S.P., 1898, p. 321.

The Peninsula (type from Trang).

189. KERIVOULA BICOLOR, *Thomas.*

Thomas, A.M.N.H., ser. 7, vol. XIV., p. 199.

The Peninsula (type from Jalor).

FAMILY RHINOLOPHIDÆ.

KEY TO THE SUB-FAMILIES.

A. A distinct antitragus markedly separated by a notch from the outer margin of the ear; upper and hinder nose-leaf pointed; six lower cheek-teeth aside ... ... *Rhinolophinæ.*

B. A slight antitragus not separated by a notch from the outer margin of the ear; upper and hinder nose-leaf not pointed; five lower cheek-teeth aside ... ... *Hipposiderinæ.*

SUB-FAMILY RHINOLOPHINÆ.

GENUS RHINOLOPHUS (MILLER, p. 108).

190. RHINOLOPHUS MALAYANUS, *Bonhote.*

Bonhote, Fas. Mal. Zool., vol. I., p. 15.

Andersen, P.Z.S., 1905, vol. II., p. 89.

The Peninsula (type from Jalor).

191. RHINOLOPHUS STHENO, *Andersen.*

Andersen, P.Z.S., 1905, vol. II., p. 91.

The Peninsula (type from Selangor); Penang Island.

192. RHINOLOPHUS AFFINIS SUPERANS, *Andersen.*

Andersen, P.Z.S., 1905, vol. II., p. 104.

Rhinolophus affinis; Horsf. Miller, P.A.N.S.P., 1898, p. 319; Blanford, p. 274; Dobson, p. 47.

The Peninsula, Trang and Pahang (type).

193. RHINOLOPHUS REFULGENS, *Andersen.*

Andersen, P.Z.S., 1905, vol. II., p. 124.

The Peninsula, Selangor and Perak (type from Gunong Ijau).

194. RHINOLOPHUS MINOR, *Horsf.*

Blanford, p. 276; Dobson, p. 50.

The Peninsula, Batu Caves, Selangor (Thomas, A.M.N.H., ser. 7, vol. I., p. 361), Bisernt (Bonhote, Fas. Mal. Zool., vol. I., p. 16).

Digitized by Google

195. RHINOLOPHUS SEDULUS, *Andersen.*

Andersen, A.M.N.H., ser. 7, vol. XVI., p. 247.

The Peninsula, Pahang.

196. RHINOLOPHUS TRIFOLIATUS, *Temm.*

Blanford, p. 272; Dobson, p. 41; Miller, P.A.N.S.P., 1898, p. 319.

Andersen, A.M.N.H., ser. 7, vol. XVI., p. 249.

The Peninsula and Singapore.

197. RHINOLOPHUS LUCTUS, *Temm.*

Blanford, p. 270; Dobson, p. 39; Andersen, A.M.N.H., ser. 7, vol. XVI, p. 251.

The Peninsula and Singapore.

198. RHINOLOPHUS CŒLOPHYLLUS, *Peters.*

Blanford, p. 272; Dobson, p. 53.

Andersen, A.M.N.H., ser. 7, vol. XVI., p. 651.

The Peninsula, Kedah.

SUB-FAMILY HIPPOSIDERINÆ.

KEY TO THE GENERA.

A. Foremost part of nose-leaf not divided ... *Hipposideros.*

B. Foremost part of nose-leaf divided into two distinct lappets ... ... *Cœlops.*

GENUS HIPPOSIDEROS (MILLER, p. 109).

199. HIPPOSIDEROS DIADEMA (*Geoff.*).

Blanford, p. 284; Dobson, p. 64. Andersen, A.M.N.H., ser. 7, vol. XVI., p. 499.

The Peninsula, Jalor (Bonh., P.Z S., 1900), Johore (Thomas, P.Z.S., 1886), Penang (Cantor).

200. HIPPOSIDEROS ARMIGER DEBILIS, *Andersen.*

Andersen, A.M.N.H., ser. 7, vol. XVII., p. 37.

Hipposideros armiger, Hodgson; Blanford, p. 283.

Phyllorhina armigera, Dobson, p. 64.

The Peninsula (type from Province Wellesley); Penang Island (Cantor, J.A.S.B., 1846).

201. HIPPOSIDEROS GALERITUS, *Cantor.*

Cantor, J.A.S.B., 1846, p. 183; Blanford, p. 287.

Phyllorina galerita, Dobson, p. 69.

The Peninsula; Singapore and Penang (type).

Digitized by Google

202. HIPPOSIDEROS LARVATUS (*Horsf.*).

Blanford, p. 288. Miller, P.A.N.S.P., 1898, p. 319.

Phyllorhina larvata, Dobson, p. 68.

The Peninsula; Penang (Cantor, J.A.S.B., 1846).

203. HIPPOSIDEROS BICOLOR (*Temm.*).

Blanford, p. 289; Flower, P.Z.S., 1900, p. 343.

Phyllorhina bicolor, Dobson, p. 70.

The Peninsula; Penang and Singapore.

204. HIPPOSIDEROS STOLICZKANUS (*Dobson*).

Phyllorhina stoliczkana, Dobson, p. 61; Dobson, P.A.S.B., 1871, p. 106.

Penang Island (type).

GENUS CŒLOPS (MILLER, p. 113).

205. CŒLOPS ROBINSONI, *Bonhote*.

Bonhote, J.F.M.S.M., 1908, p. 4.

The Peninsula (type from Gunong Tahan).

FAMILY NYCTERIDÆ.

KEY TO THE GENERA.

A. Tail long; nose-leaf slight, consisting of a deep facial groove bordered by expansions of skin; premaxillaries present ... ... *Nycteris*.

B. Tail absent; nose-leaf distinct, long and erect; premaxillaries absent ... ... *Megaderma*.

GENUS NYCTERIS (MILLER, p. 101).

206. NYCTERIS JAVANICA, *Geoff.*

Blanford, p. 295; Dobson, p. 79.

The Peninsula, Malacca (Andersen, Cat. Mamm. Ind. Mus. pt. 1, p. 122), Jalor (Bonh., Fas. Mal. Zool. vol. I., p. 17).

GENUS MEGADERMA (MILLER, p. 103).

207. MEGADERMA SPASMA, *Linn.*

Blanford, p. 294; Dobson, p. 79.

The Peninsula; Penang and Singapore.

F.M.S. Government Press.

Digitized by Google

Digitized by Google

ON A NEW SPECIES OF *CYORNIS* FROM THE MOUNTAINS OF THE MALAY PENINSULA.

By HERBERT C. ROBINSON, C.M.Z.S., M.B.O.U.,
Director of Museums, Federated Malay States.

CYORNIS PENINSULARIS, *sp. nov.*

SIMILAR to *Cyornis oatesi* (Salvad.) from Manipur and Tenasserim and *Cyornis vivida* (Swinh.) from China and Formosa, but considerably smaller than either; female with the under tail coverts pale chestnut buff.

Adult Male.—Lores and a narrow frontal band glossy black; crown, rump and a patch behind the ear coverts shining cobalt blue; mantle, back and wing coverts very dark purplish blue; ocular region, ear coverts, chin and throat black with a purplish wash, more defined on the line separating the throat from the breast, which, with the rest of the under surface, the under wing coverts, under tail coverts and axillaries, is chestnut; primaries and secondaries black, externally edged with purplish blue on their outer webs, the inner webs of the lesser primaries and the secondaries edged with rufous buff, more clearly defined on the innermost; tail feathers black, the outer webs purplish blue; iris dark hazel; bill black; feet blackish brown.

Total length, 5.6 in. (146 mm.); wing, 3.1 in. (78 mm.); tail, 2.95 in. (75 mm.); tarsus, .69 in. (17.5 mm.); bill from gape, .62 in. (15 mm.).

Adult Female.—Lores, facial and periocular region and throat dull greyish brown, speckled with rufous and black; crown and nape greyish, the feathers of the former with darker edges, presenting a scaly appearance; back, mantle and rump brownish ochraceous, more yellowish on the rump; upper tail coverts and tail dull chestnut brown; wing coverts dull brown edged with ochraceous; primaries and secondaries blackish brown, all except the outer primaries broadly edged with yellowish brown; edge of wing and under wing coverts pale yellowish buff; axillaries greyish buff; thighs ochraceous; breast, belly and flanks greyish: the feathers of the breast in the centre edged with ochraceous buff and with a clear whitish yellow patch in the centre of the belly: under tail coverts pale chestnut buff; iris hazel; bill black; feet blackish brown.

Total length, 5.23 in. (132 mm.); wing, 2.96 in. (75 mm.); tail, 2.65 in. (68 mm.); tarsus, .65 in. (16 mm.); bill from gape, .62 in. (15 mm.).

Types.—Male and female, Telôm, Perak-Pahang boundary, South Perak, Federated Malay States, collected on 28th November, 1908, by H. C. Robinson and C. B. Kloss; only the above pair were seen though nearly a month was spent in the locality.

Digitized by Google

Except for the character of the frontal plumes this species, together with its near allies, *C. oatesi* and *C. vivida*, would seem to be best placed in the genus *Niltava*, with which it agrees in the presence of a bright patch behind the ear coverts in the male, though this is absent in the female.

THE BIRDS AT PRESENT KNOWN FROM THE MOUNTAINS OF THE MALAY PENINSULA.

By HERBERT C. ROBINSON, C.M.Z.S., M.B.O.U.,
Director of Museums, Federated Malay States.

NO connected list has up to the present been attempted of the birds inhabiting the central mountain zone of the Peninsula, though various papers dealing with detached portions of it have appeared in the last few years, which are duly noted in the Bibliography.

I have, therefore, brought together all that is known on this region basing my conclusions on the very large material now in the Selangor Museum, which, after the elimination of duplicates, amounts to over 3,000 specimens. Systematic collecting, more especially in Selangor, has been carried on during the last five years, and I think it is now fairly certain that but few if any more species remain to be discovered on the main range of the Peninsula, though, as I have stated elsewhere, it is possible that the mountains of Lakon on the N.-E. Coast may yield further novelties.

Commencing from the north of the Peninsula, it may be well to detail the various mountains that have been collected on up to date with the collectors:

1. Mountains of Trang, latitude 7° 40′ N., maximum height 3,000 ft.

   Large collections were made on these hills by Dr. W. L. Abbott, the well-known American Naturalist, in 1899, but no detailed account has ever appeared; the following new species have, however, been described from the collection by Dr. C. W. Richmond:

   Oreocichla affinis
   Æthopyga anomala
   Turdinulus granti
   Stachyris chrysops (synonym of *S. bocagei, postea*)
   Criniger sordidus (synonym of *C. ochraceus, postea*).

2. Bukit Besar, E. Coast, Malay Peninsula, latitude 6° 30′ N., maximum height 3,500 ft.

   Considerable collections were made here by Dr. N. Annandale and myself in 1901 and reported on by Mr. O. Grant. The mountain is isolated and no high level fauna occurs thereon.

Digitized by Google

3. Gunong Inas, latitude 5° 10′ N., height 5,800 ft.

A peak of the Larut range, which runs parallel to, but is not connected with, the main range.

A few mountain birds were collected here by Messrs. Yapp and Laidlaw of the Skeat Expedition and reported on by Bonhote, *loc. cit.*, but the collections were quite small.

4. Gunong Ijau; Maxwell's Hill; Larut Hills.

These peaks are the southern termination in about 4° 50′ N. of the range, of which Gunong Inas forms one of the northern summits; they have been much collected on by Wray, Hartert and Butler, and large collections therefrom are to be found in the Taiping Museum, though unfortunately they have never been properly labelled and have all been mounted and exposed to light. Collections from this region, which varies in height from 2,000-4,750 ft, have been described by Sharpe, *loc. cit.*, (1) and (2); Butler, *loc. cit.*, and Hartert, *J. für. O.*, 1891, pp. 379-407.

5. Gunong Batu Puteh, Telôm, Batang Padang mountains.

These terms cover a district in the main central range of the Malay Peninsula centering round a point in about 4° 15′ N. and ranging in altitude from about 3,500-7,000 ft.

Large collections have been made here by Wray, myself and the collectors of the Selangor Museum, and are partially described by Sharpe (3) and Grant (1).

6. Semangko Pass and neighbouring hills, 2,700-5,000 ft.

A point in the dividing range of the Peninsula between Selangor and Pahang in latitude 3° 40′ N. at a height of 2,700 ft., from which hills rise steeply on both sides to over 5,000 ft.

The bulk of the mountain collections in the Selangor Museum have been obtained in this district, which is exceptionally well situated for collecting.

7. Gunong Mengkuang Lebah and Gunong Ulu Kali.

Points in the main dividing range of the Peninsula from 4,200-5,800 ft. in latitude 3° 25′ N. *app.*

Large collections have also been made here and a few specimens are mentioned by Grant (2) *loc. cit.*

8. Ginting Bidei, 2,300 ft.

A pass on the main range about 20 miles south of Gunong Mengkuang Lebah in latitude 3° 13′ N. *app.*

A few birds were collected here by Butler and considerable series have been obtained by the Selangor Museum collectors, working from this as a centre from 1,500-4,000 ft.

9. Gunong Angsi, Negri Sembilan, 2,600-3,200 ft., latitude 2° 45′ N.

A control station on a spur south of the termination of the main dividing range.

Digitized by Google

Large collections have been made here, but no mountain forms occur.

10. Mount Ophir, borders of Malacca and Johor, latitude 2° 20′ N., 4,100 ft. high.

Wallace and Whitehead made small collections here, and several species received by Blyth from his Malacca correspondents were probably also from the vicinity. The lower slopes were favourite hunting grounds of the old Malacca trade skin hunters.

No mountain forms are known from the hill, which is quite detached.

11. Gunong Pulai, Johor, latitude 1° 35′ N., about 3,000 ft.

Much collected on by Davison for Hume, whose collections passed to the British Museum.

12. Gunong Tahan, an isolated massif on the east side of the main range, latitude 4° 45′ N., 7,150 ft. high.

Collected on by Waterstradt and myself; the respective collections described by Hartert (1) and Grant (2) *loc. cit.*

BIBLIOGRAPHY.

SHARPE, R. B.:

Notes on some Birds from Perak. *Proc. Zool. Soc. London*, 1886, pp. 350, 353. Quoted as *Sharpe* (1).

SHARPE, R. B.:

On a Second Collection of Birds formed by Mr. L. Wray on the Mountains of Perak, Malay Peninsula. *Proc. Zool. Soc. London*, 1887, pp. 431-447, pls. xxxvii-xxxviii. Quoted as *Sharpe* (2).

SHARPE, R. B.:

List of a Collection of Birds made by Mr. L. Wray on the Main Range of Mountains of the Malay Peninsula, Perak. *Proc. Zool. Soc. London*, 1888, pp. 268-281, pl. xx. Quoted as *Sharpe* (3).

HARTERT, E.:

Zur Ornithologie von Perak. *Journ. für Ornithologie*, 1889, pp. 379-407.

HARTERT, E., and BUTLER, A. L.:

Notes on Birds from Perak. *Novitates Zoologicæ*, v., pp. 506, 8. Quoted as *Hartert* and *Butler*.

BUTLER, A. L.:

Birds of the Larut Hills. *Journ. Straits Branch Roy. Asiat. Soc.*, xxxii., pp. 9-31 (1899). Quoted as *Butler*.

BONHOTE, J. L.:

On the Birds collected during the "Skeat Expedition" to the Malay Peninsula, 1899-1900. *Proc. Zool. Soc. London*, 1901 (1), pp. 537-580. Quoted as *Bonhote*.

Digitized by Google

HARTERT, E.:

On Birds from Pahang, Eastern Malay Peninsula. *Novitates Zoologicæ*, ix., pp. 537-580 (1902). Quoted as *Hartert*.

OGILVIE-GRANT, W. R.:

Report on the Birds. *Fasiculi Malayenses Zool.*, iii., pp. 65-123 (1905). Quoted as *Grant* (1).

OGILVIE-GRANT, W. R.:

Gunong Tahan Expedition, Report on the Birds. *Journ. Fed. Malay States Mus.*, iii., pp. 15-57, pls. ii., iii. (1908). Quoted as *Grant* (2).

LIST OF BIRDS.

1. *RHIZOTHERA LONGIROSTRIS*—THE LONG-BILLED PARTRIDGE.

Rhizothera longirostris (Temm.); *Grant, Cat. Birds Brit. Mus.*, xxii., p. 183 (1893).

Ginting Bidei, 2,300 ft. May, 1908.

Almost confined to bamboo jungle and not ascending the hills to more than about 3,500 ft. at the outside.

2. *ARBORICOLA CAMPBELLI*—CAMPBELL'S TREE-PARTRIDGE.

Arboricola campbelli, *Robinson* and *Grant, Ibis*, 1905, p. 165, pl. iv.; *id., Journ. Fed. Mal. States Mus.*, i., p. 126.

This very distinct Tree-partridge was originally described from a pair collected in the Telôm Valley on the borders of South Perak and Pahang at about 3,800 ft. It has since been found to be not uncommon on Gunong Mengkuang Lebah and Gunong Ulu Kali in Selangor at heights of 4,500-5,200 ft., numerous specimens having been trapped in these localities.

A half-grown bird differs from the adult in having the white malar stripe more developed and the grey feathers of the breast and sides of the abdomen broadly tipped with rufous ochraceous.

The nest and eggs were discovered on Gunong Mengkuang Lebah in March, 1907, on the ground beneath a small stemless palm. The former is a loose pad of sticks and dead leaves very flat and about six inches in diameter; the eggs, two in number, are pure white and somewhat glossy with numerous small scattered pores; they are very pointed at one end and measure A, 42 × 32 mm.; B, 42 × 31.5 mm.

3. *ROLLULUS ROULROUL*—THE CRESTED GREEN WOOD-QUAIL.

Rollulus roulroul (Scop.); *Grant, Cat.*, p. 225; *Hartert*, p. 539; *Grant* (2), p. 57.

Bukit Kutu, 3,000 ft. August; Gunong Mengkuang Lebah, 5,200 ft. April.

I can detect no tangible differences between these specimens and a pair collected in April at Tanjong Malim at the foot of the main range.

The species is common throughout the Western Malay Peninsula with the exception of the swampy littoral belt.

Digitized by Google

4. *POLYPLECTRON INOPINATUS*—ROTHSCHILD'S PEACOCK PHEASANT.

Chalcurus inopinatus, *Rothsch.*, *Bull. B.O.C.*, xiii., No. xcx., p. 41 (1903); *id.*, *Nov. Zool.*, x., pl. ii. (1903).

Polyplectron inopinatus, *Grant* (2), p. 55.

Very common both on the mountains above the Semangko Pass, 2,700-4,500 ft., and on Gunong Mengkuang Lebah and Gunong Ulu Kali, whence we have secured a considerable number of specimens. At the former locality the species breeds about January, as very young specimens and chicks just emerging from the downy stage were obtained towards the end of February.

5. *RHEINWARDTIUS NIGRESCENS*—THE OCELLATED MALAY ARGUS-PHEASANT.

Rheinwardtius ocellatus nigrescens, *Hartert*, *Nov. Zool.*, ix., p. 538; *Grant* (2), p. 56.

This species is only known from the three original specimens obtained by Waterstradt, which came from the Ulu Dong in the Lipis District of Pahang on the west side of the Pahang River, and the two secured by myself at moderate elevations on Gunong Tahan.

I do not think that it will ultimately prove to be confined to the mountains and I believe that I have heard its call, which is quite different from that of the common Argus, quite close to Kuala Lipis at not more than 300 or 400 ft. elevation.

6. *BUTRERON CAPELLEI*—THE LARGER THICK-BILLED GREEN PIGEON.

Butreron capellei (Temm.); *Salvad.*, *Cat. Birds Brit. Mus.*, xxi., p. 32 (1893); *Bonhote*, p. 76; *Hartert*, p. 539; *Grant* (1), p. 122.

One specimen was seen but not secured, flying through the Semangko Pass in February, 1908.

7. *SPHENOCERCUS ROBINSONI*—THE MALAYAN WEDGE-TAILED PIGEON.

Sphenocercus korthalsi, *Robinson* nec *Temm.*, *Journ. Fed. Malay States Mus.*, i., p. 52 (1905).

Sphenocercus robinsoni, *Grant*, *Bull. B.O.C.*, xix., No. cxxvii., p. 12 (1906); *id.* (2), p. 53.

Two ♀ specimens have been obtained in the vicinity of Ulu Kali, 5,000 ft., one of which is the female type of the species. It is distinctly difficult to obtain, as it is by no means common and flies very high while the country it frequents is very broken. A specimen from Gunong Ijau, Larut, 4,750 ft., shot on 12th September, 1908, is marked ♂ by the native collector, but has no maroon whatever on the shoulder or cinnamon on the under tail coverts, and is, therefore, probably very immature or else a female. Wing 6.5 in., tail 5.1 in.

8. SPENOCERCUS, *sp.*

The Selangor Museum possesses two skins of a *Spenocercus*, which probably represent a species allied to but distinct from *S. sphenurus*. One, an adult female, was shot on the Semangko Pass on 16th

Digitized by Google

February, 1908; while another, an immature male in moult, was obtained in Pulau Rumpia—one of the Sembilan Islands, off the mouth of the Perak River—in March, 1906. Both have the centre of the abdomen *pure white*, the under tail coverts pale chrome, broadly centred with greenish olive, and the tail greyish black tipped with paler grey.

The male has the angle of the wing maroon and indications of a dove grey collar on the hind neck. The base of the feathers on the side of the neck is rufous. Wing of female about 5.9 in.

The species is almost certainly distinct, but until more specimens are obtained I prefer not to describe it.

9. *TRERON NIPALENSIS*—THE THICK-BILLED GREEN PIGEON.

Treron nipalensis (Hodgs.); *Salvad.*, *Cat.*, p. 34; *Grant* (1), p. 122.

Semangko Pass, Selangor-Pahang border, 2,700 ft. February, March, 1904, 1908.

During February and March on dark and rainy nights, accompanied by wind, this species often flies in numbers into the window of the Rest House, which is situated in the middle of the pass with steep hills on either side. On one evening in February, 1904, thirteen were thus captured.

The species is abundant in the foot hills, especially when the *kayu ara*, a variety of fig of which it is very fond, is in fruit.

10. *OSMOTRERON OLAX*—THE LITTLE GREEN PIGEON.

Osmotreron olax (Temm.); *Grant* (1), p. 121.

♀. Semangko Pass, Selangor-Pahang border, 2,700 ft. 24th February, 1908.

Very common in the low country, but only accidental on the high hills. The specimen enumerated above flew to light together with *Ptilinopus jambu*.

11. *PTILINOPUS JAMBU*—THE PINK-HEADED FRUIT DOVE.

Ptilinopus jambu (Gm.); *Salvad.*, *Cat.*, p. 80.; *Hartert*, p. 539.

2 ♂ ♀. Semangko Pass, Selangor-Pahang border, 2,700 ft. 24th February, 1908.

Captured at light together with one female of *Osmotreron olax*.

Sporadic throughout the Peninsula, but nowhere very common.

This species seems to perform local migrations at night; besides the present specimens, I have heard of one caught at Government House, Singapore, which is situated on an eminence about 200 ft. above the sea.

12. *CARPOPHAGA BADIA*—THE COPPER-BACKED IMPERIAL PIGEON.

Carpophaga badia (Raffles); *Salvad.*, *Cat.*, p. 218; *Hartert*, p. 539.

Ducula badia, *Butler*, p. 29.

This Pigeon is exceedingly common during the greater part of the year along the ridges of the higher mountain ranges, where its loud booming note is constantly heard in the early morning. During the

Digitized by Google

fruiting of certain trees it, however, descends to the low country and the coast, and specimens have been shot among the mangroves at Tanjong Karang, Coast of Selangor (January); Dindings, Perak Coast (May); and Rantau Panjang low country, Selangor (February).

13. *MACROPYGIA LEPTOGRAMMICA*—THE LARGER MALAY CUCKOO-DOVE.

Macropygia tusalia, *Sharpe* (nec *Hodgs.*), *P.Z.S.*, 1887, p. 443.

Macropygia leptogrammica, *Salvad.*, *Cat.*, p. 341; *Grant* (2), p. 53.

Fairly common on Gunong Mengkuang Lebah and Ulu Kali, Selangor, above 5,000 ft., but known elsewhere only from one or two specimens collected by Wray on the Larut Hills.

14. *MACROPYGIA RUFICEPS*—THE LITTLE MALAY CUCKOO-DOVE.

Macropygia ruficeps (Temm.); *Salvad.*, *Cat.*, p. 360; *Butler*, p. 30; *Hartert*, p. 540; *Grant* (2), p. 53.

Very common throughout the central portion of the Peninsula from the foot of the hills to over 5,000 ft., especially in the neighbourhood of the hot springs which are not uncommon. I can detect no difference whatever between specimens from 5,000 ft. and those from 200 ft.

15. *CHALCOPHAPS INDICA*—THE BRONZE-WINGED GROUND DOVE.

Chalcophaps indica (Linn.); *Salvad.*, *Cat.*, p. 514; *Butler*, p. 30; *Bonh.*, p. 77; *Hartert*, p. 540; *Grant* (1), p. 120; *id.* (2), p. 53.

Fairly common throughout the hills, but more so at 2,000 ft. than at higher elevations. Ranges up to 4,500 ft.

16. *RALLINA SUPERCILIARIS*—THE BANDED CRAKE.

Rallina superciliaris (Eyton); *Sharpe*, *Cat. Birds Brit. Mus.*, xxiii., p. 76 (1894); *Grant* (1), p. 120.

Apparently visits the high mountains of Perak in winter; one was trapped near the Telôm River in November, 1908, two or three miles from the locality whence a specimen was secured in January, 1902.

17. *ACCIPITER GULARIS*—THE MALAYAN BESRA.

Accipiter virgatus (Temm.); *Butler*, p. 29; *Sharpe*, *Cat. Birds Brit. Mus.*, i., p. 150 (1874).

Accipiter gularis (Temm. and Schleg.); *Grant*, *Ibis*, 1896, pp. 104 *et seqq.*

♂. Gunong Mengkuang Lebah, Selangor, 5,200 ft. 3rd April, 1905.

A single very adult male in fresh plumage has the upper parts pure slate-grey; throat stripe reduced to a mere hair line under parts except throat, belly and under tail coverts which are pure white, rufous salmon; thighs rufous salmon. Wing 6.4 in., tail 4.8 in., tarsus 1.85 in.

This specimen may possibly represent a distinct mountain form bearing the same relation to *A. gularis* that *A. rufotibialis*, Sharpe, from Kina Balu does to the typical *A. virgatus*. It differs from A. rufotibialis in larger size and in the almost obsolete throat stripe.

Digitized by Google

18. *PERNIS TWEEDALII* HUME'S HONEY BUZZARD.

Pernis tweedalii, *Hume, Stray Feathers*, ix., pp. 446-448; *id., op. cit.*, x., p. 513 (1887).

♀ ad. Semangko Pass, 2,700 ft. 17th February, 1904.
♀ ad. Batu, nr. Kuala Lumpur. 6th January, 1900.
♂ imm. Maxwell's Hill, Taiping, Perak, 3,600 ft. 8th September, 1908.

This bird is very common in the more jungly parts of the country, but can only occasionally be got. It appears to be resident, whereas the other Malayan species of the genus *P. cristatus* auct is certainly migratory.

The two adult specimens agree well with Hume's plate (*loc. cit. sup.*), except that there is decidedly more black on the plumage of the lower surface. The immature male has the under surface barred with rufous buff and white; breast and upper part of the belly with dark brown shaft stripes, more marked on the breast; black throat and moustachial stripes pronounced; feathers of the sides of the neck broadly edged with rufous; crest black faintly tipped with white, lores grey.

19. *ICTINAETUS MALAYENSIS*—THE BLACK EAGLE.

Ictinaetus malayensis (Rheinw.); *Sharpe, Cat. Birds Brit. Mus.* i., p. 257 (1874); *Sharpe* (2), p. 433; *id.* (3), p. 268.

Very fairly common in the high hills, especially in Larut, but practically impossible to secure except where there are large clearings. I have seen it on almost every hill. I have spent more than a day or two upon. Not often met with in the low country.

20. *SPIZAETUS ALBONIGER*—BLYTH'S HAWK EAGLE.

Spizaetus alboniger (Blyth); *Sharpe, Cat.*, p. 271; *Butler*, p. 29; *Grant* (1), p. 114.

Very common on the Government Plantation on the Larut Hills, Perak, where it is very destructive to chickens, and also met with though more sparsely in the low country; much rarer in Selangor and Pahang.

Spizaetus limnaetus (Horsf.), mentioned by Sharpe (2), p. 433, but of which he did not examine specimens, is far more probably this species.

21. *HETEROSCOPS VULPES*—THE MOUNTAIN SCOPS OWL.

Pisorhina luciæ, *Hartert*, p. 541.

Heteroscops vulpes, *Grant, Bull. B.O.C.*, xix., No. cxxvii., p. 11 (1906); *id.* (2), p. 51.

♂. Gunong Mengkuang Lebah, 4,800 ft. 13th March, 1907.
♂ imm. Semangko Pass, 2,700-4,000 ft. 7th March, 1908.

The immature bird is in a dark brown, not rufous, phase of plumage and is devoid of the whitish outer webs to the inner scapulars.

Probably by no means rare on the higher mountains, where the hoot of a small owl is often heard, but not often obtained.

Digitized by Google

22. *GLAUCIDIUM BRODIEI* THE COLLARED PIGMY OWLET.

Glaucidium brodiei (Burton); *Sharpe, Cat. Birds Brit. Mus.*, ii., p. 212 (1875); *id.* (2), p. 434; *Grant* (2), p. 52.

Fairly common on the Semangko Pass and also on the mountains of South Perak.

23. *SYRNIUM MAINGAYI*—THE MALAYAN WOOD OWL.

Syrnium maingayi, *Hume, Stray Feathers*, vi., p. 27 (1878); *Sharpe* (1), p. 470; *Grant* (2), p. 51.

♂. Ginting Bidei, Selangor, 2,300 ft. May, 1908.

A single specimen from the above locality agrees well with Sharpe's description of the type. Wing 13.5 in.

24. *SYRNIUM NEWARENSE*—THE HIMALAYAN WOOD OWL.

Syrnium newarense (Hodgs.); *Sharpe, Cat.*, p. 281; *id.* (2), p. 434.

Besides the specimen cited by Sharpe (*supra*) from the Larut Hills, I have examined another specimen from the Waterloo Estate near Taiping, which agrees well with the specimen of *S. maingayi* noted above. In all probability all the wood owls of this type from the Malay Peninsula should be considered to belong to S. maingayi, which is at best but a sub-species of *S. indrani* or *S. newarense*.

25. *ALCEDO EURYZONA*—THE BROAD-ZONED KINGFISHER.

Alcedo euryzona (Temm.); *Sharpe, Cat. Birds Brit. Mus.*, xvii., p. 154 (1892); *Hartert*, p. 543.

Though I have never obtained a specimen, and though there are none in the Selangor Museum, I insert this bird in the list, as we constantly met with a single individual on the Semangko Pass in February, 1908, though it was so exceedingly wary that no one of our party was able to obtain it. It was also not uncommon at Kuala Teku at the foot of Gunong Tahan. There is a specimen in the Perak Museum from the vicinity of Taiping.

26. *CEYX TRIDACTYLA*—PALLA'S THREE-TOED KINGFISHER.

Ceyx tridactyla (Pall.); *Sharpe, Cat.*, p. 174.

Though abundant on deep jungle streams in the low country, birds of this genus are rare on the hills. There are two specimens in the Museum, immature and male adult, from the Semangko Pass, shot in November and February, respectively.

27. *BUCEROS RHINOCEROS*—THE RHINOCEROS HORNBILL.

Buceros rhinoceros (Linn.); *Ogilvie-Grant, Cat. Birds Brit. Mus.*, xvii., p. 352 (1892); *Butler*, p. 26; *Hartert*, p. 543.

Common in hills and low country and old jungle, but very hard to secure.

28. *DICHOCEROS BICORNIS*—THE HOMRAI HORNBILL.

Dichoceros bicornis (Linn.); *Grant, Cat.*, p. 355; *Butler*, p. 26; *Bonhote*, p. 70; *Grant* (1), p. 108.

Digitized by Google

Often seen from hill tops flying over the tops of the trees below, but not often got. More abundant in the northern half of the Peninsula.

29. *RHYTIDOCEROS UNDULATUS*—THE MALAYAN WREATHED HORNBILL.

Rhytidoceros undulatus (Shaw); *Grant, Cat.*, p. 382.

♂ ♀. Gunong Ulu Kali, Selangor, 4,800 ft. January, 1906.

Occasionally met with in flocks of up to ten or twelve individuals, but rare.

30. *ANORRHINUS GALERITUS*—THE BUSHY-CRESTED HORNBILL.

Anorrhinus galeritus (Temm.); *Grant, Cat.*, p. 391; *Butler*, p. 26; *Grant* (2), p. 48.

Semangko Pass, 2,700 ft. February, 1904, 1908.
Ginting Bidei, 2,300 ft. May, 1908.

A characteristic hill bird, which, though not ascending very high on the mountains, is not found in the plains; common in the above localities.

31. *BERENICORNIS COMATUS*—THE LONG-CRESTED HORNBILL.

Berenicornis comatus (Raffles); *Grant, Cat.*, p. 423.

We have no very recent or exactly localised specimens of this magnificent Hornbill in the Selangor Museum. It is quite common in the State, but keeps to very high jungle, feeds on high trees and flies very high, and is, therefore, not an easy bird to procure. Crossing the Semangko Pass in a motor car in December, 1908, we observed near a summit a flock of nine or ten adult and immature birds perched in a tree near the road. They appeared quite undisturbed at our approach.

32. *RHINOPLAX VIGIL*—THE HELMETED HORNBILL.

Rhinoplax vigil (Forst.); *Grant, Cat.*, p. 427; *Butler*, p. 26; *Grant* (1), p. 108.

Also fairly common.

33. *NYCTIORNIS AMICTUS*—THE VERMILION-BEARDED BEE-EATER.

Nyctiornis amictus (Temm.); *Sharpe, Cat. Birds Brit. Mus.*, xvii., p. 90 (1893); *Butler*, p. 29; *Hartert*, p. 544; *Grant* (2), p. 49.

Common nearly everywhere, in fairly open jungle, up to about 3,500 ft. on the main range of the Peninsula, most abundant at from 1,000-1,500 ft.

34. *LYNCORNIS TEMMINCKI*—GOULD'S EARED NIGHT-JAR.

Lyncornis temminckí (Gould.); *Hartert, Cat. Birds Brit. Mus.*, xvi., p. 606 (1892); *Hartert*, p. 544.

Not so common in the hills as in the low country, but generally to be met with on the Semangko Pass, where its peculiar note tect-ta-bu is constantly heard.

Digitized by Google

35. *CAPRIMULGUS JOTAKA*—THE JUNGLE NIGHT-JAR.

Caprimulgus jotaka (Temm. and Schleg.); *Hartert, Cat.*, p. 552; *Grant* (1), p. 107.

Caprimulgus indicus jotaka, *Butler*, p. 28.

Semangko Pass, 2,700 ft. February, 1906.

Telôm, Perak-Pahang border, 3,500 ft. January and November.

Possibly resident throughout the year on the mountains. In the lowlands and on the islands of the Straits of Malacca it is met with only in the winter months, when it is abundant.

36. *COLLOCALIA INNOMINATA*—HUME'S SWIFTLET.

Collocalia innominata (Hume); *Hartert, Cat.*, p. 503.

Semangko Pass, Selangor-Pahang boundary, 2,700 ft. February, 1904, 1906.
Gunong Mengkuang Lebah, Selangor, 4,800-5,200 ft. March, 1907.

Very widely distributed throughout the State of Selangor from the mangrove swamps on the coast to the tops of the highest mountains: but, together with other species of *Cypselidæ*, commonest at the Semangko Pass.

These specimens may not impossibly represent *C. gigas*, Hartert, collected by Butler on the Semangko Pass. At the moment I have not access either to authentic specimens or to the description so prefer to record them as *C. innominata* with the description of which they perfectly agree.

37. *COLLOCALIA LINCHI*—HORSFIELD'S SWIFTLET.

Collocalia linchi (Horsf. and Moore); *Hartert, Cat.*, p. 508; *Butler*, p. 27.

Semangko Pass, Selangor-Pahang boundary, 2,700 ft. February, 1906.

Equally common with *C. innominata* at the above locality, but not met with elsewhere in the State. Abundant on the Larut range near Taiping.

38. *CHÆTURA GIGANTEA*—THE MALAYAN SPINE-TAIL SWIFT.

Chætura gigantea (Temm.); *Hartert, Cat.*, p. 475; *Butler*, p. 27; *Grant* (2), p. 46.

Very numerous, both at Ginting Bidei and at the Semangko Pass in the early mornings and on cloudy afternoons during and after rain.

39. *CHÆTURA INDICA*—THE INDIAN SPINE-TAIL SWIFT.

Chætura indica (Hume); *Hartert, Cat.*, p. 475.

A male shot by Mr. A. L. Butler at the Semangko Pass in November, 1900, has the loral spot clear white, while two other from the same locality obtained in February and May have indications of the same, though in one case they are very faint. The Perak Museum also possesses a specimen of *Ch. indica* shot in the neighbourhood of Taiping.

Digitized by Google

I am inclined to think that, while *Ch. gigantea* is the resident form, *Ch. indica* migrates south in winter, while possibly interbreeding also takes place.

40. *CHÆTURA COCHINCHINENSIS*—THE INDO-CHINESE SPINE-TAIL SWIFT.

Chætura cochinchinensis (Oust.); *Hartert, Cat.*, p. 491; *id., Ibis*, 1896, p. 491.

Chætura klaesii (Buttik.); *Hartert, Cat.*, p. 491 (synonym).

Semangko Pass, 2,700 ft. November, 1900. A. L. Butler [c].
Ditto, February, 1908.

This very distinct species differs from the other large Spine-tail Swifts in its smaller size, wing 7.0-7.3 in., its smoke-grey throat, clearly differentiated from the rest of the under parts and in having the centre of the back pale whitish brown. It is by far the most abundant species of its genus on the Semangko Pass, and is also known from Larut, Perak.

41. *CHÆTURA LEUCOPYGIALIS*—THE WHITE RUMPED SPINE-TAIL SWIFT.

Chætura leucopygialis (Blyth); *Hartert, Cat.*, p. 490; *Butler*, p. 27.

♀. Semangko Pass, 2,700 ft. May, 1902.

Rare in Selangor or perhaps easily overlooked. The above specimen is the only one in the Selangor Museum. As noted by Butler, its flight is not nearly so swift or direct as that of its larger congeners, more resembling that of *Collocalia*.

42. *CYPSELUS PACIFICUS*—THE LARGE WHITE-RUMPED SWIFT.

Cypselus pacificus (Lath.); *Hartert, Cat.*, p. 448.

Very common at the Semangko Pass in February, 1908, and also at Kuala Lumpur during rainy, windy weather in October, 1907. Hitherto its occurrence in the Peninsula has rested on a specimen c^1 of the British Museum Catalogue obtained by Cantor in Penang.

43. *TACHORNIS INFUMATA*—THE EASTERN PALM-SWIFT.

Tachornis infumata (Sclat.); *Hartert, Cat.*, p. 467; *Grant* (1), p. 107.

Semangko Pass, Selangor-Pahang boundary, 2,700 ft. February, 1908.

Fairly common, but not so abundant as the two species of *Collocalia* that fly with it.

44. *MACROPTERYX LONGIPENNIS*—THE CRESTED TREE-SWIFT.

Macropteryx longipennis (Rafin.); *Hartert, Cat.*, p. 514; *Butler*, p. 28; *Sharpe* (3), p. 278; *Grant* (2), p. 47.

♀. Bukit Kutu, Ulu Selangor, 3,000 ft. August, 1902.
2 ♀. Semangko Pass, Selangor-Pahang boundary, 2,700 ft. February, 1908.

Ranging as high as 5,000 ft. *Macropteryx comata* (Temm.) has not yet been met with at any elevation on the Selangor main range, though common among the foot hills.

Digitized by Google

45. *MACROPTERYX COMATA*—THE TUFTED TREE-SWIFT.

Macropteryx comata (Temm.); *Hartert, Cat.*, p. 517; *Sharpe* (3), p. 278; *Butler*, p. 28; *Hartert*, p. 544; *Grant* (2), p. 47.

Only accidental on the hills, not ascending them nearly so high as *M. longipennis*, but very common along their bases.

TROGONIDÆ.

46. *PYROTROGON ERYTHROCEPHALUS*—THE RED-HEADED TROGON.

Pyrotrogon (Harpactes) erythrocephalus (Gould.); *Grant, Cat. Birds Brit. Mus.*, xvii., p. 488 (1892); *Sharpe* (3), p. 280; *Butler*, p. 28; *Grant* (1), p. 106.

Common on the main range of mountains from 3,000 ft. upwards, but not met with as yet on Gunong Tahan.

47. *PYROTROGON NEGLECTUS*—THE MALAYAN TROGON.

Harpactes diardi (Temm.); *Grant, Cat.*, p. 432 (*partim ex Malacca and Sumatra*).

Pyrotrogon neglectus, *Forbes* and *Robinson, Bull. Liverpool Mus.*, ii., p. 34 (1900); *Hartert*, p. 544.

By no means common anywhere, except quite in the south of the Peninsula. The Selangor Museum possesses specimens from low elevations only.

48. *PYROTROGON DUVAUCELI*—THE RED RUMPED TROGON.

Harpactes duvauceli (Temm.); *Grant, Cat.*, p. 491; *Sharpe* (1), p. 353; *Butler*, p. 28; *Bonhote*, p. 70.

Pyrotrogon duvauceli, *Hartert*, p. 544; *Grant* (1), p. 106.

Recorded by Butler (*loc. cit.*) from as high as 3,500 ft. on the Larut Hills. Quite the commonest of the family in the low country.

49. *PYROTROGON ORESCIUS*—THE YELLOW-BREASTED TROGON.

Pyrotrogon (Harpactes) orescius (Temm.); *Grant, Cat.*, p. 494; *Sharpe* (3), p. 280; *Grant* (1), p. 106; *id.* (2), p. 45.

♀. Ginting Bidei, Selangor, 2,300 ft. May, 1908.

By no means common and apparently inhabiting a somewhat restricted zone from about 2,000-4,000 ft.

CUCULIDÆ.

50. *SURNICULUS LUGUBRIS*—THE DRONGO CUCKOO.

Surniculus lugubris (Horsf.); *Shelley, Cat. Birds Brit. Mus.*, xix., p. 227 (189); *Hartert*, p. 544; *Grant* (1), p. 106; *id.* (2), p. 45.

♂ ad. Semangko Pass, Selangor-Pahang boundary, 2,700 ft. February, 1904.
♂ ad. „ „ „ 1908.
♀ pull. „ „ 24th February, 1908.

The last-mentioned chick was found in the nest of a Flycatcher—*Cryptolopha butleri*, Hartert—built under an overhanging bank, and the

Digitized by Google

male foster-parent was shot while in attendance. The youngster is clothed throughout with black feathers very broadly tipped with white, less so on the back.

51. *HIEROCOCCYX BOCKI*—WARDLAW-RAMSAY'S HAWK CUCKOO.

Hierococcyx bocki (Wardl.-Rams.); *Shelley, Cat.*, p. 234.

I include this species in the Peninsular list on the strength of a mounted specimen from the Larut Hills in the Taiping Museum, which, I am assured by Mr. Wray, the late Curator, was so identified by Dr. Sharpe. *H. sparverioides* also occurs in the winter months in the low country.

52. *HIEROCOCCYX FUGAX*—HORSFIELD'S HAWK CUCKOO.

Hierococcyx fugax (Horsf.); *Shelley, Cat.*, p. 236; *Sharpe* (2), p. 442.

I have not myself met with this species in the Malay Peninsula, but it was very abundant on Pulau Jemor—a small islet in the Straits of Malacca—in November, 1906, together with several other migratory Cuckoos.

53. *CUCULUS POLIOCEPHALUS*—THE SMALL CUCKOO.

Cuculus poliocephalus (Lath.); *Shelley, Cat.*, p. 255; *Blandford, Faun. Brit. Ind. Birds*, iii., p. 209 (1895).

♂ ad. Gunong Ulu Kali, Selangor, 4,800-5,800 ft. February, 1906.

♀ ad. Semangko Pass, Selangor-Pahang boundary, 2,500 ft. February, 1908.

Shelley and Blandford (*loc. cit. supra*) both state that this species is found in the Malay Peninsula, but I do not know on what specimens their statement is founded. No recent collector has met with the species, and there are no specimens from the Malay Peninsula in the Hume collection in the British Museum. The species is almost certainly a migrant remaining for a very short time on the mountains of the Peninsula, as is the case with several other birds.

54. *CACOMANTIS MERULINUS*—THE RUFOUS-BELLIED CUCKOO.

Cacomantis merulinus (Scop.); *Shelley, Cat.*, p. 268; *Bonhote*, p. 74; *Hartert*, p. 545; *Grant* (1), p. 105.

♀. Ginting Bidei, Selangor, 2,300 ft. May, 1908.

Common in the low country from December to May, but not often found in the hills.

55. *CENTROPUS SINENSIS*—THE CROW PHEASANT.

Centropus sinensis (Steph.); *Shelley, Cat.*, p. 343; *Bonhote*, p. 74; *Grant* (1), p. 105.

♂. Ginting Bidei, Selangor, 2,300 ft. May, 1908.

The Crow Pheasants in the Malay Peninsula are usually found in waste ground or in stretches of country overgrown with coarse lalang grass (*Imperatora koenigi*). They are, therefore, not met with as a

Digitized by Google

rule on the hills, which are covered with primary jungle, but at Ginting Bidei there happens to be a small patch of lalang, the site of a former bungalow, in which this bird was shot.

56. *RHOPODYTES TRISTIS*—THE LARGE GREEN-BILLED MALKOHA.

Rhopodytes tristis (Less.); *Shelley, Cat.*, p. 386; *Bonhote*, p. 75; *Hartert*, p. 545; *Grant* (1), p. 103.

♂. Semangko Pass, Selangor-Pahang boundary, 2,700 ft. February, 1908.
♀. Telôm, Batang Padang, South Perak, 3,500 ft. October, 1904.
♂. „ „ „ November, 1908.

The form of *Rhopodytes tristis* inhabiting the mountains of the Malay Peninsula is probably subspecifically distinct from the typical race from India differing in its smaller size. Wing 5.9 in. against 6.5 in., tarsus 1.35 in. against 1.55. in. However, in the absence of specimens for comparison of *R. tristis* from India and the northern parts of the Peninsula, where it is common in the lowlands, and of *R. elongatus* (S. Müll.) from Sumatra, I prefer not to separate the present race, which will probably be found to be intermediate between the two above-mentioned species.

57. *RHOPODYTES SUMATRANUS*—THE SUMATRAN GREEN-BILLED MALKOHA.

Rhopodytes sumatranus (Raffles); *Shelley, Cat.*, p. 391; *Hartert*, p. 545; *Grant* (2), p. 43.

Common on Gunong Tahan up to about 4,000 ft., but not met with on other mountains at any elevation.

58. *ZANCLOSTOMUS JAVANICUS*—THE LESSER RED-BILLED MALKOHA.

Zanclostomus javanicus (Horsf.); *Shelley, Cat.*, p. 380; *Bonhote*, p. 75; *Hartert*, p. 545; *Grant* (1), p. 104; *id.* (2), p. 44.

♂. Bukit Kutu, Ulu Selangor, 3,000 ft. August, 1902.
♂. Ginting Bidei, Selangor, 2,300 ft. May, 1908.

Sparsely distributed from sea level to 5,000 ft., but commonest about 3,000 ft. Usually met with in bamboo jungle.

59. *UROCOCCYX ERYTHROGNATHUS*—THE GREATER RED-BILLED MALKOHA.

Urococcyx erythrognathus (Hartl.); *Shelley, Cat.*, p. 398; *Bonhote*, p. 76; *Grant* (1), p. 104; *id.* (2), p. 44.

Bukit Kutu, Ulu Selangor, 3,000 ft. August, 1902.

Of only accidental occurrence in the mountains.

CAPITONIDÆ.

60. *CALORHAMPHUS HAYI*—THE BROWN BARBET.

Calorhamphus hayi (J. E. Grey); *Shelley, Cat. Birds Brit. Mus.*, xix., p. 51 (1891); *Butler*, p. 25; *Hartert*, p. 546; *Grant* (2), p. 43.

Ginting Bidei, 2,300 ft. May.

Digitized by Google

Very common in low country jungle, but becoming much scarcer in the mountains up to 3,000 ft., above which it does not occur.

61. *CHOTORHEA CHRYSOPOGON*—THE GOLD-WHISKERED BARBET.

Chotorhea chrysopogon (Temm.); *Shelley, Cat.*, p. 57; *Butler*, p. 25; *Bonhote*, p. 72; *Grant* (1), p. 103; *id.* (2), p. 43.

Bukit Kutu, Selangor, 3,000 ft. August, 1902.

Distribution similar to the preceding species, but much scarcer.

62. *CHOTORHEA VERSICOLOR*—THE MANY-COLOURED BARBET.

Chotorhea versicolor (Raffles); *Shelley, Cat.*, p. 59; *Grant* (1), p. 103.

Megalæma versicolor, *Sharpe, P.Z.S.*, 1888, p. 280.

Rare on the mountains and not abundant anywhere.

63. *CYANOPS OORTI*—MÜLLER'S BARBET.

Cyanops oorti (Müller); *Shelley, Cat.*, p. 71; *Butler*, p. 25; *Hartert*, p. 546; *Grant* (2), p. 43.

Megalæma oorti, *Sharpe* (2), p. 442.

Common on the mountains of the main range from Northern Perak to the Semangko Pass. Also on the Larut Hills and Gunong Tahan, but not descending below 3,000 ft.

64. *CYANOPS RAMSAYI*—RAMSAY'S GOLDEN-THROATED BARBET.

Cyanops ramsayi (Wald.); *Shelley, Cat.*, p. 70; *Sharpe* (2), p. 442; *Bonhote*, p. 73; *Hartert*, p. 546; *Grant* (2), p. 43.

Distribution identical with the preceding.

65. *CYANOPS MYSTACOPHANES*—THE GAUDY BARBET.

Cyanops mystacophanes (Temm.); *Shelley, Cat.*, p. 72; *Bonhote*, p. 73; *Grant* (1), p. 102.

♀. Ginting Bidei, 2,300 ft. May, 1908.

Also from Rantau Panjang in the Selangor low country, but much commoner in the northern parts of the Peninsula.

66. *MESOBUCCO DUVAUCELI*—THE CRIMSON-EARED BARBET.

Mesobucco duvauceli (Less.); *Shelley, Cat.*, p. 85; *Butler*, p. 24; *Grant* (1), p. 101.

Bukit Kutu, Selangor, 3,000 ft. August, 1902.

Sporadic, but fairly common in the low country wherever met with. All six specimens before me have the ear coverts strongly washed with verditer blue. They need comparison with typical *M. duvaucceli* and with *M. cyanotis*, which is only a sub-species, from Tenasserim.

Digitized by Google

67. *PSILOPOGON PYROLOPHUS*—THE FIRE-TUFTED BARBET.

Psilopogon pyrolophus (S. Müll.); *Shelley, Cat.*, p. 98; *Butler*, p. 24; *Sharpe* (1), p. 352; *id.* (2), p. 442; *Grant* (1), p. 101; *id.* (2), p. 43.

Distribution similar to *C. oorti* and *ramsayi*, except that it does not occur on Gunong Tahan and ranges lower down the hills to about 2,200 ft. Exceedingly common wherever met with.

INDICATORIDÆ.

68. *INDICATOR MALAYANUS*—THE MALAY HONEY GUIDE.

Indicator archipelagicus (Temm.); *Shelley, Cat. Birds Brit. Mus.*, xix., p. 4 (1891) (*partim.*)

Indicator malayanus, *Sharpe, P.Z.S.*, 1878, pp. 794, 795 (Malacca); *Hume, Stray Feathers*, viii., p. 155 (Klang).

A single female specimen of a Honey Guide was shot in the vicinity of a bee's nest at Ginting Bidei, 2,300 ft., on 13th May, 1908, by one of the Museum collectors.

Like the type of the species from Malacca and Hume's bird from Klang, the present specimen lacks the yellow shoulder spot present in both sexes of *I. archipelagicus*, so that the Peninsular form may well be regarded as distinct under Sharpe's name *I. malayanus*.

The bird before me, which is perfectly adult, agrees fairly well with the type description, but has the breast strongly washed with dull greyish and is decidedly small. Wing 3.4 in. against 3.9 in.

PICIDÆ.

69. *GECINUS RODGERI*—RODGER'S GREEN WOODPECKER.

Gecinus chlorolophus, *Hargitt, Cat. Birds Brit. Mus.*, xviii., pp. 60, 62 (part. specimen v''') (1890); *Sharpe* (2), p. 443.

Gecinus rodgeri, *Hartert* and *Butler*, p. 508; *Butler*, p. 23; *Grant* (2), p. 42.

Common on the hills of the Peninsula from 3,000-5,000 ft. from Larut to Gunong Mengkuang Lebah, but not on Gunong Tahan. Numerous specimens are in the Selangor Museum from Semangko Pass, Gunong Ulu Kali and Gunong Mengkuang Lebah.

70. *GECINUS PUNICEUS OBSERVANDUS*—THE CRIMSON-WINGED GREEN WOODPECKER.

Gecinus puniceus (Horsf.); *Hargitt, Cat.*, p. 64; *Sharpe* (3), p. 279.

Gecinus puniceus observandus, *Hartert, Nov. Zool.*, iii., p. 542; *id., t.c.*, ix., p. 547; *Grant* (1), p. 101; *id.* (2), p. 41.

Common throughout the State, except in the mangrove swamps, extending up the hills to about 3,000 ft., where it meets and is replaced by the succeeding species.

There are specimens in the Selangor Museum from the Semangko Pass and Ginting Bidei, besides numerous lowland localities.

Digitized by Google

71. *GECINUS ROBINSONI*—THE BLACK-CAPPED WOODPECKER.

Gecinus robinsoni, *Grant, Bull. B.O.C.*, xix., No. c., xxvii., p. 10 (1906); *id.* (2), p. 42.

The types of this Woodpecker, whose nearest ally is Gecinus occipitalis which occurs in Tenasserim, were obtained on Gunong Tahan between 5,300 and 6,000 ft., and up to the present remain unique. The species will, however, not improbably be found on the high mountains in the vicinity of Temongoh, where the Kelantan, Perak and Pahang frontiers converge.

72. *GAUROPICOIDES RAFFLESI*—RAFFLE'S THREE-TOED WOODPECKER.

Gauropicoides rafflesi (Vig.); *Hargitt, Cat.*, p. 132; *Grant* (1), p. 100; *id.* (2), p. 41.

A local species, not as a rule ascending the hills to any great elevation, and commoner in the southern half of the Peninsula.

73. *GECINULUS VIRIDIS*—THE GREEN BAMBOO PECKER.

Gecinulus viridis, Blyth; *Journ. Asiat. Soc. Bengal*, 1862, p. 341; *Hargitt, Cat.*, p. 136 (1890); *Robinson, Journ. Fed. Malay States Museums*, ii., p. 76, No. 306 (1908).

MALE.—General colour above golden olive green, yellower on the sides of the occiput and nape; crown of head and nape rich scarlet, the feather greenish at their bases; rump and upper tail coverts flecked with scarlet, beneath duller olive green; primaries and secondaries dull brown; the outer webs margined with olive green, more broadly on the secondaries, the inner webs with large white spots; axillaries and under wing coverts dusky, with buffy white spots; tail feathers blackish brown, the outer webs fringed with olive, and the inner webs with buffy white spots; shafts black; iris chestnut; tarsi and feet plumbeous green; bill livid bluish grey, whiter at the tip.

FEMALE.—Similar to the male, but with the crown and nape yellowish olive.

IMMATURE.—Three very immature males from Ginting Bidei, shot in April and May, have the whole under surface brownish black, greyer on the throat and faintly washed with olive green on the belly and flanks; upper surface olive green without the golden tinge of adult birds; head greyish brown, the feathers broadly tipped with golden olive, the occipital region more or less strongly washed with scarlet; the rump in all three specimens flecked with scarlet.

SPECIMENS EXAMINED.—Fifteen, Semangko Pass, 2,700-4,500 ft. (February); Tanjong Malim, 500 ft. (April); Ginting Bidei, 2,300 ft. (April and May); Telôm, Perak-Pahang boundary, 3,800 ft. (November).

This Woodpecker appears to be not uncommon on the lower slopes of the Selangor and South Perak Main Range throughout almost its entire length, but seems hitherto to have escaped notice, which is

Digitized by Google

probably due to the fact that it is exclusively confined to dense bamboo jungle which is almost impenetrable and exceedingly unpleasant to collect in, owing to the immense number of large and venomous mosquitoes which frequent it. The only other place within Peninsular limits, from which this species has been recorded, is Kossoum near Tongkah, so that the present localities are an extension in range southwards of over 500 miles.

74. *PYRRHOPICUS PORPHYROMELAS*—THE MALAY BAY WOODPECKER.

Lepocestes porphyromelas (Boie); *Hargitt, Cat.*, p. 382; *Sharpe* (2), p. 443; *Sharpe* (3), p. 279; *Grant* (2), p. 40.

Has a very wide range in altitude from the swamp jungle near the coast almost to the tops of the highest peaks of the main range, but nowhere very common.

In habits it is similar to its congener, keeping on or near the ground. Found in every locality visited on the main range.

75. *PYRRHOPICUS PYRRHOTIS*—THE RED-EARED BAY WOODPECKER.

Lepocestes pyrrhotis (Hodgs.); *Hargitt, Cat.*, p. 380; *Sharpe* (3) p. 279.

In the Malay Peninsula, this species, so far as is at present known, is confined to the mountains of the main range above 4,000 ft. from Telôm in Batang Padang on the north to Gunong Mengkuang Lebah to the south.

The Selangor Museum possesses specimens from the latter locality and from the hills above the Semangko Pass, where the bird was not uncommon, being found in fairly dense undergrowth, usually on fallen timber.

76. *MIGLYPTES TUKKI*—THE BUFF-NECKED BARRED WOODPECKER.

Miglyptes tukki (Less.); *Hargitt, Cat.*, p. 388; *Sharpe* (3), p. 279; *Butler*, p. 24; *Hartert*, p. 547.

Very common up to 3,000 ft., but not higher.

77. *MIGLYPTES GRAMMITHORAX*—THE FULVOUS-RUMPED BARRED WOODPECKER.

Miglyptes grammithorax (Malh.); *Hargitt, Cat.*, p. 385; *Sharpe* (2), p. 443; *Butler*, p. 23; *Hartert*, p. 547.

Occurring with the preceding and about equally common.

78. *MICROPTERNUS BRACHYURUS*—THE MALAY RUFOUS WOODPECKER.

Micropternus brachyurus (Vieill.); *Hargitt, Cat.*, p. 396; *Sharpe* (3), p. 279; *Bonhote*, p. 72; *Hartert*, p. 547; *Grant* (1), p. 99; *id.* (2), p. 41.

Usually found near cultivation or in secondary jungle, feeding on ants or tree termites, and rarely in high forest. A pair from the Semangko Pass differ in no way from lowland birds.

Digitized by Google

79. *CHRYSOPHLEGMA MALACCENSE*—THE BANDED RED WOODPECKER.

Chrysophlegma malaccense (Lath.); *Hargitt, Cat.*, p. 122; *Sharpe* (2), p. 442; *Bonhote*, p. 71; *Grant* (1), p. 100; *id.* (2), p. 41.

Chrysophlegma miniatus malaccensis, *Hartert*, p. 546.

Specimens are in the Selangor Museum from Telôm, Perak-Pahang boundary, 4,000 ft.; Semangko Pass, 2,700 ft.; and Gunong Angsi, Negri Sembilan, 2,600 ft. They appear indistinguishable from others obtained in the low country at heights not exceeding 500 ft.

80. *CHRYSOPHLEGMA HUMII*—HUME'S GOLDEN-NAPED WOODPECKER.

Chrysophlegma humii, *Harg., Cat.*, p. 126; *Butler*, p. 23; *Hartert*, p. 546; *Grant* (1), p. 100; *id.* (2), p. 41.

Another low country and submontane form reaching 3,000 ft. on the main range at the Semangko Pass, above which it is replaced by *C. wrayi*. Found on Gunong Tahan at 3,000 ft. by myself and at 4,000 ft. by Waterstradt in the same locality, where, however, *C. wrayi* does not occur.

81. *CHRYSOPHLEGMA WRAYI*—WRAY'S GOLDEN-NAPED WOODPECKER.

Chrysophlegma wrayi, Sharpe; *Hargitt, Cat.*, p. 130, pl. ii.; *Sharpe* (3), p. 279; *Bonhote*, p. 71; *Grant* (1), p. 100.

This fine species of Woodpecker is confined to the mountains of the Peninsula and does not occur below 3,000 ft. It is not found on the isolated range of Gunong Tahan, nor does it occur at Ginting Bidei, Gunong Ulu Kali, being the most southerly recorded locality. Wherever met with it is a common species frequenting good-sized jungle trees in pairs. It is very restless, and at the least alarm takes to flight, emitting a harsh scream or yell similar to that of the English Green Woodpecker (*Gecinus viridis*).

A female by dissection in the Selangor Museum (189/08), shot on the Semangko Pass on 25th February, 1908, is assuming the plumage of the male, having the basal portions of the feathers of the chocolate malar stripe lemon-yellow.

82. *CHRYSOCOLAPTES VALIDUS*—THE ORANGE-BACKED WOODPECKER.

Chrysocolaptes validus (Temm.); *Hargitt, Cat.*, p. 458; *Bonhote*, p. 72; *Grant* (1), p. 99; *id.* (2), p. 99.

Rare on the mountains.

83. *HEMICERCUS SORDIDUS*—THE GREY AND BUFF WOODPECKER.

Hemicercus sordidus (Eyton); *Hargitt, Cat.*, p. 482; *Hartert*, p. 547; *Grant* (1), p. 98.

An immature male obtained at Ginting Bidei, 2,300 ft., in October, 1907, appears to represent the maximum elevation at which the species occurs in the Peninsula. It is fairly common in the low country, especially in bamboo jungle.

Digitized by Google

84. *PICUMNUS INNOMINATUS*—THE SPECKLED PICULET.

Picumnus innominatus (Burton); *Hargitt, Cat.*, p. 550; *Sharpe* (2), p. 443.

Vivia innominata (Burton); *Butler*, p. 24.

Three specimens obtained at a height of 4,500 ft. on the hills above the Semangko Pass are the only ones obtained in the Malay Peninsula, with the exception of the two recorded by Sharpe and Butler from the Larut Hills. At elevations of from 3,000-5,000 ft. the species is probably not very uncommon, but, owing to the fact that it frequents the tops of high trees, is very difficult either to see or obtain.

85. *SASIA ABNORMIS EVERETTI*—THE MALAYAN RUFOUS PICULET.

Sasia everetti, *Hargitt, t.c.*, p. 559, pt. xv.; *Hartert*, p. 547.*

Sasia abnormis (Temm.); *Sharpe* (3), p. 279.

A submontane bird, widely but sparingly distributed throughout the Peninsula up to about 3,000 ft. Found among low trees and brushwood frequently, perching transversely on the boughs, not longitudinally like other Woodpeckers.

I have followed Hartert in adopting the name of the Bornean form for the species, which differs from the continental race in having a somewhat larger and more robust bill.

An immature female from the low country near Tanjong Malim, obtained in April, 1908, precisely resembles the figure of the type, an unsexed specimen from Lumbidan, Borneo, obtained by Sir Hugh Low.

EURYLÆMIDÆ.

86. *CALYPTOMENA VIRIDIS*—THE GREEN GAPER.

Calyptomena viridis (Raffles); *Sclat., Cat. Birds Brit. Mus.*, xiv., p. 456 (1888); *Hartert*, p. 548.

Ginting Bidei, 2,300 ft. May, 1908.

Common everywhere in the low country, especially in old secondary jungle. It does not appear to range far into the mountains, and the above elevation seems to be the greatest definitely recorded, though Waterstradt's birds from Gunong Tahan (*Hartert, loc. cit.*) are labelled 2,000-5,000 ft.

87. *PSARISOMUS DALHOUSIÆ*—THE LONG-TAILED BROADBILL.

Psarisomus dalhousiæ (Jameson); *Sclater, Cat.*, p. 458 (1888); *Butler*, p. 23; *Grant* (2), p. 38.

Common on the Semangko Pass at about 3,000 ft., though on Gunong Tahan it was met with as low as 500 ft. The only other recorded localities in the Peninsula are the Larut Hills, 3,500 ft., and Telôm, South Perak, 3,500 ft.

* Waterstradt is stated to have obtained the species on Gunong Tahan at from 5,000-7,000 ft., but I think that some mistake has probably taken place in the labelling. It was probably secured much lower down the range.

Digitized by Google

88. *SERILOPHUS ROTHSCHILDI*—ROTHSCHILD'S BROADBILL.

Serilophus rothschildi, *Hartert* and *Butler*, *Bull. B.O.C.*, vii., No. liv., p. 50 (1898); *id.*, *Nov. Zool.*, v., p. 508; *Butler*, p. 22; *Robinson*, *antea*, p. 77, No. 331.

MALE.—Forehead and anterior part of the crown bluish grey, darkening to dull brownish grey on the occiput and mantle; back, rump and upper tail coverts chestnut, duller on the back; starting from in front of the eye and reaching as far as the hind neck a glossy black superciliary streak, broadening posteriorly, the feathers somewhat elongate; loral region dark grey; ear coverts grey with a tinge of brown; a white ring round the eye; under surface silvery grey, bluish on the breast and white on the centre of the abdomen and under tail coverts; tibial feathers glossy black; tail feathers black, all but the two centre pairs broadly tipped with white and with a narrow edging of white, extending some distance up the outer webs; primaries glossy black, the innermost narrowly tipped with chestnut on their inner webs with a speculum of greyish blue on the outer webs, and another white one on the inner webs, extending just beyond the shafts; the primaries, secondaries and tertiaries broadly tipped with white which extends some distance up the shafts, the white tips succeeded by an ill-defined band of greyish blue; remaining primaries, with the terminal portion of the shaft, white and very narrowly tipped with blue; secondaries similar to the inner primaries, but a much broader band of chestnut on the inner web; tertials chestnut, blackish basally; wing coverts glossy black, the lesser ones along the angle of the wing dark bluish grey; under wing coverts black; axillaries white.

"Iris greenish brown, mottled with golden specks; eyelid and base of mandible for about $\frac{1}{8}$ in. bright gamboge yellow; bill pale bluish white, tip and lateral edges whitish; feet pale greenish chrome; claws milky blue."—(*A. L. Butler*).

Total length, 62 in. (158 mm.); wing, 3.5 in. (89 mm.); tail, 2.6 in. (65 mm.); tarsi, .75 in. (19 mm.); bill culmen, .62 in. (16 mm.); bill gape, .93 in. (24 mm.).

FEMALE.—Similar to the male, but with a gorget, interrupted mesially, on the lower neck, formed by glistening white tips to the feathers.

IMMATURE MALE (half grown).—Almost identical with the adult male, but with the occiput browner and the chestnut on the tertials less developed; legs in dried skin pale yellowish, not dark greenish.

One of the most noticeable features in birds of this genus is the curious form of the outer primaries, which are abruptly truncated at the tip with the shaft extended for about $\frac{1}{5}$ in., forming a sharp point.

SPECIMENS EXAMINED.—Five, Ginting Bidei, Selangor, 2,300 ft. (May and November), from bamboo jungle.

Until these specimens were obtained in November, 1907, this very beautiful species was known only from the three original specimens obtained by Mr. Butler on the Larut Hills between 2,500 and 3,500 ft.

Digitized by Google

in February and March, 1898. That it has not been obtained more frequently is probably due to the fact that it is largely confined to bamboo jungle, which, as mentioned previously, is difficult and unpleasant to collect in.

89. *EURYLÆMUS JAVANICUS*—HORSEFIELD'S BROADBILL.

Eurylæmus javanicus (Horsf.); *Sclater, Cat.*, p. 463; *Hartert*, p. 548.

Bukit Kutu, Ulu Selangor, 3,000 ft. August, 1902.

Usually found on the foot hills, and not extending to greater elevation than the above.

90. *CORYDON SUMATRANUS*—THE DUSKY BROADBILL.

Corydon sumatranus (Raffles); *Sclater, Cat.*, p. 466; *Sharpe* (3), p. 278; *Hartert*, p. 548; *Grant* (2), p. 39.

Bukit Kutu and Semangko Pass, 2,700-3,500 ft.

Not found higher than the above limit, and much commoner on the lower hills, 500-1,000 ft.

HIRUNDINIDÆ.

91. *HIRUNDO GUTTURALIS*—THE EASTERN SWALLOW.

Hirundo gutturalis, Scop.; *Sharpe, Cat. Birds Brit. Mus.*, x., p. 134 (1885); *Sharpe* (2), p. 442; *Butler*, p. 20.

Fairly common everywhere to considerable altitudes, especially in the winter months when young birds are in the great majority.

MUSCICAPIDÆ.

92. *HEMICHELIDON FULIGINOSA*—THE SOOTY FLYCATCHER.

Hemichelidon siberica (Gm.); *Sharpe, Cat. Birds Brit. Mus.*, iv., p. 120 (pt.) (1879); *Butler*, p. 18.

The Sooty Flycatcher occurs in migration in the mountains of the Peninsula on migration, but is not abundant, and does not remain long. Specimens are in the Selangor Museum from Semangko Pass, 3,000 ft. (January); Bukit Kutu, 3,000 ft. (December); Tanjong Malim, 1,300 ft. (April).

93. *HEMICHELIDON FERRUGINEA*—THE FERRUGINOUS FLYCATCHER.

Hemichelidon ferruginea, Hodgs.; *Sharpe, Cat.*, p. 132; *Butler*, p. 18; *Hartert*, p. 548; *Grant* (1), p. 95.

A migratory species like the preceding, but much commoner and apparently making a longer stay if not actually resident. The Selangor Museum possesses specimens from most localities visited on the main range, dated from October to March, and Waterstradt collected it at from 2,000-5,000 ft. on Gunong Tahan, where I did not myself meet with it in July. It has not yet been met with in the lowlands of the Peninsula itself, but I secured one specimen on the Aroa Islands—a small group of low islands in the Straits of Malacca, about 25 miles off the Sumatran Coast—in November.

Digitized by Google

94. *ALSEONAX LATIROSTRIS*—THE BROWN FLYCATCHER.

Alseonax latirostris (Raffles); *Sharpe, Cat.*, p. 127; *Butler*, p. 19; *Grant* (1), p. 94.

A winter visitor to the Peninsula. Specimens in the Selangor Museum are dated from November to February.

95. *CYORNIS CONCRETA*—THE WHITE-TAILED BLUE FLYCATCHER.

Pachycephala cyanea (Hume); *Gadow, Cat. Birds Brit. Mus.*, viii., p. 224 (1883).

Niltava leucoprocta (Tweedd.); *Sharpe* (3), p. 272.

Cyornis concretus (Müll.); *Hartert*, p. 549; *Grant* (2), p. 37.

Another characteristic bird of the mountain bamboo jungle. I have before me seven skins from Ginting Bidei, collected in November and May, and a single male from the Semangko Pass, shot in April. Evidently a rare and local species, as besides these specimens only three others on record from the Malay Peninsula. I regard the occurrence of the species at as low an elevation as 500-1,000 ft. on Gunong Tahan (*Grant, loc. cit.*) as purely accidental.

96. *CYORNIS MALAYENSIS*—THE MALAY BLUE AND CHESTNUT FLYCATCHER.

Cyornis malayensis, *antea*, p. 163.

♂ ♀. Telôm, Perak-Pahang boundary, 3,500 ft. November, 1908.

Will probably be found along the whole length of the main range above 3,000 ft.

97. *CYORNIS UNICOLOR INFUSCATA*—THE PALE BLUE FLYCATCHER.

Siphia unicolor infuscata (Blyth); *Hartert*, p. 215.

Siphia unicolor, *Sharpe, Cat.*, p. 446.

Four specimens before me (♂ ♀, Ginting Bidei, October and May; ♂, Bukit Arang, Selangor, 500 ft.; ♀, Gunong Tahan, 3,300 ft., June) agree with Dr. Hartert's remarks on the subject, in that the males are of small size (wing, 76-87 mm.) and very brightly coloured.

98. *CYORNIS TICKELLIÆ*—TICKELL'S BLUE FLYCATCHER.

Siphia tickelliæ (Blyth); *Sharpe, Cat.*, p. 447.

Cyornis tickelliæ, *Butler*, p. 18.

Fairly abundant at the Semangko Pass in February and at Ginting Bidei in May. From the latter locality young birds in mottled plumage were obtained, so that the breeding season is probably in April.

99. *NITIDULA HODGSONI*—THE PIGMY BLUE FLYCATCHER.

Tarsiger hodgsoni (Moore); *Sharpe, Cat.*, p. 258.

Nitidula hodgsoni, *Butler*, p. 18.

Two males shot on the hills above the Semangko Pass in February, 1908, and Butler's specimen from 4,500 ft. on the Larut Hills are the only records for the Malay Peninsula.

Digitized by Google

100. *ANTHIPES MALAYANA*—THE MALAY WHITE GORGETED FLYCATCHER.

Digenea malayana, *Sharpe* (3), p. 247; *Butler*, p. 18; *Grant* (2), p. 37.

Anthipes malayana, *Sharpe* (3), pp. 247, 272.

Distribution in the Peninsula as *Muscicapula westermanni*. Common above 4,000 ft. in low scrub.

101. *NILTAVA GRANDIS DECIPIENS*—THE MALAYAN NILTAVA.

Niltava grandis, Hodgs.; *Sharpe* (1), p. 351; *id.* (2), p. 436; *id.* (3), p. 272; *Hartert* and *Butler*, p. 507; *Butler*, p. 19.

Niltava decipiens, *Salvad.*, *Ann. Mus. Civ. Gen.* (2), xii., p. 49 (1892); *Grant* (1), p. 94; *id.* (2), p. 37.

Niltava grandis decipiens, *Hartert*, p. 551.

Exceedingly common amongst low scrub on all the hills above about 3,500 ft.

102. *ERYTHROMYIAS MUELLERI*—THE SHORT-TAILED FLYCATCHER.

Erythromyias muelleri (Blyth); *Sharpe, Cat.*, p. 200; *Hartert*, p. 551.

Ginting Bidei, 2,300 ft. October.
Semangko Pass, 2,700-4,500 ft. February.

This species occurs at low altitudes within a few miles of Kuala Lumpur, and has also been found dead on the beach at Kuantan on the East Coast (Pahang) after a heavy storm, so that it is not impossibly migratory.

103. *POLIOMYIAS LUTEOLA*—THE ORANGE-BREASTED FLYCATCHER.

Poliomyias luteola (Pall.); *Sharpe, t.c.*, p. 201; *Grant* (1), p. 94.

Bukit Kutu, 3,000 ft. November, 1898.
Semangko Pass, 2,700 ft. November, 1900.

The two specimens recorded above, both collected by Butler, and two adult males from Telôm are very much more intense in colouration than individuals of the same sex collected on Pulau Terutau—an island off the West Coast of the Peninsula, about 80 miles north of Penang—in December, 1907.

104. *MUSCICAPULA WESTERMANNI*—THE LITTLE MALAY PIED FLYCATCHER.

Muscicapula westermanni, *Sharpe, P.Z.S.*, 1888, p. 280; *Butler*, p. 52; *Hartert*, p. 551; *Grant* (2), p. 38.

Fairly common on all the hills of the main range, on the Larut Range and on Gunong Tahan, above 4,000 ft., but not descending lower.

Digitized by Google

105. *MUSCICAPULA MALAYANA*—THE MALAYAN RUFOUS-BREASTED BLUE FLYCATCHER.

Muscicapula malayana, *Grant, Bull. B.O.C.*, xix., No. cxxvii., p. 10 (1906); *id.* (2), p. 38.

Muscicapula hyperythra, *Sharpe* (3), p. 270; *Hartert*, p. 552.

The only locality in Selangor for this Flycatcher is Gunong Mengkuang Lebah, 4,800-5,200 ft., where it is common. The general distribution in the Peninsula is the same as that of the preceding species, except that the present form has not yet been met with on the Larut Hills.

106. *GERYGONE MODIGLIANII*—MODIGLIANI'S FLYCATCHER.

Gerygone modiglianii, *Salvad., Ann. Mus. Civ. Gen.* (2), xii., p. 71 (1891); *Hartert*, p. 552

Gerygone pectoralis, *Davison, Ibis*, 1892, p. 99; *Sharpe, Bull. B.O.C.*, ii., p. 7 (1892).

Two specimens only, are on record from the Malay Peninsula: the type of *G. pectoralis* from the Coast of Pahang near Pekan, and Waterstradt's skin from Gunong Tahan, 2,000-5,000 ft.

107. *CYANOPTILA BELLA*—HAY'S FAIRY FLYCATCHER.

Xanthopygia cyanomelæna (Temm.); *Sharpe, Cat.*, p. 249.

Four birds—an adult and two immature males, collected by Mr. A. L. Butler on Bukit Kutu, Ulu Selangor, 3,000 ft., and an adult male from Pulau Terutau, north of Penang, shot in March—appear to be the only specimens of this migratory bird hitherto obtained in the Peninsula.

108. *HYPOTHYMIS AZUREA*—THE AZURE FLYCATCHER.

Hypothymis azurea (Bodd.); *Sharpe, Cat.*, p. 274; *Hartert*, p. 552; *Grant* (1), p. 94; *id.* (2), p. 37.

Three thousand feet is about the superior limit of this species, which is very common in the low country.

109. *RHIPIDURA ALBICOLLIS*—THE WHITE THROATED FAN-TAIL FLYCATCHER.

Rhipidura albicollis (Vieill.); *Sharpe, Cat.*, p. 317; *Sharpe* (2), p. 435; *Hartert* and *Butler*, p. 507; *Butler*, p. 19; *Grant* (1), p. 92; *id.* (2), p. 37.

Rhipidura atrata, *Salvad., Ann. Mus. Civ. Gen.*, xiv., p. 203 (1879); *Hartert*, p. 552.

Common everywhere above 3,000 ft., but difficult to obtain in good plumage.

I have followed Grant in not recognising *R. atrata*, Salvad., described from the mountains of Sumatra and based mainly on the wider white tips to the tail feathers as distinct.

Digitized by Google

110. *TERPSIPHONE AFFINIS*—THE BURMESE PARADISE FLYCATCHER.

Terpsiphone affinis (Blyth); *Sharpe, Cat.*, p. 349; *Sharpe* (3), p. 270; *Butler*, p. 19; *Hartert*, p. 553; *Grant* (2), p. 37.

Adult specimens in white plumage are in the collection from Ginting Bidei, shot in May, and also numerous examples in the chestnut plumage, amongst which may be included *T. incii*, which, however, is a migrant and does not probably occur in the Peninsula so late in the spring.

About 3,500 ft. represents the superior limit of the species, specimens having been obtained at that height at Telôm in the Batang Padang highlands, South Perak.

111. *PHILENTOMA VELATUM*—THE MAROON-BREASTED FLYCATCHER.

Philentoma velatum (Temm.); *Sharpe, Cat.*, p. 365; *Sharpe* (3), p. 271; *Hartert*, p. 553; *Grant* (2), p. 36.

Bukit Kutu, August, and Ginting Bidei, May.

Not met with above 3,500 ft.

112. *PHILENTOMA PYRRHOPTERUM*—THE CHESTNUT-WINGED FLYCATCHER.

Philentoma pyrrhopterum (Temm.); *Sharpe, Cat.*, p. 366; *Sharpe* (3), p. 271; *Hartert*, p. 553.

Ginting Bidei. October.

Altitudinal range as in the two preceding species.

113. *RHINOMYIAS PECTORALIS*—SALVADORI'S FLYCATCHER.

Rhinomyias pectoralis (Salvad.); *Sharpe, Cat.*, p. 368; *Hartert*, p. 553; *Grant* (2), p. 35.

Specimens from Tanjong Malim, South Perak, at the foot of the main range are in the Selangor Museum.

114. *CULICICAPA CEYLONENSIS*—THE GREY-HEADED FLYCATCHER.

Culicicapa ceylonensis (Swains.); *Sharpe, Cat.*, p. 369; *Sharpe* (3), p. 271; *Butler*, p. 19; *Hartert*, p. 553.

Bukit Kutu, Semangko Pass and Ginting Bidei.

A submontane bird, rare in the low country, but not ascending the hills to more than 3,000 ft.

115. *CRYPTOLOPHA TRIVIRGATA*—STRICKLAND'S FLYCATCHER WARBLER.

Cryptolopha trivirgata (Strickl.); *Sharpe, Cat.*, p. 396; *id.* (2), p. 435; *id.* (3), p. 271; *Hartert*, p. 553; *Grant* (2), p. 36.

Gunong Mengkuang Lebah, 4,800-5,200 ft.

Not as a rule below 4,000 ft., but fairly common on most mountains above that elevation.

Digitized by Google

116. *CRYPTOLOPHA BUTLERI*—BUTLER'S FLYCATCHER WARBLER.

Cryptolopha butleri, *Hartert, Bull. B.O.C.*, vii., No. liv., p. 50 (1898); *id., Ibis*, 1898, p. 435; *id., Nov. Zool.*, v., p. 508 (1898).

♂, 2 ♀. Semangko Pass, 3,000-4,000 ft. February, 1898.

The type specimen was collected on Gunong Ijau on the Larut Range at about 4,000 ft. and remained unique until the above three specimens were obtained. The nest was also secured among roots and rubbish beneath an overhanging bank at the side of a path; it was the usual deep cup-shaped structure characteristic of the smaller Fly-catchers and contained a nestling of the Drongo Cuckoo (*Surniculus lugubris*). The male parent was shot in the immediate vicinity of the nest.

117. *CRYPTOLOPHA DAVISONI*—DAVISON'S FLYCATCHER WARBLER.

Cryptolopha davisoni, *Sharpe, P.Z.S.*, 1888, p. 271; *Grant* (2), p. 35.

Gunong Mengkuang Lebah, 4,800 ft. March, 1907.

In company with *C. trivirgata*, but much rarer.

118. *ABRORNIS SCHWANERI*—THE BAMBOO FLYCATCHER WARBLER.

Cryptolopha schwaneri (Blyth); *Sharpe, Cat.*, p. 403; *id., in Whitehead's Kinabalu*, p. 214 (1892).

Semangko Pass, 3,000 ft. February; Ginting Bidei, 2,300 ft. October and May.

Common in bamboo jungle in the above localities, but hitherto overlooked.

The main distinction between this species and the closely allied *Abrornis superciliaris* from Tenasserim lies in the *greyish black*, not brown lores, and in the greater extent of the grey crown.

The specimen of *A. superciliaris* in the British Museum referred to by Oates (Faun. Brit. Ind. Birds, i., p. 430) requires re-examination. If the identification is correct, there is probably some mistake in locality as it is in the highest degree unlikely that any bird of the genus occurs in the island.

119. *STOPAROLA THALASSINOIDES*—THE MALAYAN VERDITER FLYCATCHER.

Stoparola thalassinoides (Cab.); *Sharpe, Cat.*, p. 439; *id.* (3), p. 271; *Hartert*, p. 553.

1 ♂. Semangko Pass. February, 1908.

Apparently somewhat rare and local in the Malay Peninsula. The only other specimens in the Selangor Museum are: one shot by Mr. A. L. Butler at Kuala Lumpur in March, 1900, and one from Telôm, November, 1908.

Digitized by Google

CAMPOPHAGIDÆ.

120. *ARTAMIDES LARUTENSIS*—THE MOUNTAIN CUCKOO SHRIKE.

Artamides larutensis, *Sharpe, P.Z.S.*, 1887, p. 435.

Graucalus larutensis (Sharpe); *Butler*, p. 18; *Hartert*, p. 554: *Grant* (2), p. 35.

Fairly common, replacing *G. sumatrensis* (S. Müll.) above 3,000 ft.

121. *LALAGE CULMINATA.*

Lalage culminata (A. Hay); *Sharpe, Cat. Birds Brit. Mus.*, iv., p. 104 (1879); *Bull. B.O.C.*, i., No. 2, p. vii. (1892).

Campophaga minor, *Davison, Ibis*, 1892, p. 99.

Lalage fimbriata culminatus, *Hartert, Nov. Zool.*, ix., pp. 556, 557 (1902).

Gunong Tahan.

122. *PERICROCOTUS FLAMMIFER*—DAVISON'S SCARLET MINIVET.

Pericrocotus flammifer, Hume; *Sharpe, Cat.*, p. 74; *Butler*, p. 17; *Grant* (1), p. 90.

Very common on the Semangko Pass up to 3,000 ft., but very rare in the low country, where, however, it is occasionally met with.

123. *PERICROCOTUS FRATERCULUS*—THE BURMESE SCARLET MINIVET.

Pericrocotus fraterculus, Swinh.; *Sharpe, Cat.*, p. 73 (1870).

Pericrocotus speciosus fraterculus, *Butler*, p. 17; *Hartert*, p. 555.

The specimens from Gunong Ijau, 1,500-3,500 ft., and Gunong Tahan, 3,000 ft., are the only ones from the Malay Peninsula, with which I am acquainted; I have not met with the species myself, nor is it represented in the Selangor, Perak or Singapore Museums.

124. *PERICROCOTUS MONTANUS*—WRAY'S MINIVET.

Pericrocotus montanus, *Salvad., Ann. Mus. Civ. Gen.*, xiv., p. 205 (1879); *Hartert*, p. 554; *Grant* (1), p. 91; *id.* (2), p. 34.

Pericrocotus wrayi, *Sharpe* (3), p. 269, pl. xv.; *Butler*, p. 17; *Bonhote*, p. 60.

Exceedingly common on all the Selangor mountains above 3,000 ft., becoming scarcer above 4,500 ft.

PYCNONOTIDÆ.

125. *ÆTHORHYNCHUS LAFRESNAYEI*—THE GREAT IORA.

Æthorhynchus lafresnayei (Hartl.); *Sharpe, Cat. Birds Brit. Mus.*, vi., p. 14 (1881); *Grant* (1), p. 88.

Bukit Kutu, 3,000 ft., and Ginting Bidei, 2,300 ft.

Not very rare in certain localities, but seldom procured, as it keeps to the tops of fairly high trees. There is a series of six specimens in the Selangor Museum, including lowland localities close to Kuala Lumpur.

Digitized by Google

126. *CHLOROPSIS HARDWICKII*—THE ORANGE-BELLIED GREEN BULBUL.

Chloropsis hardwickii, Jard. and Selby.; *Sharpe, Cat.*, p. 18; *Grant* (1), p. 89.

Semangko Pass, Gunong Ulu Kali and Gunong Mengkuang Lebah.

Fairly abundant in the above localities, usually not below 4,000 ft. In Perak it occurs on the Larut Hills and in the Batang Padang Highlands at similar elevations. It has not yet been collected on Gunong Tahan, but doubtless occurs there.

127. *CHLOROPSIS ZOSTEROPS*—THE MALACHITE-SHOULDERED GREEN BULBUL.

Chloropsis zosterops, Vig.; *Sharpe, Cat.*, p. 24; *Grant* (2), p. 33.

Chloropsis viridis viriditectus, *Hartert, Nov. Zool.*, ix., pp. 212, 557 (1902).

Mr. Butler collected a pair on Bukit Kutu, 3,000 ft., in November, 1898, but it has not since been met with on the mountains in Perak and Selangor. It occurs up to 3,300 ft. on Gunong Tahan.

128. *CHLOROPSIS ICTEROCEPHALA*—THE YELLOW-HEADED GREEN BULBUL.

Chloropsis icterocephala (Less.); *Sharpe, Cat.*, p. 30; *Butler*, p. 14; *Hartert*, p. 557.

Semangko Pass and Ginting Bidei.

Not reaching more than 3,000 ft. The commonest species of the Genus in the Malay Peninsula.

129. *CHLOROPSIS CYANOPOGON*—THE BLUE-WHISKERED GREEN BULBUL.

Chloropsis cyanopogon (Temm.); *Sharpe, Cat.*, p. 32; *Hartert*, p. 557.

Ginting Bidei, 2,300 ft. May, 1908.

The range of this species is similar to *C. icterocephala*, but it is decidedly scarcer.

130. *IRENA CYANEA*—THE MALAYAN FAIRY BLUE BIRD.

Irena cyanea, Begbie; *Sharpe, Cat.*, p. 179; *Butler*, p. 14; *Hartert*, p. 557; *Grant* (1), p. 88; *id.* (2), p. 33.

Very common at low elevations, becoming scarcer on the hills and disappearing at 3,000 ft.

131. *HEMIXUS CINEREUS*—THE ASHY BULBUL.

Hemixus cinereus (Blyth); *Sharpe, Cat.*, p. 52; *Bonhote*, p. 61; *Hartert*, p. 557; *Grant* (1), p. 88; *id.* (2), p. 32.

Common on almost every mountain visited in the Malay Peninsula from Bukit Besar (2,500 ft.) near Patani in the north to Mount Ophir in the south.

Digitized by Google

The types of the species and of Iole terricolor, Hume, founded on worn specimens are stated to have come from near Malacca, but are probably from the slopes of the Mount Ophir. The species is, however, said to occur near sea level in Johore. Its superior limit is about 4,200 ft.

132. *HEMIXUS MALACCENSIS*—THE STREAKED BULBUL.

Hemixus malaccensis (Blyth); *Sharpe, Cat.*, p. 52; *Hartert*, p. 559; *Grant* (1), p. 88; *id.* (2), p. 33.

Ginting Bidei, 2,300 ft. October.

Decidedly rare north of Malacca on the W. Coast, the above specimen being the only one I have seen from Selangor. Common on Gunong Tahan.

133. *IOLE OLIVACEA*—THE OLIVE BULBUL.

Iole olivacea, Blyth; *Sharpe, Cat.*, p. 55; *Butler*, p. 15; *Hartert*, p. 558; *Grant* (1), p. 87.

Ginting Bidei, 2,300 ft. May, 1908.

Not found on the mountain beyond 2,500 ft., but fairly numerous in thick jungle on the foot hills. The specimens before me (seven in number) are very typical and show no approach to *Iole virescens*, which has been recorded from Tonka in the north of the Peninsula.

134. *IOLE PERACENSIS*—THE MOUNTAIN STREAKED BULBUL.

Iole tickelli peracensis, *Hartert* and *Butler*, *Nov. Zool.*, v., p. 506 (1898); *Butler*, p. 15; *Hartert*, p. 558.

Iole peracensis, *Grant* (1), p. 87; *id.* (2), p. 32.

Iole tickelli, *Sharpe* (2), p. 437; *Bonhote*, p. 61.

Very common on most mountains above 2,500 ft. Does not occur south of Selangor.

135. *MICROPUS MELANOLEUCUS*—THE BLACK AND WHITE BULBUL.

Microtarsus melanoleucus (Eyton); *Sharpe, Cat.*, p. 69; *Grant* (2), p. 32.

A single specimen was collected on Bukit Kutu by Butler in November, 1898. It has been met with on Gunong Tahan as high as 6,000 ft., and is common on the Selangor Coast throughout the year.

136. *CRINIGER TEPHROGENYS*—THE LOWLAND CRESTED BULBUL.

Criniger tephrogenys (Jard. and Selby.); *Sharpe, Cat.*, p. 71, *foot-note*; *Hartert*, p. 558; *Grant* (1), p. 86; *id.* (2), p. 31.

Ginting Bidei, 2,300 ft. May, 1908.

Common from the sea coast to about 2,500 ft., above which its place is taken by *C. ochraceus* (Moore).

Digitized by Google

137. *CRINIGER OCHRACEUS*—THE UPLAND CRESTED BULBUL.

Criniger ochraceus, Moore; *in Horsf.* and *Moore, Cat. B. Mus., E. I. Co.*, i., p. 252; *Hartert*, p. 559; *Grant* (2), p. 35.

Criniger gutturalis, *Sharpe, Cat.*, p. 80; *Butler*, p. 24.

Criniger sordidus, *Richmond, Proc. U.S. Nat. Mus.*, xxii., p. 320 (1900).

Fairly common from 2,000-4,000 ft., replacing the lowland *C. tephrogenys*, but found at sea level on Pulau Langkawi, north of Penang.

138. *CRINIGER FINSCHII*—FINSCH'S BULBUL.

Criniger finschii, Salvad.; *Sharpe, Cat.*, p. 84, pl. vi., fig. 1; *Hartert*, p. 560.

Normally a low country form. The Selangor Museum possesses specimens from the vicinity of Kuala Lumpur and from Tanjong Malim, Perak. Met with by Waterstradt on Gunong Tahan from 2,000-5,000 ft.

139. *TRACHYCOMUS OCHROCEPHALUS*—THE YELLOW-CROWNED BULBUL.

Trachycomus ochrocephalus (Gm.); *Sharpe, Cat.*, p. 93; *id.* (3), p. 272.

Though this bird is exceedingly common on the banks of the big rivers, it is never, so far as my experience goes, met with in deep jungle. There is, therefore, probably some mistake in the labelling of the specimen recorded by Sharpe as from the Batang Padang mountains.

140. *ALOPHOIXUS PHÆOCEPHALUS*—THE CRESTLESS WHITE-THROATED BULBUL.

Criniger phæocephalus (Hartl.); *Sharpe, Cat.*, p. 74.

Alophoixus phæocephalus (Hartl.); *Faun. Brit. Ind.*, i., p. 259 (1889); *Hartert*, p. 560.

Ginting Bidei, 2,300 ft. October, 1907.

Somewhat local and not extending far up the hills.

141. *TRICHOLESTES CRINIGER*—THE HAIRY-BACKED BULBUL.

Tricholestes criniger (Blyth); *Sharpe, Cat.*, p. 89; *Butler*, p. 14; *Hartert*, p. 560; *Grant* (1), p. 86; *id.* (2), p. 31.

Bukit Kutu and Ginting Bidei.

Common; found as high as 3,000 ft.

142. *PYCNONOTUS FINLAYSONI*—FINLAYSON'S STRIPE-THROATED BULBUL.

Pycnonotus finlaysoni, Strickl.; *Sharpe, Cat.*, p. 144; *Butler*, p. 15; *Bonhote*, p. 62; *Hartert*, p. 560; *Grant* (1), p. 85.

One specimen from Semangko Pass, 2,700 ft., another from Tanjong Malim at the foot of the main range, and a third from Kuala Lumpur are the only records of this species from the State of Selangor. North of the latitude of Taiping it is very abundant, probably extending somewhat further to the south on the East Coast. It is stated to be common in Malacca, whence Hume's collectors obtained numerous specimens.

Digitized by Google

143. *PYCNONOTUS SIMPLEX*—MOORE'S OLIVE BULBUL.

Pycnonotus simplex (Less.); *Sharpe, Cat.*, p. 153, pl. ix., *Butler*, p. 15; *Bonhote*, p. 62; *Hartert*, p. 560; *Grant* (1), p. 86; *id.* (2), p. 31.

Ginting Bidei. May, 1908.

Common everywhere in secondary and old jungle up to 3,000 ft.

144. *OTOCOMPSA FLAVIVENTRIS*—THE BLACK-CRESTED YELLOW BULBUL.

Otocompsa flaviventris (Tick.); *Sharpe, Cat.*, p. 161; *Butler*, p. 14.

Sparsely distributed above 2,000 ft. Specimens are in the Selangor Museum from Bukit Kutu, Semangko Pass and Ginting Bidei.

145. *RUBIGULA CYANIVENTRIS*—THE GREY-BELLIED BULBUL.

Rubigula cyaniventris (Blyth); *Hartert*, p. 561; *Grant* (2), p. 31.

Pycnonotus cyaniventris (Blyth); *Butler*, p. 15.

Bukit Kutu, 3,000 ft. August, 1902.

Common in the lowlands and up to 3,000 ft.

146. *RUBIGULA WEBBERI*—THE SCALY-BREASTED BULBUL.

Rubigula webberi (Hume); *Sharpe, Cat.*, p. 171; *Hartert*, p. 561; *Grant* (2), p. 31.

Bukit Kutu, 3,000 ft. August, 1902.

The above specimen is the only one I have seen from the western Federated Malay States.

TIMELIIDÆ.

147. *GAMPSORHYNCHUS SATURATIOR*—THE WHITE-HEADED SHRIKE BABBLER.

Gampsorhynchus saturatior, *Sharpe, P.Z.S.*, 1888, p. 273; *Butler*, p. 11; *Grant* (1), p. 83.

Semangko Pass, 2,400-3,000 ft.

This species is only known from the type procured by Mr. Wray in the Batang Padang highlands in South Perak, and the very numerous specimens obtained by Mr. Butler, myself and the collectors of the Selangor Museum at the Semangko Pass, where the bird is very common. It is generally seen in early morning or evening high among the bamboos, and is very active and restless in its habits. The zone it inhabits is very limited, and I have never seen it above 3,000 ft., nor much below 2,400 ft.

148. *EUPETES MACROCERCUS*—THE MALAYAN EUPETES.

Eupetes macrocercus (Temm.); *Sharpe, Cat. Birds Brit. Mus.*, vii., p. 338 (1883); *Hartert*, p. 561; *Grant* (2), p. 30.

Semangko Pass and Ginting Bidei.

A bird that seems to be very rarely met with, now that the days of the old Malacca plumage hunters are a thing of the past. I have

Digitized by Google

never seen the bird myself, but my Dyak hunters tell me it runs about on the ground among fallen timber like a Pitta. It has not been met with above 3,000 ft.

149. *TROCHALOPTERON PENINSULÆ*—THE MALAY LAUGHING THRUSH.

Trochalopteron peninsulæ, *Sharpe, P.Z.S.*, 1887, p. 436, pt. xxxvii.; *Hartert* and *Butler*, p. 506; *Butler*, p. 11; *Bonhote*, p. 63; *Hartert*, p. 562; *Grant* (2), p. 30.

Common on all the peaks of the Peninsula Main Range, south to Gunong Mengkuang Lebah, and also on Gunong Tahan; not so common on the Larut Range from G. Inas to the hills above Taiping; not as a rule found below 3,500 ft. A bird with a pleasant clear whistle usually met with in parties of four or five on low trees and bushes, sometimes nearly on the ground. Peculiar to the Peninsula.

150. *POMATORHINUS BORNEENSIS*—CABANI'S SCIMITAR BABBLER.

Pomatorhinus borneensis (Cab.); *Sharpe, Cat.*, p. 411; *Hartert*, p. 561.

Ginting Bidei. November, 1907.

Not rare on the lower hills of the southern portion of the Malay Peninsula up to about 2,500 ft. Waterstradt obtained it on Gunong Tahan at 4,000 ft.

151. *POMATORHINUS WRAYI*—WRAY'S SCIMITAR BABBLER.

Pomatorhinus wrayi, *Sharpe, P.Z.S.*, 1887, p. 437; *Butler*, p. 11; *Grant* (2), p. 30.

Sparingly distributed on mountains above 4,000 ft. as far south as Gunong Mengkuang Lebah.

152. *MELANOCICHLA LUGUBRIS*—THE BLACK BABBLING THRUSH.

Melanocichla lugubris (S. Müll.); *Sharpe, Cat.*, p. 451; *Grant* (1), p. 84.

Melanocichla peninsularis, *Sharpe, P.Z.S.*, 1888, p. 274.

Hitherto only found on the mountains of the main range from Batang Padang in South Perak to Gunong Mengkuang Lebah in Selangor at altitudes of from 3,400-5,000 ft. Usually on low trees or among fallen timber near the ground in parties of from three to seven.

153. *RHINOCICHLA MITRATA*—THE CHESTNUT-CAPPED BABBLING THRUSH.

Rhinocichla mitrata (S. Müll.); *Sharpe, Cat.*, p. 452 (1883); *id.*, *P.Z.S.*, 1886, p. 352; 1888, *p. 274*; *Butler*, p. 11; *Bonhote*, p. 63; *Hartert*, p. 562; *Grant* (1), p. 84; *id.* (2), p. 562.

Common on nearly all the high mountain in Selangor above 3,000 ft., though apparently rare on Gunong Tahan, where I did not procure or see it, and where Waterstradt only got two specimens.

Digitized by Google

154. *TURDINUS ABBOTTI*—ABBOTT'S BABBLER.

Turdinus abbotti (Blyth); *Sharpe, Cat.*, vii., p. 540 (1883); *Grant* (2), p. 29.

Turdinus abbotti olivaceum (Strickl.); *Butler*, p. 12; *Hartert*, p. 562.

A single specimen from Ginting Bidei marks the upper range of this species.

A very common bird in the low country, usually found in parties of three or four among low bushes in secondary jungle. It is at first sight easily confused with the succeeding species, which is found in company with it. Indeed until Mr. Boden Kloss pointed out the mistake, the whole of the series of both species in the Selangor Museum had been registered under the above name.

On careful examination certain marked differences present themselves by which the two species can be at once differentiated; as the table of dimensions shows *T. abbotti* is a larger bird than *T. sepiarius* with noticeably longer tail and coarser bill, though the tarsus is slightly longer in the latter. The colour of the upper surface is richer and darker in *T. sepiarius*, the head being slightly darker than the rest of the upper surface. In addition there is a distinct grey supercilium, which is quite absent in *T. abbotti*. In the latter, the feathers of the head, more noticeably of the mantle, have pale shaft stripes, which is not the case in *T. sepiarius*.

155. *TURDINUS SEPIARIUS*—HORSFIELD'S BABBLER.

Turdinus sepiarius (Horsf.); *Sharpe, Cat.*, p. 544; *id., P.Z.S.*, 1888, p. 275; *Hartert*, p. 563.

Ginting Bidei. October and May.

Also near Kuala Lumpur.

TABLE OF DIMENSIONS.

Turdinus abbotti.

Locality.	Sex.	Wing.	Tail.	Culmen.	Bill from gape.	Tarsus.
		mm.	mm.	mm.	mm.	mm.
Cheras, Selangor (8-5-'08)	♂ ad.	71	55	19	22	25
„ (22-3-'08)	♂ „	74	53	19	23.5	25
„ „	♂ „	72	57.5	19	23	24.7
Kuala Lumpur (February, 1907)	♂ „	75	56	20.2	24.5	26
Tanjong Karang, Selangor Coast (16-1-'08) ...	♂ „	76.5	54.7	20	23	25
Cheras, Selangor (14-3-'08)	♂ „	72	58	19.5	22.5	24
Ginting Bidei, Selangor, 2,300 ft. (1-11-'07) ...	♂ „	76	53.5	20.5	23	25
Malacca (trade skin)		70	53	20	23	24
Kuala Tembeling, Pahang (September, 1907) ...	♀	72	54	19.5	22.5	24.7

Digitized by Google

Turdinus sepiarius.

Locality.	Sex.	Wing.	Tail.	Culmen.	Bill from gape.	Tarsus.
		mm.	mm.	mm.	mm.	mm.
Nr. Kuala Lumpur, Selangor (8-7-'07)	♂	67	44.5	18	21	25
,, ,,	♂	68	48	17.5	20	26.5
,, (9-7-'07)	♀	71	44	18	20	26.5
,, (7-7-'07)	♀	69	41 (worn)	18	21	25
Ginting Bidei, Selangor, 2,300 ft. (26-10-'07)	♂	71.5	48	18.5	20	26
,, (31-10-'07)	♂	71.5	49	18.5	21	27
,, (9-5-'08)	♂	68	49	17.5	21	25.5

156. *TURDINUS MACRODACTYLUS*—STRICKLAND'S BABBLER.

Turdinus macrodactylus (Strickl.); *Sharpe, Cat.*, p. 548 (1883).

North of the latitude of Malacca, this species does not appear to be a very common bird, and the Selangor Museum possesses but few recent specimens, three from Ginting Bidei, and another from the Batu Caves near Kuala Lumpur.

157. *TURDINUS LORICATUS*—MÜLLER'S BABBLER.

Myiothera loricata, *Müll., Tijdschr. Nat. Gesch. Amsterd.*, 1835, p. 348.

Turdinus marmoratus, *Wardl.-Rams., P.Z.S.*, 1880, p. 15.

Turdinus loricatus, *Sharpe, Cat. Birds Brit. Mus.*, vii., p. 550 (1883); *Robinson, Journ. Fed. Mal. States Mus.*, iii., p. 79; No. 446 (1907).

ADULT FEMALE.—General colour above rufous brown, the feathers, except those of the rump, obscurely edged with black, less markedly so on the head and lores; throat white, the feathers narrowly tipped with black, the black tips much broader on the malar region; ear coverts and a large patch on each side of the neck bright russet chestnut; breast and centre of the abdomen greyish black, each feather broadly and irregularly barred and tipped with white; flanks, thighs and under tail coverts russet brown, the latter faintly tipped with whitish buff; primaries dull brown, more rufous on the outer webs; tail rufous brown; under wing coverts brown with paler margins; iris chestnut; bill and tarsi black.

Total length, 8.4 in.; wing, 3.9 in.; tail, 3.2 in.; culmen, .85 in.; tarsus, 1.4 in.

IMMATURE FEMALE.—Similar to the adult, but with the feathers of the head, hind neck and mantle with rufous shaft stripes, broadening towards the tips of the feathers.

SPECIMENS EXAMINED.—One adult female from Ginting Bidei, Selangor Main Range, 2,300 ft., dated 3rd November, 1907, and two adult females and an immature female from the Semangko Pass, Selangor, 28th February, 1908.

Digitized by Google

Like *Gecinulus viridis* this Timeliad is an inhabitant of thick bamboo jungle and has escaped notice hitherto for similar reasons. It is strictly a ground bird with very limited powers of flight, but displays great agility in running along the fallen bamboos and rubbish, amongst which it lives.

I have never shot the species myself, all those obtained having been secured by a Dyak collector, and have only once caught a glimpse of it.

Careful comparison with Dr. Sharpe's description (*loc. cit.*) reveals no tangible difference between the Malayan and Sumatran form, from the mountains of which island alone the species has hitherto been recorded.

158. *DRYMOCATAPHUS NIGRICAPITATUS*—THE BLACK-CAPPED BABBLER.

Drymocataphus nigricapitatus (Eyton); *Sharpe, P.Z.S.*, 1888, p. 275; *Grant* (2), p. 29.

Ginting Bidei, 2,300 ft., and numerous other places in the Selangor lowlands.

159. *DRYMOCATAPHUS TICKELLI*—TICKELL'S BABBLER.

Drymocataphus tickelli (Blyth); *Sharpe, Cat.*, p. 557 (1883).

This bird is common at the Semangko Pass between 2,200 and 3,000 ft., and at Ginting Bidei at similar elevations, and a single specimen was also obtained by Mr. Butler on Bukit Kutu, 3,000 ft. It is also abundant in the Batang Padang highlands. It is only found in dense jungle and is very shy, which, perhaps, accounts for the fact that it has not hitherto been recorded from the Malay Peninsula.

160. *SETARIA CINEREA*—THE SMALLER RED-HEADED TREE BABBLER.

Malacopterum cinerum (Eyton); *Sharpe, Cat.*, vii., p. 565; *Hartert*, p. 564; *Grant* (1), p. 83.

Attaining its maximum elevation at about 2,500 ft. Three specimens were collected at Ginting Bidei in May, 1908.

161. *SETARIA MAGNIROSTRIS*—THE BROWN-HEADED TREE BABBLER.

Turdinus magnirostris (Moore); *Sharpe, Cat.*, p. 547; *Robinson, Journ. Fed. Mal. States Mus.*, ii., p. 79 (1907).

Malacopterum magnirostre, *Hartert*, p. 563; *Grant* (1), p. 83; *id.* (2), p. 29.

Ginting Bidei, 2,300 ft. May, 1908.

Range as in the preceding species.

162. *ANUROPSIS MALACCENSIS*—THE MALAY WREN BABBLER.

Anuropsis malaccensis (Hartl.); *Sharpe, Cat.*, p. 588; *Grant* (2), p. 29.

Very common from the sea coast to about 2,500 ft., above which level it is not met with, its place being apparently taken by *Corythocichla leucosticta*,

Digitized by Google

163. *TURDINULUS GRANTI*—GRANTS' WREN BABBLER.

Turdinulus granti, *Richmond, Proc. U.S. Nat. Mus.*, xxii., p. 320 (1900).

Turdinulus exsul, *Grant, Ibis*, 1895, p. 60.

Turdinulus humei, *Hartert, Nov. Zool.*, ix., p. 564 (1902); *Robinson, Journ. Fed. Mal. States Mus.*, i., p. 26 (1905).

2 ♂, 3 ♀. Ginting Bidei, Selangor, 2,300 ft. Oct., Nov., 1907; May, 1908.
♂. Semangko Pass, Selangor, 2,700-4,500 ft. February, 1908.
♀. Gunong Angsi, Negri Sembilan, 2,600 ft. April, 1906.

A comparison of the above series, which is actually before me, with Mr. Richmond's description of the five specimens collected by Dr. Abbott in Trang reveals no material differences, and *T. humei*, Hartert, must, therefore, be regarded as a pure synonym.

DIMENSIONS.—Wing, 2.07 in. (2.10 in.*); tail, 1.02 in. (.96 in.); tarsus, .87 in. (.88 in.); culmen, .56 in. (.57 in.). The specimen from Semangko Pass is somewhat darker and more fulvous than the others, but is closely approached in this respect by a female from Ginting Bidei.

The species has been obtained by Mr. Kloss in Southern Johore, so that its range extends practically throughout the whole length of the Peninsula.

164. *CORYTHOCICHLA LEUCOSTICTA*—THE MALAY STREAKED BABBLER.

Corythocichla leucosticta, *Sharpe, P.Z.S.*, 1887, p. 438; *Butler*, p. 11; *Bonhote*, p. 64; *Grant* (2), p. 28.

Turdinulus striatus leucosticta (Sharpe); *Hartert*, p. 565.

Common everywhere from the tops of the highest mountains down to about 2,500 ft. Not known south of Selangor.

165. *ALCIPPE PERACENSIS*—THE MOUNTAIN NUN THRUSH.

Alcippe peracensis, *Sharpe, P.Z.S.*, 1887, p. 439; *Butler*, p. 12; *Hartert*, p. 566; *Grant* (1), p. 82; *id.* (2), p. 28.

Quite the commonest bird in the mountains, found everywhere about 3,000 ft. in parties of five and six, searching the boughs of low shrubs for insects. Below 3,000 ft. its place is taken by *A. cinerea*, which is, however, a much rarer bird relatively.

166. *ALCIPPE CINEREA*—THE GREY NUN THRUSH.

Alcippe cinerea, Blyth; *Sharpe, Cat.*, p. 622; *Butler*, p. 12; *Hartert*, p. 566; *Grant* (1), p. 82; *id.* (2), p. 28.

Common at Ginting Bidei in October and May.

167. *PSEUDOMINLA SOROR*—THE MALAY TIT BABBLER.

Minla soror, *Sharpe, P.Z.S.*, 1887, p. 439, pt. xxxviii., fig. 1; *Grant* (2), p. 25.

Pseudominla soror, *Sharpe, Hand-l. Birds*, iv., p. 47 (1903).

Sittiparus castaneiceps soror, *Hartert*, p. 25.

Very abundant on Gunong Mengkuang Lebah, rarer near Semangko Pass.

* Dimensions in parentheses are those of the type specimen.

Digitized by Google

168. *STACHYRIS DAVISONI*—DAVISON'S BABBLER.

Stachyris nigriceps, *Sharpe* (nec *Hodgs.*), *P.Z.S.*, 1887, p. 440.

Stachyris davisoni, *Sharpe, Bull. B.O.C.*, i., p. vii. (1892); *Butler*, p. 12; *Hartert, Nov. Zool.*, i., p. 471 (1894); *id., op. cit.*, ix., p. 566 (1902); *Grant* (1), p. 82; *Grant* (2), p. 28.

Fairly common at intermediate elevations, southward from Central Perak to Southern Johore, the Rhio Archipelago and the Natunas.

169. *STACHYRIS POLIOGASTER*—HUME'S BABBLER.

Stachyris poliogaster, *Hume*; *Sharpe, Cat.*, p. 539.

♂. Bukit Kutu, Ulu Selangor, 3,000 ft. October, 1898. A. L. Butler [c].

♂ ♀. Ginting Bidei, Selangor, 2,300 ft. October, 1907, and May, 1908.

Besides the type, which was collected by Davison on Gunong Pulai in Southern Johore, these seem to be the only specimens met with up to the present.

170. *STACHYRIS POLIOCEPHALA*—THE GREY-HEADED BABBLER.

Stachyris poliocephala (Temm.); *Sharpe, Cat.*, p. 534; *Butler*, p. 12; *Hartert*, p. 566; *Grant* (2), p. 258.

Fairly common up to 2,500 ft. in suitable localities.

171. *STACHYRIS LEUCOTIS*—THE WHITE-EARED BABBLER.

Stachyris leucotis (Strickl.); *Sharpe, Cat.*, p. 537.

♀. Sungei Tali, Ulu Bentong, Pahang, 1,500 ft. December, 1904.

Apparently somewhat local, as few recent collectors have met with it. The only other locality, whence the Selangor Museum possesses specimens, is Gunong Angsi, Negri Sembilan, where it was found to be very common in April, 1906. It is also abundant (*fide* Kloss) in South-western Johore.

172. *STACHYRIS NIGRICOLLIS*—THE BLACK-NECKED BABBLER.

Stachyris nigricollis (Temm.); *Sharpe, Cat.*, p. 535; *id.* (3), p. 275.

Collected by Wray on the Batang Padang mountain. We have only found it in low country, where it is very abundant in certain localities.

173. *STACHYRIS CHRYSÆA BOCAGEI*—THE GOLDEN BABBLER.

Stachyris bocagii, *Salvad., Ann. Mus. Civ. Gen.*, xiv., p. 223 (1879).

Cyanoderma chrysæa, *Sharpe, P.Z.S.*, 1887, *p. 440.*

Stachyridiopsis chrysœa assimilis (Walden); *Hartert*, p. 566.

Stachyridiopsis chrysæa (Hodgs.); *Butler*, p. 12; *Grant* (1), p. 81; *id.* (2), p. 27.

Stachyris chrysops, *Richmond, Proc. Biol. Soc. Washington*, xv., p. 157 (1902).

Abundant in small flocks on most of the higher hills above 3,000 ft. On the Semangko Pass the species was breeding in February, 1908, and two half-fledged young, which are uniform olive brown without a trace of golden yellow, were obtained on the 27th of that month.

Digitized by Google

The twelve adult specimens in the Selangor Museum (7 ♂, 5 ♀) agree minutely with the description of *Stachyris chrysops*, Richmond, from Trang [*Proc. Biol. Soc. Washington*, xx., p. 157 (1902)], which was founded on a single specimens.

The birds in freshly-mounted plumage are too bright to be referable to *S. assimilis* from N. Tenasserim, and I have therefore followed Grant in regarding them as identical with *S. bocagei* from the mountain of Sumatra, of which, in the absence of further material confirming the species, *St. chrysops* must be regarded a synonym.

174. *KENOPIA STRIATA*—THE STRIPED BABBLER.

Kenopia striata (Blyth); *Sharpe, Cat.*, p. 573; *Hartert*, p. 567.

Apparently rare. I have not yet met with the bird.

175. *MIXORNIS GULARIS*—THE YELLOW-BREASTED BABBLER.

Mixornis gularis (Raffles); *Sharpe, Cat.*, p. 168; *id., P.Z.S.*, 1888, *p. 275*; *Bonhote*, p. 64; *Butler*, p. 12; *Hartert*, p. 567; *Grant* (1), p. 8.

Widely spread throughout the Peninsula up to about 2,500 ft., but commonest on the sea coast, especially among *Casuarinas*. The Selangor Museum possesses a large series ranging from the Langkawi group of islands, north of Penang, to Malacca. Specimens from the former locality are distinctly intermediate between the present species and the Indian *M. rubricapilla*.

176. *MACRONUS PTILOSUS*—THE FLUFFY-BACKED BABBLER.

Macronus ptilosus, Jard. and Selby; *Sharpe, Cat.*, p. 583; *id.* (3), p. 275.

Batang Padang mountains (*Wray*). Almost the commonest of the smaller *Timeliidæ* in the low country.

177. *MYIOPHONEUS DICRORHYNCHUS*—THE LARGER WHISTLING THRUSH.

Myiophoneus dicrorhynchus, Salvad.; *Sharpe, t.c.*, p. 10; *Grant* (2), p. 27.

Myiophoneus, sp. inc., *Sharpe, P.Z.S.*, 1887, *p. 436*.

Myiophoneus eugenii, *Hume*; *Butler*, p. 12; *Bonhote*, p. 163.

2 ♂. Semangko Pass, 2,500-4,500 ft. February, 1908.

A large *Myiophoneus* is common in certain parts of the Malay Peninsula, but in the lowlands appears to be only found in vicinity of the precipitous limestone cliffs.

* All the large *Myiophoneus* from the Malay Peninsula seem to be the same species, though whether referable to the Tenasserim species, *M. eugenii*, Hume, or the Sumatran, *M. dicrorhynchus*, is hard to say. The former, if distinct, must be very close indeed to the Sumatran race, which was described first. I have followed Grant in his identification, but by Sharpe's Key (*Cat. Birds*, vii., *p. 6*) all would appear to belong to *M. eugenii*.

* Since the above was in type we have obtained very large series of *Myiophoneus temmincki* from the islands of Langkawi and Terutau, north of Penang.

Digitized by Google

178. *MYIOPHONEUS ROBINSONI*—THE MOUNTAIN WHISTLING THRUSH.

Myiophoneus robinsoni, *Grant, Journ. Fed. Mal. States Mus.*, i., p. 104 (1905).

By no means uncommon on the high mountains of Selangor above 3,500 ft.

Specimens are in the Selangor Museum from Gunong Mengkuang Lebah, Gunong Ulu Kali and the mountains above the Semangko Pass.

179. *BRACHYPTERYX WRAYI*—WRAY'S SHORT WING.

Brachypteryx nipalensis, *Sharpe, P.Z.S.*, 1888, p. 273; *Butler*, p. 13.

Brachypteryx wrayi, *Grant, Bull. B.O.C.*, xix., No. cxxvii., p. 10 (1906); *id., Journ. Fed. Mal. States Mus.*, iii., p. 26 (1908).

Gunong Mengkuang Lebah and Semangko Pass.

Four specimens from the above localities agree well with the type description, with a skin from Gunong Tahan, and with three males from the vicinity of the type locality.

180. *SIBIA SIMILLIMA*—THE MALAYAN SIBIA.

Sibia simillima (Salvad.); *Sharpe* (1), p. 352; *id.* (3), p. 274; *Butler*, p. 13; *Bonhote*, p. 63; *Grant* (1), p. 8; *id.* (2), p. 26.

Sibia picaoides simillima, *Hartert*, p. 567.

Met with in flocks of six or seven, and very noisy. Exceedingly common on the Larut Hills and the Peninsular main range, south to Southern Selangor, but not found below 3,000 ft.

181. *SIVA MALAYANA*—THE MALAYAN CHESTNUT-TAILED SIVA.

Siva castaneicauda, *Sharpe* (nec *Hume*), *P.Z.S.*, 1888, p. 275; *Bonhote*, p. 64.

Siva malayana, *Grant* (2), p. 25.

Siva strigula malayana, *Hartert*, p. 567.

Rather rare in Selangor, whence the Selangor Museum possesses only two specimens from Gunong Mengkuang Lebah and Gunong Ulu Kali, dated February and March. Both are in unworn plumage and differ from the large series of Tahan specimens, which are very faded and abraded in having the under surface below the throat and the under tail coverts bright orange yellow clouded with olive on the breast and flanks; the head is rich golden olive, deepening to dark orange on the forehead, and clearly defined from the back, which is greyish, strongly washed with yellowish olive, not almost pure, pure grey as in the Tahan birds. The differences are most striking, but are almost certainly due to the age of the feathers only.

182. *SIVA SORDIDIOR*—THE MALAYAN DULL SIVA.

Siva sordidior, *Sharpe, P.Z.S.*, 1888, p. 276; *Butler*, p. 13; *Grant* (1), p. 80.

Generally distributed over the high mountains of Selangor and Perak above 4,000 ft., but nowhere very common.

Digitized by Google

183. *HERPORNIS XANTHOLEUCA*—THE WHITE-BELLIED HERPORNIS.

Herpornis zantholeuca, Hodgs.; *Sharpe* (3), p. 275; *Butler*, p. 13; *Hartert* p. 568; *Grant* (1), p. 80; *id.* (2), p. 25.

A submontane bird, commonest at about 1,500 ft., but found as high as 3,300 ft.

184. *CUTIA CERVINICRISSA*—THE MALAYAN CUTIA.

Cutia cervinicrissa, *Sharpe, P.Z.S.*, 1888, p. 276; *Grant* (1), p. 80.

Found on the mountains of the main range from Batang Padang, in South Perak, to Gunong Mengkuang Lebah, in Selangor, above 4,000 ft.

The eight specimens now in the Selangor Museum and many other duplicates which have passed through my hands all bear out the diagnosis of the species in having the abdomen and lower tail coverts rufous tawny, not white as in *C. nipalensis*.

185. *PTERYTHIUS ÆRALATUS*—TICKELL'S SHRIKE TIT.

Pterythius æralatus (Tick.); *Sharpe* (2), p. 440; *id.* (3), p. 276; *Butler*, p. 14; *Bonhote*, p. 64; *Hartert*, p. 576; *Grant* (2), p. 22.

Distributed above about 3,500 ft.

186. *PTERYTHIUS TAHANENSIS*—THE TAHAN SHRIKE TIT.

Pterythius tahanensis, *Hartert*, p. 576; *Grant* (2), p. 22.

Gunong Mengkuang Lebah and Semangko Pass, Selangor.

Rare in Selangor and only found well above 4,000 ft.

187. *MESIA ARGENTAURIS*—THE SILVER-EARED MESIA.

Mesia argentauris (Hodgs.); *Sharpe* (1), p. 352; *id.* (3), p. 276; *Butler*, p. 14; *Hartert*, p. 568; *Grant* (1), p. 80; *id.* (2), p. 25.

Common at high elevations throughout the mountains of the Peninsula to the south of Selangor.

TROGLODYTIDÆ.

188. *PNOEPYGA LEPIDA*—THE HILL WREN.

Pnoepyga lepida, *Salvad., Ann. Mus. Civ. Gen.*, xix., p. 227; *Grant* (2), p. 24.

Pnoepyga pusilla, *Sharpe, P.Z.S.*, 1888, p. 273.

♂ ad., ♀ imm. Hills above Semangko Pass, 4,000 ft. February, 1908.

Decidedly rare and only found amongst the very thickest scrub, whence it is very difficult to obtain specimens.

The immature bird is dull blackish brown, beneath the feathers with blackish edges, the throat feathers paler, also edged with black.

Digitized by Google

TROGOLYTIDÆ.

189. *GEOCICHLA INTERPRES*—TEMMINCK'S GROUND THRUSH.

Geocichla interpres (Temm.); *Seebohm, Cat. Birds Brit. Mus.*, v., p. 167 (1881); *Richmond, Proc. U.S. Nat. Mus.*, xxii., p. 319 (1899).

Known at present from the mountains of Trang, Northern Malay Peninsula, and Rembau (Hume, S. F., viii., p. 39) in Negri Sembilan.

190. *GEOCICHLA INNOTATA*—THE MALAY GREY AND ORANGE GROUND THRUSH.

Geocichla innotata (Blyth); *Seebohm, Cat.*, p. 176; *Butler*, p. 20.*

It is exceedingly curious fact that no recent collector has been able to obtain any of the Malay *Geocichla*. I am not aware of any specimens having been obtained in the last twenty years, nor are there any in any of the local Museum. Possibly they are confined to the north of the Peninsula. Butler's specimen noted above was only *seen*.

191. *CICHLOSELYS SIBERICUS*—THE SIBERIAN GROUND THRUSH.

Geocichla siberica (Pall.); *Seebohm, Cat.*, p. 180 (1879).

Geocichla davisoni, Hume; *Grant* (1), p. 78.

Common on the higher Selangor mountains in winter. I have had through my hands over twenty specimens of this Ground Thrush, of which thirteen are now before me, and I do not believe that it is possible to distinguish two races, *G. davisoni*, Hume, being as the author himself considered merely the very old male (*Stray Feathers*, v., pp. 63, 136, 1877). One specimen (Sel. Mus. 679/07) exactly answers to the description of *G. davisoni*, but all the others have much more white about them. I have obtained this species on Pulau Jarak in the middle of the Straits of Malacca, off the mouth of the Perak River in December, 1904, but the skin was unfortunately destroyed by rats.

192. *OREOCICHLA AFFINIS*—RICHMOND'S MOUNTAIN THRUSH.

Oreocichla horsfieldi, *Richmond, Proc. Biol. Soc. Washington*, xx., p. 158 (1902).

Mountain of Trang, Northern Malay Peninsula.

193. *TURDUS OBSCURUS*—THE DARK OUZEL.

Merula obscurus (Gm.); *Seebohm, t.c.*, p. 273.

Turdus obscurus (*Gm.*); *Grant* (1), p. 78.

Two females, evidently on passage, were shot on Gunong Ulu Kali, Selangor, 4,700 ft., in February, 1906.

---

* Recently I have secured three specimens from Terutau and Langkawi, which are somewhat intermediate between *G. citrina* (Lath.) and *G. innotata* in respect to the white tips to the primary coverts.

Digitized by Google

194. *PETROPHILA SOLITARIA*—THE EASTERN BLUE ROCK THRUSH.

Monticola solitaria (Müll.); *Seebohm., Cat.*, p. 319.

Monticola cyanus solitaria, *Butler*, p. 20.

Cyanocincla solitaria, Hume, Stray Feathers, ix., p. 116 (1880).

The most southerly specimen recorded from the Malay Peninsula. Shot in February on the Larut Hills. Also obtained at Ghirbee (*Hume, loc. cit.*).

A male of the western form, *P. cyaneus*, was shot by M. Boden Kloss at the Batu Caves, Kuala Lumpur, on 3rd August, 1908.

195. *PETROPHILA GULARIS*—THE CHINESE ROCK THRUSH.

Monticola gularis (Swinh.); *Seebohm., Cat.*, p. 326; *Butler*, p. 20.

Besides the specimen from the Larut Hills recorded by Butler (*loc. cit.*), there is another mounted and undated specimen from the same locality in the Taiping Museum. A third specimen is known from Malacca [*Hume, Stray Feathers*, ix., p. 116 (1880)].

196. *HYDROCICHLA RUFUCAPILLA*—THE CHESTNUT-BACKED FORK TAIL.

Hydrocichla ruficapilla (Temm.); *Sharpe, Cat.*, p. 319; *Butler*, p. 19; *Hartert*, p. 572.

3 ♂, 2 ♀. Ginting Bidei, 2,300 ft. May, 1908.

Common on clear rocky streams and torrents throughout the Peninsula up to about 3,000 ft.

197. *HENICURUS SCHISTACEUS*—THE SLATY-BACKED FORK TAIL.

Henicurus schistaceus, Hodgs.; *Sharpe, Cat. Birds Brit. Mus.*, vii., p. 365 (1883); *Butler*, p. 19; *Hartert*, p. 570; *Grant* (1), p. 79.

Found in similar situations to the preceding, but not as a rule below 4,000 ft., though Butler obtained it on the Larut Hills at 2,000 ft. Very abundant above the Semangko Pass.

198. *LARVIVORA CYANEA*—THE SIBERIAN BLUE CHAT.

Larvivora cyanea (Pall.); *Seebohm., Cat. Birds Brit. Mus.*, v., p. 303 (1881); *Butler*, p. 13.

This species is met with throughout the Malay Peninsula from October to April, but is common in the hills than in the low country. It has also been met with in some of the islands in the Straits of Malacca, also during the winter months.

199. *NOTODELA LEUCURA*—THE WHITE-TAILED BLUE ROBIN.

Notodela leucura (Hodgs.); *Sharpe, Cat. Birds Brit. Mus.*, vii. p. 23 (1883); *Butler, Journ. Strait. Branch Roy. Asiat. Soc.*, No. 34, p. 99 (1900).

A single female collected by A. L. Butler on Gunong Ijau, Larut Hills, at 4,000 ft. in March, 1898, is the only record for the species in

Digitized by Google

the Malay Peninsula; elsewhere it is known from Mt. Mooleyit in Tenasserim and from Nepal and Sikkim. It has been overlooked by me in my Hand-list of the Birds of the Malay Peninsula, *antea*, p. 66.

200. *COPSYCHUS MUSICUS*—THE STRAITS ROBIN.

Copsychus musicus (Raffles); *Sharpe*, P.Z.S., 1888, p. 79; *Hartert*, p. 575; *Grant* (1), p. 79.

Copsychus saularis (Linn.); *Sharpe, Cat.*, p. 1; *Butler*, p. 20.

Occasionally found in large hill clearings and along the roads crossing the main range, but not a normal inhabitant of mountain jungle.

201. *CITTOCINCLA MACRURA*—THE SHAMA.

Cittocincla tricolor (Vieill.); *Sharpe, Cat.*, p. 84; *Grant* (1), p. 79.

Kittocincla macrurus (Gm.); *Hartert*, p. 572.

The Shama ascends the hills to about 3,000 ft., but is very much commoner in the low country though not met with in swamp jungle.

202. *TRICHIXUS PYRROPYGUS*—THE ORANGE-TAILED THRUSH.

Trichixus pyrropygus (Less.); *Sharpe, Cat.*, p. 32; *Grant* (2), p. 24.

Met with on Gunong Tahan at 3,000 ft.; fairly common in the low country, but local.

SYLVIIDÆ.

203. *ORTHOTOMUS ATRIGULARIS*—THE BLACK-THROATED TAILOR BIRD.

Orthotomus atrigularis (Temm.); *Sharpe, Cat. Birds Brit. Mus.*, vii., p. 220 (1883); *Butler*, p. 16.

Semangko Pass, February, and Ginting Bidei, May.

Not met with much above 3,000 ft.

204. *SUTORIA MACULICOLLIS*—THE LONG-TAILED TAILOR BIRD.

Sutoria maculicollis (F. Moore); *Sharpe, Cat.*, p. 218; *id.* (2), p. 440.

Sutoria maculicauda (*bapsu*); *Butler*, p. 17.

Common in gardens, etc. I have not myself noted it on the hills where it has been obtained by Wray and Butler.

205. *FRANKLINIA RUFESCENS*—BEAVAN'S WREN WARBLER.

Citiscola beavani (Wald.); *Sharpe, Cat.*, p. 225; *Butler*, p. 16; *Grant* (2), p. 23.

Franklinia rufescens (Blyth); *Hart.*, p. 569.

Common in the lowlands at certain times of the year. One specimen was obtained at the Semangko Pass in February, 1908.

206. *ACANTHOPNEUSTE CORONATA*—TEMMINCK'S CROWNED WILLOW WARBLER.

Phylloscopus coronatus (Temm. and Schleg.); *Seebohm, Cat. Birds Brit. Mus.*, v., p. 49 (1881).

♂ ad. Telôm, Perak-Pahang border, 3,000 ft. 12th October, 1904.

Also obtained at Malacca [*Hume, Stray Feathers*, viii., p. 65 (1879)].

Digitized by Google

207. *PHYLLERGATES—CINEREICOLLIS*—THE ORANGE-HEADED WARBLER.

Phyllergates cinereicollis, Sharpe, *Ibis*, 1888, p. 479; *Grant* (2), p. 23.

Phyllergates cucullatus (Temm.); *Sharpe, Cat. Birds Brit. Mus.*, vii., p. 229 (1883); *Sharpe* (2), p. 440; *id.* (3), p. 273; *Butler*, p. 16; *Hartert*, p. 569.

Common on the Selangor Mountains above 3,500 ft.

208. *SUYA WATERSTRADTI*—THE TAHAN HILL WARBLER.

Suya waterstradti, *Hartert, Nov. Zool.*, ix., p. 568 (1902); *Grant* (2), p. 23.

So far as is at present known confined to the higher parts of Gunong Tahan, where it is very common.

LANIIDÆ.

209. *HEMIPUS PICATUS*—THE BLACK PIED SHRIKE.

Hemipus picatus (Sykes); *Sharpe, Cat. Birds Brit. Mus.*, iii., p. 307 (1877); *Hartert*, p. 576.

Replacing the lowland *H. obscurus* (Horsf.) above 3,000 ft., but not very common.

210. *TEPHRODORNIS GULARIS*—THE MALAY WOOD SHRIKE.

Tephrodornis gularis (Raffles); *Sharpe, Cat. Birds Brit. Mus.*, p. 278 (1877); *Butler*, p. 17; *Hartert*, p. 576; *Grant* (2), p. 21.

Does not range high into the mountains. Butler got it on the Larut Hills at 3,000 ft., and it is abundant on Gunong Angsi in Negri Sembilan at 2,600 ft.

211. *PLATYLOPHUS ARDESIACUS (CAB.)*—THE JAY SHRIKE.

Platylophus ardesiacus (Cab.); *Sharpe, Cat.*, p. 317; *id., P.Z.S.*, 1888, p. 269; *Grant* (1), p. 77.

Common at Ginting Bidei.

An immature bird is greyer below somewhat browner above and with the greater wing coverts tipped with buff.

212. *LANIUS TIGRINUS*—THE THICK-BILLED SHRIKE.

Lanius tigrinus (Drap.); *Gadow, Cat. Birds Brit. Mus.*, viii., p. 289 (1883); *Butler*, p. 17; *Grant, Nov. Zool.*, ix., p. 480 (1902); *Hartert*, p. 576; *Grant* (2), p. 77.

2 ♀ imm. Semangko Pass. February, 1908.

Adult birds seem very rare in the Malay Peninsula. There are only two in the Selangor Museum collection, one from Gunong Angsi, Negri Sembilan, 2,600 ft., and another from Tanjong Malim at the foot of the main range, both females, and both shot in April.

Digitized by Google

PARIDÆ.

213. *MELANOCHLORA FLAVOCRISTATA*—THE SULTAN TIT.

Melanochlora sultanea (Hodgs.); *Gadow, Cat.*, p. 6; *Sharpe* (3), p. 277; *Butler*, p. 14; *Grant* (1), p. 76; *id.* (3), p. 21.

Melanochlora flavocristata (Lafr.); *Hellmayr, Serreich Parida*, p. 31 (1903); *Sharpe, Hand-l. Birds*, iv., p. 326 (1903).

Abundant nearly everywhere from 2,000 ft. to about 4,000 ft., and occasionally in the low country at the foot of the main range. It is usually met with in flocks of six or seven among high trees at the edge of clearings or in the jungle.

SITTIDÆ.

214. *DENDROPHILA AZUREA*—THE DEEP BLUE NUTHATCH.

Sitta azurea, Less.; *Gadow, Cat. Birds Brit. Mus.*, viii., p. 357 (1883); *Hartert*, p. 573.

Dendrophila azurea (Less.); *Butler*, p. 15; *Grant* (1), p. 76; *id.* (2), p. 21.

Fairly common on the Selangor main range, but not found below 3,500 ft.

215. *DENDROPHILA FRONTALIS SATURATIOR*—THE MALAY NUTHATCH.

Sitta frontalis saturatior, *Hartert*, p. 573.

Dendrophila saturatior, *Grant* (1), p. 76; *id.* (2), p. 21

Semangko Pass. February, 1908.

Locally distributed up to about 3,000 ft.

The above specimen agrees well with a pair from Gunong Angsi, 2,600 ft., Negri Sembilan, and differs from a skin from Trang collected by Dr. W. L. Abbott in being much more intense in colouration. Malay Peninsula specimens require comparison with freshly-collected Javan ones (the type locality) and with Indian skins before the validity of the sub-species can be considered as established.

CORVIDÆ.

216. *CISSA ROBINSONI*—THE MALAY BLUE MAGPIE.

Cissa robinsoni, Grant, *Bull. B.O.C.*, xix., No. cxxviii., p. 9 (1906); *id.* (2), p. 16.

This fine species originally described from a single specimen from Gunong Tahan has since proved to be very numerous on the Selangor mountains, especially near the Semangko Pass, whence a large number of specimens have been recently obtained: it also occurs at Telôm in the Batang Padang mountains. In all localities it is very wild and hard to secure. As is the case with other members of the genus, the plumage of this bird is extraordinarily sensitive to light and very slight exposure changes the greenish yellow of the head and body to pale blue and the maroon of the primaries to dull grey.

Digitized by Google

DICRURIDÆ.

217. *DISSEMURUS PARADISEUS*—THE LARGE RACKET-TAILED DRONGO.

Dissemurus paradiseus (Linn.); *Sharpe, Cat. Brit. Mus.*, iii., p. 258 (1878); *Hartert*, p. 579.

Waterstradt (Hartert, *loc. cit.*) is said to have got this species up to 5,000 ft. on Gunong Tahan. I have never met with it anywhere above 2,000 ft.

218. *BHRINGA REMIFER*—THE LESSER RACKET-TAILED DRONGO.

Bhringa remifer (Temm.); *Sharpe, Cat.*, p. 257; *id.* (2), p. 434; *Bonhote*, p. 59; *Hartert*, p. 580; *Grant* (1), p. 68.

Very abundant on all the hills from 2,500-5,000 ft., especially where there is much bamboo.

219. *CHAPTIA MALAYENSIS*—THE MALAYAN BRONZED DRONGO.

Chaptia malayensis (A. Hay); *Sharpe, Cat.*, p. 44.

Chaptia aenea (Vieill.); *Grant* (1), p. 67; *id.* (2), p. 17.

Almost as common in the hills as *Bhringa remifer* in similar situations, but unlike that species, occasionally found in low country also.

220. *DICRURUS ANNECTENS*—THE CROW-BILLED DRONGO.

Dicrurus annectens (Hodgs.); *Sharpe, Cat.*, p. 231.

♀ imm. Ginting Bidei, 2,300 ft. 29th October, 1907.

A migratory species, common on the islands of the Straits of Malacca and in the coastal districts in the winter months. Immature birds, with a great deal white in the plumage, are always in the majority.

ORIOLIDÆ.

221. *ORIOLUS CONSANGUINEUS*—THE BLACK-AND-RED MOUNTAIN ORIOLE.

Oriolus consanguineus (*Wardl.-Ramsay*); *Sharpe* (2), p. 434; *Bonhote*, p. 59; *Grant* (1), p. 68.

Very abundant on all mountains above 3,500 ft., except Gunong Tahan, from which it appears to be absent.

The large series before me confirm Mr. Grant's remarks, *loc. cit.*, about size. The amount of red on the primary coverts varies very greatly, being almost absent in some individuals.

222. *UROLONCHA ACUTICAUDA*—HODGSON'S MUNIA.

Uroloncha acuticauda (Hodgs.); *Sharpe, Cat. Birds Brit. Mus.*, xiii., p. 356 (1890); *Butler*, p. 20.

Noted by Butler on the Larut Hills at 3,000 ft.; flocks were occasionally seen at the Semangko Pass in February, 1908.

223. *CHLORURA sp.*—THE MALAYAN GREEN WEAVER FINCH.

Chlorura *sp.*, *Grant, Fasc. Mal. Zool.*, iii., p. 70 (1905).

A single female of this genus was obtained at Telôm, Batang Padang highlands, South Perak, 3,500 ft., in January, 1902, but though

Digitized by Google

it has been searched for in the same locality on several occasions since, no additional specimens have come to hand. It is probably distinct from the Kina Balu form, *C. borneensis*, Sharpe.

224. *PYRRHULA WATERSTRADTI*—THE MALAYAN BULLFINCH.

Pyrrhula waterstradti, Hartert; *Nov. Zool.*, ix., p. 577 (1902); *Grant* (2), p. 18.

Gunong Ulu Kali, Selangor, 4,800-5,200 ft. February, 1906.
Gunong Mengkuang Lebah, Selangor, 4,800-5,200 ft. March, April, 1907.
Semangko Pass, Selangor, 3,500-4,800 ft. February, 1908.

The Malay Bullfinch probably occurs on all the higher mountains of Selangor wherever *Vaccinium* and Conifers are found, though it is nowhere so common as it was found to be on Gunong Tahan. Though carefully searched for, it has not yet been met with on any of the Perak Hills.

225. *MOTACILLA MELANOPE*—THE GREY WAGTAIL.

Motacilla melanope (Pall.); *Sharpe, Cat. Birds Brit. Mus.*, x., p. 500 (1885); *id.* (2), p. 441; *Butler*, p. 21; *Hartert*, p. 575; *Grant* (1), p. 71; *id.* (2), p. 19.

Common on roads, jungle paths and streams throughout the Peninsula from August to April.

226. *LIMONIDROMUS INDICUS*—THE FOREST WAGTAIL.

Limonidromus indicus (Gm.); *Sharpe, Cat.*, p. 532; *id.* (3), p. 278.

Collected by Wray on the Larut Hills, probably on migration; it has been met with in large flocks among the mangroves on the coastal districts of Selangor during the winter months.

227. *ANTHUS MACULATUS*—THE INDIAN TREE PIPIT.

Anthus maculatus (Hodgs.); *Sharpe, Cat. Birds Brit. Mus.*, x., p. 547 (1885); *Butler*, p. 21.

Butler's specimen, shot on Larut Hills at a height of about 3,700 ft. in March, 1898, is the only record of this Indian species for the Malay Peninsula. It is only a winter visitor to Tenasserim, but is found during that season in Saigon and Southern China.

Omitted by me in my Hand-list of the Birds of the Malay Peninsula, *antea*, p. 82.

NECTARINIIDÆ.

228. *ÆTHOPYGA WRAYI*—WRAY'S SUNBIRD.

Æthopyga wrayi, Sharpe, *P.Z.S.*, 1887, p. 440, pl. xxxviii., fig. 2; *Butler*, p. 21; *Hartert*, p. 573; *Grant* (1), p. 74; *id.* (2), p. 19.

Common on all the Peninsula hills, exceeding 3,000 ft. in height, but not found south of Gunong Ulu Kali in Selangor.

The specimen from Bukit Kutu that I recorded as *Æthopyga anomala* (*antea*, p. 82, No. 588) should be referred to this species; it is a mounted specimen in bad condition, lacking most of the feathers of the rump.

Digitized by Google

229. *ÆTHOPYGA TEMMINCKI*—HORSFIELD'S SCARLET SUNBIRD.

Æthopyga temmincki (S. Müll.); *Gadow, Cat. Birds Brit. Mus.*, ix., p. 16 (1884); *Robinson, Journ. Fed. Malay States Mus.*, i., p. 28 (1905).

Bukit Kutu, Ulu Selangor, 3,000 ft. November, 1900. A. L. Butler [c].
Ginting Bidei, Selangor, 2,300 ft. November, 1907.

Somewhat rare and local, and apparently restricted to a very narrow zone in altitude. Fairly common on Gunong Angsi, Negri Sembilan, at a height of about 2,700 ft. in November, 1904. Not met with on the higher hills.

230. *ÆTHOPYGA ANOMALA*—ABBOTT'S SUNBIRD.

Æthopyga anomala, Richmond, *Proc. U.S. Nat. Mus.*, xii., p. 319 (1900).

This species has been described as near *Æ. saturatior*; it appears, however, to be closer to *Æ. wrayi*, from which it only differs in lacking the yellow rump band.

231. *ANTHOTHREPTES RHODOLÆMA*—SHELLEY'S SUNBIRD.

Anthothreptes rhodolæma, Shelley, *Monogr. Nectarin*, p. 13; *Hartert, Nov. Zool.*, ix., pp. 203, 209, 574 (1908).

I cannot recognise this species amongst the very large series of *Anthothreptes malaccensis* in the Selangor Museum.

232. *ANTHOTHREPTES HYPOGRAMMICA*—THE BANDED SUNBIRD.

Anthothreptes hypogrammica (S. Müll.); *Gadow, t.c.*, p. 112; *Hartert*, p. 574; *Grant* (1), p. 73; *id.* (2), p. 19.

♂. Semangko Pass, 2,500 ft. February, 1908.
2 ♂, 2 ♀. Ginting Bidei, Selangor, 2,300 ft. October, 1907.

Abundant in deep jungle from 200-2,300 ft., taking the place of *Anthothreptes malaccensis*, which is never found far from cultivation.

233. *CHALCOPARIA SINGALENSIS*—THE RUBY THROAT.

Anthothreptes phaenicotis (Temm.); *Gadow, t.c.*, p. 121.

Chalcoparia singalensis, *Hartert*, p. 574.

Collected by Waterstradt on Gunong Tahan between 2,000 and 5,000 ft.; fairly common in the Selangor low country.

234. *ARACHNOTHERA LONGIROSTRIS*—THE LONG-BILLED SPIDER HUNTER.

Arachnothera longirostris (Lath.); *Gadow, t.c.*, p. 103; *Sharpe*, p. 441; *Hartert*, p. 574; *Grant* (1), p. 71.

♂. Semangko Pass, Selangor-Pahang boundary, 2,700 ft. February, 1908.

The only specimen I have met with on the hills.

Digitized by Google

235. *ARACHNOTHERA MODESTA*—THE DULL SPIDER HUNTER.

Arachnothera modesta (Eyton); *Gadow, t.c.*, p. 107; *Hartert*, p. 574; *Grant* (1), p. 72.

Semangko Pass, 2,700 ft. November, 1900. A. L. Butler [c].

Common in the low country, but evidently rare on the hills.

236. *ARACHNOTHERA MAGNA*—THE STREAKED SPIDER HUNTER.

Arachnothera magna (Hodgs.); *Gadow, t.c.*, p. 105; *Sharpe* (2), p. 441; *Butler*, p. 21; *Grant* (1), p. 73; *id.* (2), p. 19.

Common on all the high hills of the Peninsula above 3,000 ft. as far south as Gunong Ulu Kali.

237. *ARACHNOTHERA CRASSIROSTRIS*—THE THICK-BILLED SPIDER HUNTER.

Arachnothera crassirostris (Reichenb.); *Gadow, t.c., p. 102*; *Bonhote*, p. 64; *Grant* (1), p. 72.

A male was collected at Telôm, 3,500 ft. 1st December, 1908.

Widely distributed throughout the Peninsula, but decidedly rare.

DICÆIDÆ.

238. *DICÆUM TRIGONOSTIGMA*—THE ORANGE-BILLED FLOWER-PECKER.

Dicæum trigonostigma (Scop.); *Sharpe, Cat. Birds Brit. Mus.*, x., p. 38 (1885); *Bonhote*, p. 65; *Hartert*, p. 575; *Grant* (1), p. 75; *id.* (2), p. 20.

♂ ♀. Ginting Bidei, Selangor, 2,300 ft. May, 1908.

The upper limit, from which this species has been recorded, is about 3,300 ft. In orchard land and low country secondary growth, it is common.

239. *DICÆUM IGNIPECTUS*—THE FIRE-BREASTED FLOWER-PECKER.

Dicæum ignipectus (Hodgs.); *Sharpe, t.c.*, p. 41; *Sharpe* (2), p. 441; *Bonhote*, p. 65; *Butler*, p. 22; *Hartert*, p. 575; *Grant* (1), p. 75; *id.* (2), p. 20.

Met with on nearly all the mountains of the Peninsula, but not particularly common on any of them and not found below about 3,500 ft.

240. *PRIONOCHILUS THORACICUS*—THE SCARLET-THROATED FLOWER-PECKER.

Prionochilus thoracicus (Temm.); *Sharpe, Cat.*, p. 67; *Grant* (2), p. 19.

The three specimens collected on Gunong Tahan appear to be the only record of the species from the Peninsula in recent years. It is, however, said to occur in "Malacca."

Digitized by Google

241. *PRIONOCHILUS MACULATUS*—THE SPOTTED FLOWER-PECKER.

Prionochilus maculatus (Temm.); *Sharpe, t.c.*, p. 69; *Butler*, p. 22; *Hartert*, p. 575; *Grant* (2), p. 20.

Ginting Bidei, Selangor, 2,300 ft. May, 1908.

Not normally found in the hill country at any great height, but fairly common at the above locality, where numerous specimens were collected.

ZOSTEROPIDÆ.

242. *ZOSTEROPS TAHANENSIS*—THE UPLAND WHITE EYE.

Zosterops aureiventer, Hartert (nec *Hume*), p. 575; *Grant* (nec *Hume*), (1), p. 75.

Zosterops tahanensis, Grant, *Bull. B.O.C.*, xix., No. cxxvii., p. 9 (1906); *id.* (2), p. 21.

♂, 2 ♀. Ginting Bidei, Selangor, 2,300 ft. May, 1908.

These three skins, when compared with a series of twenty-one specimens of typical *Z. aureiventer*, Hume, from the coasts of the Malay Peninsula and the islands in the immediate vicinity, clearly show the differences pointed out by Mr. Grant—viz., a darker green upper surface and darker grey under parts. In addition, the throat is a dull greenish yellow, not bright clear yellow as in *Z. aureiventer*, and the white ring round the eye is not so broad.

SUMMARY.

On summarising the foregoing list, we find that the mountains of the Malay Peninsula above the height of 2,300 ft.—the altitude of the Ginting Bidei Pass—are now known to be inhabited by 242 species, which, with very few exceptions, are represented by recently collected specimens of undoubted authenticity; of these 157 species are also met with at lower altitudes, and may be divided into the following classes:

A.—Migrants of wide distribution and of no importance for faunal discussion:

1. Rallina superciliaris
2. Caprimulgus jotaka
3. Cypselus pacificus
4. Cacomantis merulinus
5. Hierococcyx fugax
6. Hirundo gutturalis
7. Alseonax latirostris
8. Poliomyias luteola
9. Turdus obscurus
10. Petrophila gularis
11. Larvivora cyanea
12. Acanthopneuste coronata
13. Motacilla melanope
14. Limonidromus indicus
15. Dicrurus annectens

Digitized by Google

B.—Species ranging from Burma or Tenasserim to the Malay Peninsula, but no further—*i.e.*, species of Continental Type:

1. Ceyx tridactyla
2. Collocalia innominata
3. Chætura indica
4. Dichoceros bicornis
5. Rhopodytes tristis
6. Gecinulus viridis
7. Pericrocotus flammifer
8. Æthorhynchus lafresnayei
9. Pycnonotus finlaysoni
10. Herpornis zantholeuca
11. Geocichla innotata
12. Cittocincla macrura

C.—Species distributed from Tenasserim or beyond, through the Malay Peninsula to Sumatra and Borneo—*i.e.*, species of Generalised Malayan Type:

1. Rollulus roulroul
2. Butreron capellei
3. Treron nipalensis
4. Macropygia ruficeps
5. Chalcophaps indica
6. Accipiter gularis
7. Ictinaetus malayensis
8. Spizaetus alboniger
9. Alcedo euryzona
10. Rhytidoceros undulatus
11. Anorrhinus galeritus
12. Berenicornis comatus
13. Rhinoplax vigil
14. Nyctiornis amicta
15. Chætura leucopygialis
16. Tachornis infumata
17. Macropteryx longipennis
18. Macropteryx comata
19. Pyrotrogon duvauceli
20. Pyrotrogon orescius
21. Surniculus lugubris
22. Centropus sinensis
23. Zanclostomus javanicus
24. Urococcyx erythrognathus
25. Calorhamphus hayi
26. Cyanops mystacophanes
27. Gecinus observandus
28. Gauropicoides rafflesi
29. Pyrrhopicus porphyromelas
30. Miglyptes grammithorax
31. Miglyptes tukki
32. Micropternus brachyurus
33. Chrysophlegma malaccense
34. Chrysophlegma humii
35. Hemicercus sordidus
36. Calyptomena viridis
37. Eurylæmus javanicus
38. Corydon sumatranus
39. Cyornis unicolor
40. Cyornis tickelliæ
41. Terpsiphone affinis
42. Philentoma velatum
43. Philentoma pyrrhopterum
44. Culicicapa ceylonensis
45. Chloropsis zosterops
46. Chloropsis cyanopogon
47. Hemixus malaccensis
48. Microtarsus melanoleucus
49. Criniger tephrogenys
50. Alophoixus phæocephalus
51. Trachycomus ochrocephalus
52. Tricholestes criniger
53. Pycnonotus simplex
54. Rubigula cyaniventris
55. Turdinus abbotti
56. Setaria magnirostris
57. Drymocataphus nigricapitatus
58. Copsychus musicus
59. Orthotomus atrigularis
60. Melanochlora flavocristata
61. Dissemurus paradiseus
62. Chaptia malayensis
63. Chalcoparia singalensis
64. Munia acuticauda
65. Anthothreptes hypogrammica
66. Arachnothera modesta
67. Arachnothera longirostris
68. Arachnothera crassirostris
69. Dicæum trigonostigma

Digitized by Google

D.—Species ranging from the islands of Sumatra, Borneo, or Java to the Malay Peninsula, but not to Tenasserim—*i.e.*, species of Insular Type:

1. Rhizothera longirostris
2. Osmotreron olax
3. Ptilinopus jambu
4. Carpophaga badia
5. Buceros rhinoceros
6. Lyncornis temmincki
7. Collocalia linchi
8. Chætura gigantea
9. Pyrotrogon neglectus
10. Rhopodytes sumatranus
11. Chotorhea chrysopogon
12. Chotorhea versicolor
13. Mesobucco duvauceli
14. Chrysocolaptes validus
15. Sasia everetti
16. Erythromyias muelleri
17. Gerygone modiglianii
18. Hypothymis azurea
19. Rhinomyias pectoralis
20. Stoparola thalassinoides
21. Lalage culminata
22. Chloropsis icterocephala
23. Hemixus cinereus
24. Iole olivacea
25. Criniger finschii
26. Rubigula webberi
27. Eupetes macrocercus
28. Pomatorhinus borneensis
29. Turdinus sepiarius
30. Setaria cinerea
31. Anuropsis malaccensis
32. Alcippe cinerea
33. Stachyris davisoni
34. Stachyris poliocephala
35. Stachyris leucotis
36. Stachyris nigricollis
37. Kenopia striata
38. Mixornis gularis
39. Macronus ptilosus
40. Myiophoneus dicrorhynchus
41. Geocichla interpres
42. Hydrocichla ruficapilla
43. Trichixus pyrrhopygus
44. Sutoria maculicollis
45. Lanius tigrinus
46. Tephrodornis gularis
47. Æthopyga temmincki
48. Anthothreptes rhodolæma
49. Prionochilus thoracicus
50. Prionochilus maculatus

E.—The following species are peculiar to the Malay Peninsula:

	Species.	Nearest ally.	Locality.
1.	Sphenocercus sp.	Sp. apicicauda	Tenasserim
2.	Syrnium maingayi	S. indranee	S. India
3.	Pernis tweedalii	P. cristatus	Tenasserim and Borneo
4.	Indicator malayanus	I. archipelagicus	Borneo
5.	Irena cyanea	I. puella	Tenasserim
6.	Turdinus macrodactylus	T. rufipectus	Sumatra
7.	Turdinulus granti	T. roberti	Tenasserim
8.	Stachyris poliogaster	S. rufifrons	,,
9.	Platylophus ardesiacus	P. coronatus	Sumatra and Borneo
10.	Dendrophila saturatior	D. frontalis	Tenasserim

Out of the 142 species that remain in this section, after excluding 15 migrant forms, no less than 122 are of distinctly Malayan type, while only 20 are confined to the mainland of Asia or, in the case of peculiar species, most closely related to species so confined.

Digitized by Google

We may, therefore, conclude that the bulk of the submontane avifauna (and by submontane is meant the region from about 3,000 ft. in altitude to the limits of the coastal zone) has been derived from the Sunda Islands to the East, West and South, and has not spread over the Peninsula by way of Tenasserim and Burma.

The remaining 85 species in the list are, so far as is at present known, strictly confined to the mountains above 3,000 ft., and include the greater portion of the species peculiar to the Peninsula.

On analysing the list in the same manner as the preceding section, we find that—

Seven species are migrants, met within the winter only:

1. Cuculus poliocephalus
2. Hemichelidon ferruginea
3. Hemichelidon fuliginosa
4. Cyanoptila bella
5. Cichloselys sibirica
6. Monticola solitaria
7. Anthus maculatus

Eighteen species occur elsewhere in the mountains of Tenasserim—viz.,

1. Syrnium newarense
2. Glaucidium brodiei
3. Pyrotrogon erythrocephalus
4. Cyanops ramsayi
5. Pyrrhopicus pyrrhotis
6. Psarisomus dalhousiæ
7. Nitidula hodgsoni
8. Pericrocotus fraterculus
9. Chloropsis hardwickii
10. Criniger ochraceus
11. Otocompsa flaviventris
12. Drymocataphus tickelli
13. Pteruthius æralatus
14. Mesia argentauris
15. Notodela leucura
16. Henicurus schistaceus
17. Arachnothera magna
18. Dicæum ignipectus

Eleven are high level Sumatran species—viz.,

1. Macropygia leptogrammica
2. Cyanops oorti
3. Psilopogon pyrolophus
4. Niltava decipiens
5. Cryptolopha trivirgata
6. Melanocichla lugubris
7. Rhinocichla mitrata
8. Stachyris bocagei
9. Turdinus loricatus
10. Sibia simillima
11. Pnoepyga lepida

Three species are found elsewhere only in Borneo—viz.,

1. Phyllergates cinereicollis
2. Abrornis schwaneri
3. Muscicapula westermanni

Four are common to the Malay Peninsula, Sumatra and Borneo—viz.,

1. Pericrocotus montanus
2. Oriolus consanguineus
3. Hierococcyx bocki
4. Picumnus innominatus

Three are found in the Malay Peninsula, Sumatra and Cochinchina—viz.,

1. Chætura cochinchinensis
2. Cyornis concreta
3. Bhringa remifer *

* Also in Java.

Digitized by Google

Two range from Tenasserim to Borneo—viz.,

1. Hemipus picatus *
2. Rhipidura albicollis (=atrata, Salvad.)

One is met with only in Malay Peninsula, Java and Timor—viz.,

1. Dendrophila azurea

While the remaining 36 species are peculiar to the Malay Peninsula.

Mountain species peculiar to the Malay Peninsula, with their nearest allies:

	Name.	Allied species.	Locality.
1.	Rheinwardtius nigrescens	R. ocellatus	Indo-China
2.	Arboricola campbelli	A. rubrirostris	Sumatra
3.	Polyplectron inopinatus	P. chalcurus	„
4.	Sphenocercus robinsoni	Sp. korthalsi	„
		Sp. permagnus	Loo Choo Islands
5.	Heteroscops vulpes	H. luciæ	Borneo
6.	Gecinus rodgeri	G. chlorogaster	Tenasserim
7.	Gecinus robinsoni	G. occipitalis	„
8.	Chrysophlegma wrayi	Ch. flavinucha	„
9.	Serilophus rothschildi	S. lunatus	„
10.	Anthipes malayana	A. submoniliger	„
11.	Cyornis malayensis	C. oatesi	„
12.	Muscicapula malayana	M. hyperythra	„
13.	Cryptolopha butleri	C. castaneiceps	Himalayas
14.	Cryptolopha davisoni	C. montis	Borneo
15.	Artamides larutensis	A. larvatus	Java
16.	Iole peracensis	I. tickelli	Tenasserim
17.	Gampsorhynchus saturatior	G. torquatus	„
18.	Trochalopteron peninsulæ	T. melanostigma	„
19.	Pomatorhinus wrayi	P. tickelli	„
20.	Corythocichla leucosticta	C. striatus	„
21.	Alcippe peracensis	A. nipalensis	„
22.	Pseudominla soror	P. castaneiceps	„
23.	Myiophoneus robinsoni	M. cyaneus	Java
24.	Brachypteryx wrayi	B. nipalensis	Tenasserim
25.	Siva malayana	S. castaneicauda	„
26.	Siva sordidior	S. sordida	„
27.	Cutia cervinicrissa	C. nipalensis	Karen-nee
28.	Pteruthius tahanensis	P. melanotis	Tenasserim
29.	Oreocichla affinis	O. horsfieldi	Java
30.	Suya waterstradti	S. superciliaris	Tenasserim
31.	Cissa robinsoni	Cissa minor	Sumatra
		C. jeffreyi	Borneo
32.	Pyrrhula waterstradti	P. nipalensis	Tenasserim

* *Hemipus intermedius*, Salvad., in Sumatra.

Digitized by Google

	Name.	Allied species.	Locality.
33.	Chlorura sp.	C. borneensis	Borneo
34.	Æthopyga anomala	Æ. saturata	Tenasserim
35.	Æthopyga wrayi	Æ. saturata	„
36.	Zosterops tahanensis	Z. aureiventer	Tenasserim, Java

With regard to the range of the endemic Peninsular forms, it may be noted that they are very evenly distributed throughout the main range, from as far north as has been explored to Gunong Ulu Kali in Selangor; south of Ginting Bidei in Selangor, practically all disappear; Gunong Angsi in Negri Sembilan, 3,000 ft., app., and Mt. Ophir on the borders of Malacca and Johore possessing none.

The hills behind Lakon in the N.-E. Coast of the Peninsula, which attain a height of over 5,000 ft. and have not yet been explored, may possibly yield further species, in view of the fact that the Trang hills on the same latitude on the West Coast, which are, however, of less elevation, undoubtedly possess certain mountain forms; the specific distinctness, however, of a proportion of the forms described therefrom is open to question.

Further analysis of this list of 77 resident mountain species discloses the fact that the larger proportion is derived from Tenasserim and the mainland of Asia, and not from the Sunda Islands, as is the case with the submontane forms, which is clearly shown by the following tables:

Submontane avifauna, 142 species—

	No.		Per cent.
Peculiar species	10	...	7.0
Species occurring on mainland only	13	...	9.3
„ „ islands only ...	50	...	35.2
„ of continental facies ...	20	...	14.1
„ of insular facies	122	...	85.9

Montane avifauna, 77 species—

	No.		Per cent.	
Peculiar species	36	...	46.8	
Species occurring on mainland only	18	...	23.4	
„ „ islands only ...	18	...	23.4	
„ of continental facies ...	44	...	57.1	
„ of insular facies	28	...	36.4	100
Neutral	5	...	6.5	

On going through the list in detail, one is struck, on the whole, by the lack of differentiation in the species; for, though 46 out of the 242 are not found elsewhere, hardly any of them are much more than subspecies and only nine or ten are really distinct forms. The mountains of the Malay Peninsula have been about equally well explored with Kina Balu, and what they lack in height, as compared with that mountain, they make up in area. The present list comprises 242

Digitized by Google

species included in 176 genera, while Whitehead records 159 species in 124 genera from the Bornean mountain.

But the Malay Peninsula contains no peculiar genus, while Kina Balu possesses no less than seven—viz.,

Chlamydochæra	Orthnocichla
Oreoctistes	Allocotops
Chlorocharis	Androphilus

Hæmatortyx

Several genera occur both in Tenasserim, Borneo and Sumatra, but find no representative species in the Malay Peninsula—viz.,

Merula	Staphidia

Garrulax

nor are—

Cettia	Hyloterpe

found on Kina Balu, met with here.

On the other hand, Himalayaic genera, not met with in the Sunda Islands, occur in the Peninsula—viz.,

Serilophus	Pseudominla
Nitidula	Siva
Gampsorhynchus	Cutia
Trochalopteron	Pyrrhula

As do also representatives of the Sumatran genera:

Chalcurus (Polyplectron)	Rhinocichla
Psilopogon	Melanocichla

which are not met with either in Tenasserim or Borneo.

Those few mammals that are known to be confined to the high mountains support the view that the fauna of the central chain has been very largely derived from the continental land masses to the North. These species are:

Name.	Nearest ally.	Locality.
Sciurus castaneiventris griseopectus	Sc. c. griseopectus	Assam
Sciurus tenuis tahan	Sc. tenuis	Low country, Malay Peninsula
Sciurus macclellandi novemlineatus	Sc. mc. typicus	Tenasserim
Funambulus rufigenis belfieldi	F. rufigenis typicus	,,
Mus ciliatus	Mus edwardsi	Yunnan
Mus ferreocanus	Mus berdmorei	Mergui
Mus bukit	Mus jerdoni	Tenasserim

In conclusion, it may, I think, be taken as proved:

(1) That the origin of the submontane species of the Peninsula is Indo-Malayan and comparatively recent in time, the species have spread N.-W. from the Sunda Islands rather than S.-E. from Burma.

Digitized by Google

(2) That the actual mountain fauna is composed of two elements—viz.,

(*a*) Continental,

(*b*) Sumatran,

(*a*) is largely in excess and consists of species, for the most part, identical or only slightly differentiated from the congeneric forms in Tenasserim and Burma at similar elevations;

(*b*) is less dominant and comprises species identical with or very closely allied to West Sumatran mountain species.

(3) That the connection with the Bornean mountain fauna is very distant. We may also infer that, at some geological epoch by no means distant, the land area of the Peninsula was very much less than is at present the case, and that the connection with Tenasserim has been continuous or only interrupted for very brief spaces both in time and distance.

(4) That there has been a direct land connection with Sumatra, also in comparatively recent times.

(5) That the southern portion of the Peninsula—from some point N. of the mouth of the Muar River, including Mt. Ophir, and the area on the east side of the Peninsula, south of the Pahang River, at its confluence with the Triang—has been at some very recent time disconnected with the mainland. This is shown, by the entire absence of all Tenasserim and endemic species of birds, and by the fact that the line roughly indicated is the southern boundary of such continental mammals, as *Sc. concolor* and *Sc. macclellandi*; while it is the northern limit of such insular forms as *Sus vittatus* and *Sc. peninsularis*.

F.M.S. Government Press.

Digitized by Google

RECEIVED
MAY 1 3 1916
LIBRARY OF THE PEABODY MUSEUM

No. 1.] [Vol. I.

JOURNAL

OF THE

FEDERATED MALAY STATES MUSEUMS.

TAIPING & KUALA LUMPUR, JANUARY, 1905.

CONTENTS.

	Page.
The Eggs and Embryos of Schlegel's Gavial (*Tomistoma schlegeli*, S. Müll.), by A. L. Butler...	1
Report on *Termes gestroi* as affecting Para Rubber, by H. C. Robinson	2
Further Notes on the Cave Dwellers of Perak (with three plates), by L. Wray	13
Note on a Genus of Butterflies new to the Malay Peninsula, by H. C. Robinson	15
Note on a Blight affecting Sugar Canes at Nova Scotia Estate, Lower Perak, by L. Wray	15
Note on *Ratufa bicolor*, the large Malay Squirrel, by F. W. Knocker	17
Further additions to the Batrachian Fauna of the Malay Peninsula, with a List of the Species at present known to occur therein, by H. C. Robinson	19
A Malay Method of Treating Toothache, by L. Wray	25
List of a small Collection of Mammals, Birds and Batrachians from Gunong Angsi, Negri Sembilan, by H. C. Robinson	25
Correction, Letter from Sir D. Morris	30
Note on a Sample of Coal from Upper Perak, by L. Wray ...	30
Report on the Perak Museum for 1903	31
Report on the Selangor Museum for 1903	35

PRICE 75 CENTS.

KUALA LUMPUR:

PRINTED AT THE F.M.S. GOVERNMENT PRINTING OFFICE.

1905.

200/1-05.

Digitized by Google

NOTICE.

From time to time, as material is available, it is proposed to publish numbers of this periodical. The dates of publication cannot be stated, but it is hoped that it will be possible to issue one volume of four parts every year. It will include matter more or less connected with Museum work and the results of any investigations and researches carried on by the Members of the Staff of the Federated Malay States Museums.

These Notes will take the place of the "Perak Museum Notes"; the first number of which was issued in 1893. It has, unfortunately, not appeared for some years past, owing to the inability of the Perak Government Printer to spare the type necessary to print it.

Copies may be obtained on application at the Perak or Selangor Museum.

	$	cts.
Annual Subscription	2	50
Single Copy		75

FEDERATED MALAY STATES.

LIST

OF

TAMIL PROPER NAMES.

COMPILED BY

A. V. BROWN,

(Federated Malay States Civil Service).

BY AUTHORITY.

PRICE FIFTY CENTS.

ON SALE AT THE F.M.S. GOVERNMENT PRINTING OFFICE,
KUALA LUMPUR.

Digitized by Google

SECOND EDITION.

HANDBOOK

OF THE

FEDERATED MALAY STATES:

CONTAINING

INFORMATION REGARDING THE CONDITIONS OF THE COUNTRY AND THE FIELD WHICH IT OFFERS TO DIFFERENT CLASSES OF THE PUBLIC.

COMPILED BY

H. CONWAY BELFIELD,
Acting British Resident of Perak.

PRICE $1.75.

To be obtained at the F.M.S. Government Printing Office, Kuala Lumpur.

NOW READY.

A HOKKIEN COLLOQUIAL MANUAL

IN

TWO PARTS

CONTAINING THE

CHINESE TEXT AND ENGLISH TEXT WITH NOTES

AND A

CHINESE ROMANISED VERSION.

EDITED BY

G. T. HARE, C.M.G., C.I.S.O.

PRICE FIVE DOLLARS EACH PART.

Copies can be obtained on application at the Government Printing Press in Kuala Lumpur, Selangor; at the Colonial Secretary's Office, Singapore; or at Messrs. Kelly & Walsh, Singapore, Hongkong and Shanghai.

Digitized by Google

NOTICE.

From time to time, as material is available, it is proposed to publish numbers of this periodical. The dates of publication cannot be stated, but it is hoped that it will be possible to issue one volume of four parts every year. It will include matter more or less connected with Museum work and the results of any investigations and researches carried on by the Members of the Staff of the Federated Malay States Museums.

This Journal will take the place of the "Perak Museum Notes"; the first number of which was issued in 1893.

Copies may be obtained on application at the Perak or Selangor Museum, and at the Government Printing Office, Kuala Lumpur.

	$	cts.
Annual Subscription	2	50
Single Copy		75

CONTENTS OF No. 1.

	Page.
The Eggs and Embryos of Schlegel's Gavial (*Tomistoma schlegeli*, S. Müll.), by A. L. Butler...	1
Report on *Termes gestroi* as affecting Para Rubber, by H. C. Robinson	2
Further Notes on the Cave Dwellers of Perak (with three plates), by L. Wray	13
Note on a Genus of Butterflies new to the Malay Peninsula, by H. C. Robinson	15
Note on a Blight affecting Sugar Canes at Nova Scotia Estate, Lower Perak, by L. Wray	15
Note on *Ratufa bicolor*, the large Malay Squirrel, by F. W. Knocker	17
Further additions to the Batrachian Fauna of the Malay Peninsula, with a List of the Species at present known to occur therein, by H. C. Robinson	19
A Malay Method of Treating Toothache, by L. Wray	25
List of a small Collection of Mammals, Birds and Batrachians from Gunong Angsi, Negri Sembilan, by H. C. Robinson	25
Correction, Letter from Sir D. Morris	30
Note on a Sample of Coal from Upper Perak, by L. Wray ...	30
Report on the Perak Museum for 1903	31
Report on the Selangor Museum for 1903	35

Digitized by Google

NOW ON SALE.

A REPORT

UPON

AGRICULTURE

IN THE

FEDERATED MALAY STATES.

BY

JOHN C. WILLIS, F.L.S.,

Director of the Royal Botanic Gardens, Ceylon.

PUBLISHED BY AUTHORITY.

PRICE ONE DOLLAR.

On sale at the F.M.S. Government Printing Office, Kuala Lumpur.

NOW READY.

MANUAL OF STATISTICS

RELATING TO THE

FEDERATED MALAY STATES, 1904,

CONTAINING INFORMATION AND TABLES REGARDING

TAXES, DUTIES, FEES, ETC.;
REVENUE AND EXPENDITURE; PUBLIC WORKS; RAILWAYS;
SAVINGS BANKS; AREA AND POPULATION; EDUCATION;
EXCHANGES, MONEYS, WEIGHTS, ETC.;
TRADE RETURNS; AND METEOROLOGICAL NOTES AND STATISTICS.

PUBLISHED BY AUTHORITY.

PRICE ONE DOLLAR.

ON SALE AT THE F.M.S. GOVERNMENT PRINTING OFFICE,
KUALA LUMPUR.

Digitized by Google

NOW READY.

ROMANISED MALAY SPELLING.

BEING THE REPORT OF A COMMITTEE

APPOINTED BY THE

GOVERNMENT OF THE FEDERATED MALAY STATES

TO DISCUSS THE SUBJECT OF

WRITING MALAY IN THE ROMAN CHARACTER

TOGETHER WITH

A LIST OF MALAY WORDS

SPELT ACCORDING TO THE SYSTEM RECOMMENDED.

PUBLISHED BY AUTHORITY.

PRICE ONE DOLLAR.

ON SALE AT THE F.M.S. GOVERNMENT PRINTING OFFICE,
KUALA LUMPUR.

SECOND EDITION.

HANDBOOK

OF THE

FEDERATED MALAY STATES:

CONTAINING

INFORMATION REGARDING THE CONDITIONS
OF THE COUNTRY AND THE FIELD WHICH IT OFFERS
TO DIFFERENT CLASSES OF THE PUBLIC.

COMPILED BY

H. CONWAY BELFIELD,
Acting British Resident of Perak.

PRICE $1.75.

To be obtained at the F.M.S. Government Printing Office,
Kuala Lumpur.

Digitized by Google

No. 3.] [Vol. I.

RECEIVED
MAR 13 1916
LIBRARY OF THE
PEABODY MUSEUM

JOURNAL

FEDERATED MALAY STATES

MUSEUMS.

TAIPING & KUALA LUMPUR, JULY, 1905.

CONTENTS.

	Page.
On a New Species of *Mus* from Pulau Jarak, by J. Lewis Bonhote ...	69
Report on a Sample of "Minyak Surin" from the Federated Malay States, by Professor Wyndham R. Dunstan	70
A System for the Registration of the Contents of Museums, by L. Wray...	72
A Short Account of some "Ancient Remains" found on Gunong Jerai, Kedah (with one plan), by F. W. Irby	76
Fossil Tooth of *Elephas Namadicus* from Perak	81
Destruction of Noxious Animals (Extract from the Report on F.M.S. Police Force for the year 1904)	82
Report on the Museums Department for 1904	83
Report on the Perak Museum for 1904	87
Report on the Selangor Museum for 1904	97
On a New Species of Whistling-Thrush from Selangor, by W. R. Ogilvie-Grant	104
On a New Species of Tree-Partridge from the Mountains of the Malay Peninsula, by Herbert C. Robinson; with Notes, by W. R. Ogilvie-Grant	105

PRICE 75 CENTS.

KUALA LUMPUR:

PRINTED AT THE F.M.S. GOVERNMENT PRINTING OFFICE.

1905.

275/10-05.

Digitized by Google

NOTICE.

FROM time to time, as material is available, it is proposed to publish numbers of this periodical. The dates of publication cannot be stated, but it is hoped that it will be possible to issue one volume of four parts every year. It will include matter more or less connected with Museum work and the results of any investigations and researches carried on by the Members of the Staff of the Federated Malay States Museums.

This Journal will take the place of the "Perak Museum Notes"; the first number of which was issued in 1893.

Copies may be obtained on application at the Perak or Selangor Museum, and at the Government Printing Office, Kuala Lumpur.

	$	cts.
Annual Subscription	2	50
Single Copy		75

CONTENTS OF No. 1.

	Page.
The Eggs and Embryos of Schlegel's Gavial (*Tomistoma schlegeli*, S. Müll.), by A. L. Butler...	1
Report on *Termes gestroi* as affecting Para Rubber, by H. C. Robinson	2
Further Notes on the Cave Dwellers of Perak (with three plates), by L. Wray	13
Note on a Genus of Butterflies new to the Malay Peninsula, by H. C. Robinson	15
Note on a Blight affecting Sugar Canes at Nova Scotia Estate, Lower Perak, by L. Wray	15
Note on *Ratufa bicolor*, the large Malay Squirrel, by E. W. Knocker	17
Further additions to the Batrachian Fauna of the Malay Peninsula, with a List of the Species at present known to occur therein, by H. C. Robinson	19
A Malay Method of Treating Toothache, by L. Wray	25
List of a small Collection of Mammals, Birds and Batrachians from Gunong Angsi, Negri Sembilan, by H. C. Robinson	25
Correction, Letter from Sir D. Morris	30
Note on a Sample of Coal from Upper Perak, by L. Wray ...	30
Report on the Perak Museum for 1903	31
Report on the Selangor Museum for 1903	35

CONTENTS OF No. 2.

	Page.
Description of a New Frog of the Genus *Ixalus* from Selangor, by G. A. Boulenger (with plate)	39
Notes on the Sugar Cane Rat, *Mus jalorensis*, by L. Wray	39
A Synopsis of the Birds at present known to inhabit the Malay Peninsula south of the Isthmus of Kra, by H. C. Robinson	45
On a Flying-Squirrel (*Pteromys*) from Perak, by F. W. Knocker... ...	57
A Rare Squirrel from Kuala Lumpur, by H. C. Robinson	60
A Sakai Counting-Stick or Tally, by F. W. Knocker (with plate) ...	60
Note on the Malay Sapi Utan, by R. Lydekker	61
Rhinoceros Trapping, by L. Wray	63
On a Squirrel New to the Fauna of the Malay Peninsula, by H. C. Robinson	65
Notes on Para Rubber Seed Oil, by L. Wray	66

Digitized by Google

NOW ON SALE.

A REPORT

UPON

AGRICULTURE

IN THE

FEDERATED MALAY STATES.

BY

JOHN C. WILLIS, F.L.S.,

Director of the Royal Botanic Gardens, Ceylon.

PUBLISHED BY AUTHORITY.

PRICE ONE DOLLAR.

On sale at the F.M.S. Government Printing Office, Kuala Lumpur.

NOW READY. *SECOND EDITION.*

PRICE FIFTY CENTS.

MANUAL OF STATISTICS

RELATING TO THE

FEDERATED MALAY STATES, 1904,

CONTAINING INFORMATION AND TABLES REGARDING

TAXES, DUTIES, FEES, ETC.; REVENUE AND EXPENDITURE; TELEGRAPH AND TELEPHONE LINES; PUBLIC WORKS; RAILWAYS; SAVINGS BANKS; AREA AND POPULATION; EDUCATION; EXCHANGES, MONEYS, WEIGHTS, ETC.; TRADE RETURNS; AND METEOROLOGICAL NOTES AND STATISTICS.

PUBLISHED BY AUTHORITY.

PRICE FIFTY CENTS.

On sale at the F.M.S. Government Printing Office, Kuala Lumpur; Messrs. Kelly & Walsh, Singapore; Messrs. Pritchard & Co., Penang; and Messrs. Wyman & Son, London.

Digitized by Google

NOW READY.

ROMANISED MALAY SPELLING.

BEING THE REPORT OF A COMMITTEE

APPOINTED BY THE

GOVERNMENT OF THE FEDERATED MALAY STATES

TO DISCUSS THE SUBJECT OF

WRITING MALAY IN THE ROMAN CHARACTER

TOGETHER WITH

A LIST OF MALAY WORDS

SPELT ACCORDING TO THE SYSTEM RECOMMENDED.

PUBLISHED BY AUTHORITY.

PRICE ONE DOLLAR.

ON SALE AT THE F.M.S. GOVERNMENT PRINTING OFFICE,
KUALA LUMPUR.

SECOND EDITION.

HANDBOOK

OF THE

FEDERATED MALAY STATES:

CONTAINING

INFORMATION REGARDING THE CONDITIONS
OF THE COUNTRY AND THE FIELD WHICH IT OFFERS
TO DIFFERENT CLASSES OF THE PUBLIC.

COMPILED BY

H. CONWAY BELFIELD,
Acting British Resident of Perak.

PRICE $1.75.

To be obtained at the F.M.S. Government Printing Office,
Kuala Lumpur.

Digitized by Google

No. 4.] [Vol. I.

RECEIVED
MAY 21 1906
LIBRARY OF THE
PEABODY MUSEUM

JOURNAL

FEDERATED MALAY STATES MUSEUMS.

TAIPING & KUALA LUMPUR, MAY, 1906.

CONTENTS.

Page.

On a collection of *Longicorn Coleoptera* from Selangor and Perak, by Charles J. Gahan (with plate) 109

Notes on the Petrology of Stone Implements from the Federated Malay States, by J. B. Scrivenor 123

A Synopsis of the Birds at present known to inhabit the Malay Peninsula, south of the Isthmus of Kra, by Herbert C. Robinson (*continued*) ... 124

Return of Thermometer Readings at Trig. Stations in the F.M.S. in order of Altitude (Extract from the Report on the Trigonometrical and General Survey Department for the year 1905) 133

PRICE 75 CENTS.

KUALA LUMPUR:
PRINTED AT THE F.M.S. GOVERNMENT PRINTING OFFICE.
1906.
275/5-06.

Digitized by Google

NOTICE.

FROM time to time, as material is available, it is proposed to publish numbers of this periodical. The dates of publication cannot be stated, but it is hoped that it will be possible to issue one volume of four parts every year. It will include matter more or less connected with Museum work and the results of any investigations and researches carried on by the Members of the Staff of the Federated Malay States Museums.

This Journal will take the place of the "Perak Museum Notes"; the first number of which was issued in 1893.

A HOKKIEN COLLOQUIAL MANUAL

IN

TWO PARTS

CONTAINING THE

CHINESE TEXT AND ENGLISH TEXT WITH NOTES

AND A

CHINESE ROMANISED VERSION.

EDITED BY

G. T. HARE, C.M.G., C.I.S.O.

PRICE FIVE DOLLARS EACH PART.

Copies can be obtained on application at the Government Printing Office in Kuala Lumpur, Selangor; at the Colonial Secretary's Office, Singapore; or at Messrs. Kelly & Walsh, Singapore, Hongkong and Shanghai.

FEDERATED MALAY STATES.

LIST

OF

TAMIL PROPER NAMES.

COMPILED BY

A. V. BROWN,

(FEDERATED MALAY STATES CIVIL SERVICE).

BY AUTHORITY.

PRICE FIFTY CENTS.

ON SALE AT THE F.M.S. GOVERNMENT PRINTING OFFICE,
KUALA LUMPUR.

Digitized by Google

A REPORT

UPON

AGRICULTURE

IN THE

FEDERATED MALAY STATES.

BY

JOHN C. WILLIS, F.L.S.,
Director of the Royal Botanic Gardens, Ceylon.

PUBLISHED BY AUTHORITY.

PRICE ONE DOLLAR.

On sale at the F.M.S. Government Printing Office, Kuala Lumpur.

PRICE FIFTY CENTS.

MANUAL OF STATISTICS

RELATING TO THE

FEDERATED MALAY STATES, 1904,

CONTAINING INFORMATION AND TABLES REGARDING

TAXES, DUTIES, FEES, ETC.; REVENUE AND EXPENDITURE; TELEGRAPH AND TELEPHONE LINES; PUBLIC WORKS; RAILWAYS; SAVINGS BANKS; AREA AND POPULATION; EDUCATION; EXCHANGES, MONEYS, WEIGHTS, ETC.; TRADE RETURNS; AND METEOROLOGICAL NOTES AND STATISTICS.

PUBLISHED BY AUTHORITY.

PRICE FIFTY CENTS.

On sale at the F.M.S. Government Printing Office, Kuala Lumpur; Messrs. Kelly & Walsh, Singapore; Messrs. Pritchard & Co., Penang; and Messrs. Wyman & Son, London.

Digitized by Google

Digitized by Google

No. 2.] [Vol. II.

JOURNAL

OF THE

FEDERATED MALAY STATES

MUSEUMS.

TAIPING & KUALA LUMPUR, DECEMBER, 1907.

CONTENTS.

	Page.
The Malay Varnish called "Getah Luli," by L. Wray	49
"Biak:" An Opium Substitute, by L. Wray	53
"Suji Timba," by L. Wray	56
Two Rubber Pests, by L. Wray	59
Die Inlandstämme der Malayischen Halbinsel, by Dr. Rudolf Martin ...	61
The Food of the Hamadryad, by L. Wray	64
Report on *Erythroxylon Coca* Leaves from Perak, by Prof. Wyndham R. Dunstan	65
A Hand-List of the Birds of the Malay Peninsula, South of the Isthmus of Kra, by Herbert C. Robinson	66
Report on a Sample of Lead Ore from Pahang, by L. Wray...	83
Report by Director of Museums, F.M.S., 1906	84
Report on the Perak Museum, 1906	87
Report on the Selangor Museum, 1906	97

PRICE 75 CENTS.

KUALA LUMPUR:

PRINTED AT THE F.M.S. GOVERNMENT PRINTING OFFICE.

1907.

275/12-07.

Digitized by Google

NOTICE.

FROM time to time, as material is available, it is proposed to publish numbers of this periodical. The dates of publication cannot be stated, but it is hoped that it will be possible to issue one volume of four parts every year. It will include matter more or less connected with Museum work and the results of any investigations and researches carried on by the Members of the Staff of the Federated Malay States Museums.

This Journal will take the place of the "Perak Museum Notes"; the first number of which was issued in 1893.

CONTENTS OF No. 1.

	Page.
Notes on the New Anti-opium Drug, by L. Wray	1
A Visit to the Aroa Islands, with a List of Birds found there, by Herbert C. Robinson	8
"Kain Pelangi," by L. Wray	17
Reports on Corundum from Perak, F.M.S., by Prof. Wyndham R. Dunstan	19
Report by Director of Museums, F.M.S., 1905...	26
Report on the Perak Museum, 1905	27
Report on the Selangor Museum, 1905...	44

Digitized by Google