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Notes on the Millipedes, Centipedes, Scorpions, etc., of the Malay Peninsula and Siam.

By Captain Stanley S. Flower, 5th Fusiliers.

I. Introductory Remarks.

The animals which this paper is about, from their strange shapes, curious habits and the power of inflicting dangerous wounds which some possess, are of interest to most people, but especially to those who, having been brought up in England, where none but very small and harmless species exist, come to live in the East Indies, where a wonderful variety of these creatures flourish. However little one may care for natural history, one must come in contact with them, millipedes, centipedes, scorpions and spiders all entering houses and often turning up where least wanted, even in one's bath-sponge and bedding. When I arrived in the Straits Settlements, in March 1895, I knew practically nothing of these animals, how they were classified, how to distinguish between them, or which were poisonous and which harmless, and in no book or paper could I find the information wanted, so I set to work to collect and examine specimens, and compare them with such literature on the subject as was available. Mr. R. J. Pocock, of the British Museum of Natural History, most kindly gave me invaluable assistance in identifying specimens, and answering questions of all sorts about these animals, and finally has been so good as to look through my notes made in the Peninsula and Siam from 1895 to 1898. These notes, then, I venture to lay before the Society, hoping they may be of use to residents in the Straits, Native States and Siam, who are interested in these strange animals, and also hoping that they may help some more competent writer to compose a full catalogue.

The specimens I collected were distributed between the British Museum, and the Royal Siamese Museum, Bangkok; except some now in the Raffles Museum.

II. Position in the Animal Kingdom.

Millipedes, centipedes, scorpions and spiders all belong to the great collection of invertebrate animals with jointed legs which is for convenience grouped together and called the Sub-kingdom ARTHROPODA (or GNATHOPODA). Various opinions are held by naturalists as to the divisions into which this Sub-kingdom should be divided. Valuable papers on the subject appeared in "Natural Science" in 1897, by Mr. R. J. Pocock in the February number (p. 114), and by Prof. Ray Lankester in the April number (p. 267); from these the following provisional classification is adopted.

Sub-kingdom *Arthropoda*.

SECTION I. Prototracheata (or Malacopoda).

Class (i). *Prototracheata* (or *Peripatoidea*).

Containing the single family Peripatidæ, now divided into about four genera. A single specimen is on record from Sumatra, and Mr. H. N. Ridley informs me that the Skeat expedition recently obtained it in the Malay Peninsula. This very interesting animal has somewhat the general external appearance of a caterpillar, it has a pair of antennæ, and in the Sumatran specimen 24 pairs of legs (t. Sedgwick, Cambridge Nat. Hist., vol. v, 1895, p. 26).

SECTION II. Tracheata (or Lipobranchia).

Subdivision A.—Progoneata (or Prosthogonea).

Class (ii). *Diplopoda*. "Millipedes" (vide post).

Class (iii). *Pauropoda*. Containing the single family Pauropidæ.

Minute creatures with twelve body segments and branched antennæ; which I believe have not so far been found in Malaya.

Class (iv). *Symphyla*. Containing the single family Scolopendrellidæ (vide post).

Subdivision B.—Opisthogoneata (or Opisthogonea).

Class (v). *Chilopoda*. "Centipedes" (vide post).

Class (vi). *Hexapoda* (or *Insecta*). The true insects, such as wasps, flies, butterflies, beetles, grasshoppers, etc., etc., divided into several orders.

SECTION III. Branchiata (or Acerata, or Sozo-branchia).

Class (vii). *Crustacea*. Crabs, lobsters, shrimps, wood-lice, barnacles, etc., etc., divided into several orders.
Class (viii). *Gigantostraca*, divided into 3 orders:—
1st Order *Xiphosura*. Containing the single family Limulidæ (vide post).
2nd order *Merostomata* (or *Eurypterida*), extinct.
3rd order *Trilobita*, extinct. [It is probable that the Trilobita should form a distinct class].
Class (ix). *Arachnida*. Scorpions, spiders, etc., (vide post).
Class (x). *Pantopoda* (or *Pycnogonida*) "Sea-spiders."

II. Diplopoda.

The Millipedes, Class *Diplopoda*, are invertebrate animals found in all temperate and tropical regions, herbivorous, slow-moving and incapable of biting a human being, some are nearly 10 inches (254 mm.) in length. *Head.* The head is distinct and has a pair of short antennæ (composed of seven or eight segments) in front and two pairs of jaws on its lower surface. *Body.* The body is more or less elongated and consists of from 9 to over 100 segments, all much alike in structure. The majority of species are nearly cylindrical in cross section (but some are flattened), each segment being cased in a horny ring. *Legs.* The bases of the legs are almost in contact in the middle of the lower surface of the body, there are two pairs to most of the segments, the last pair of legs are never elongated.

Native Names for Millipedes.

Malay, *Gongok*, *Ulat-bulan*.
Siamese, *King keu*. [1894, p. 56).
Jakan, *Gr-gok* (Lake+Kelsall, J. S. B. R. A. S., No. 26,

Occasionally Millipedes are met with in very large numbers. The late Mr. Whitehead in his book "Kinabalu," p. 17, describing his visit to Malacca, writes, "On the way down from Mount Ophir I saw a wonderful gathering of pale yellow Millipedes,

about six inches long; they were in a mass, one on the top of the other, which must have numbered several hundreds, and reminded me of a huge dish of macaroni." And I myself saw enormous numbers on the island of Kosichang, in the Gulf of Siam, when visiting it on the 27th and 28th of August 1897; the following extract from my diary may be of interest:—

"The chief living feature of the island was the Millipedes. From sea-level to the top of the hill, all about the ground under the shade of the trees and in the hot midday sunshine they were crawling about in hundreds and hundreds; the big red-brown ones (*Thyropygus*) were particularly conspicuous, 5, 6 or 7 often to be seen crossing the path within a few yards: some of these were uniform in colour, others banded alternately lighter and darker; then there were smaller Millipedes of a beautiful grey colour, and flattened ones (*Orthomorpha*); when we turned over dead leaves in the wood we found in the soil many small white-legged Millipedes, which when disturbed sprang about, very lively, hopping an inch or two off the ground, and were quite difficult to catch; a contrast to the numberless "Tikal" Millipedes (*Zephronia*), which were exceedingly numerous on the artificial stone work, and which when picked up always rolled into a ball and remained quite quiet." At the end of February 1898, I was again at Kosichang; *not one single Millipede was to be seen* abroad, but we found a few by searching in damp spots, underneath timber, old tins, etc. This shows how the different seasons affect these animals; and how a locality where in the dry season there seem to be none, in the wet season literally swarms with Millipedes.

An anomymous writer in a Singapore paper of(? 13th) October 1897, gives the following Malay account of the evolution of Millipedes, etc.:—"There is a belief that if the vertebral bone of a fish is kept under a mattress for some time it becomes a centipede, and that the strands which are found between the pulp and the rind of a plantain, commonly known as pisang klat, when securely bottled up and kept in a dark corner become Millipedes. There is also a belief that a fresh water fish, not unlike the European sly, and known to the natives as 'ekan klee,' is generated from a tadpole."

Key to Classification of Millipedes.

I. Body furnished with tufts of scale-like hairs. Antennæ eight jointed. Scent-glands absent. *Sub-class PSELAPHOGNATHA;* contains the single family *Polyxenidæ*, minute millipedes, "only about one tenth of an inch long" (Pocock, R. N. H. vol. vi, p. 209), so far not known from the Malay Peninsula.

II. Body not furnished with tufts of scale-like hairs. Antennæ seven jointed. Scent-glands usually present. *Sub-class CHILOGNATHA*; divided into three orders.

A. Body short and broad, 12 or 13 segments, second and last segments enormously enlarged, capable of being rolled into a ball, no scent-glands. *Order* ONISCOMORPHA.

B. Body elongate, 19 or more segments, none of them very much larger than the rest, capable of being spirally coiled (except *Sphæriodesmus*).

A. Last back plate forms a hood over the last pair of legs, 19 or 20 segments, no scent-glands, no known species exceeds a quarter of an inch (6 mm.) in length. *Order* LIMACOMORPHA, contains the single family *Glomeridesmidæ;* a species occues in Sumatra.

B. Last back plate forms a complete ring, enclosing the anal valves, 19 to over 100 segments, some species exceed $9\frac{3}{4}$ inches (say 250 mm. in length). *Order* HELMINTHOMORPHA.

a' Mandibles degenerate, from about 30 to over 100 segments, species seldom exceed $1\frac{1}{2}$ inch (38 mm.) in length. Sub-order *Colobognatha.*

b' Mandibles normal.

a''. Pedal laminæ free, 30 to 32 segments, Sub-order *Chordeumoidea.* Small Millipedes known from Sumatra, Burmah, etc., but so far not from the Malay Peninsula.

b''. Pedal laminæ united to the terga.

a'''. From about 30 to over 70 segments, Sub-order *Iuloidea.*

b'''. 19 or 20 segments, Suborder *Polydesmoidea.*

Sub-class *Chilognatha.*

Order *Oniscomorpha.*

Short, robust Millipedes, convex above and flat below, capable of rolling themselves into a ball, hence popularly called "Pill Millipedes." The body consists of 12 or 13 segments, of which the first is very small, the second is enermously expended at the sides, and the last expended laterally and posteriorly, so as to entirely cover the anal region. Each typical body segment consists of 7 pieces; a large vaulted semi-circular horny plate forming the upper surface, and concealing the legs, beneath this on each side a small pleural plate, and between this and the two legs two still smaller tracheal plates bearing the stigmata, one corresponding to each leg. The legs are in contact in the middle line of the body, and those of the last pair, or last two pairs, are enlarged in the male and transformed into a pair of clasping organs. The back plates are not furnished with scent-pores. Pill-millipedes are found in North America, Europe, Africa, Asia and Australasia; some species attain a length of over 2¼ inches (or 60 mm.); they are divided into two families:—

A. 12 segments, antennæ close together. *Glomeridæ.*
B. 13 segments, antennæ further apart. *Zephroniidæ.*

Pill-millipedes may possibly be confounded at first sight with Woodlice, belonging to the Crustacea, and with certain wingless Cockroaches, belonging to the Hexapoda, which both occur in similar localities and surroundings; the cockroach can be at once detected by having only 3 pairs of legs, and the woodlouse by its having only one pair of legs to each segment, instead of two pairs to most segments as in the Millipedes. "Moreover, the hinder end of the body in the crustacean is composed of a number of small segments more or less closely crowded together, but in the Pill-millipede the last segment is much enlarged, and acts as a kind of protective cover to the lower side of the body when it is spherically rolled. Of course there are other differential characteristics between the two not less striking than that already mentioned; but it is needless to enter into them here." Pocock, J. B. N. H. S. vol. xii, p. 269 (1899).

Family *Glomeridæ.*

Pill-millipedes with the antennæ relatively close together on the front of the head, eyes with a single (lateral vertical) row of ocelli, a conspicuous horse-shoe shaped "sensory" organ between the eyes and the antennæ, and the body consisting of twelve segments; they are usually of small size, under $\frac{5}{8}$ of an inch (15 mm.) in length, and are found in England, Europe, North America, and parts of Asia. Though species of *Glomeris* are known from Tenasserim, Sumatra and Borneo, they have not yet, to my knowledge, been recorded from the Malay Peninsula.

Family *Zephroniidæ.*

Pill-Millipedes with the antennæ widely separated, situated completely at the sides of the head, eyes composed of a spherical cluster of ocelli, no "sensory" organ on the face between the eyes and the antennæ, and the body consisting of thirteen segments; they attain a length of over $2\frac{1}{4}$ inches (say 60 mm.), and are found in Africa, Madagascar, India, Ceylon, Sikkim, Burma, Siam, Cochin China, the Malay Peninsula and Archipelago, Australia and New Zealand. Over sixty species are known, divided into about seven genera. "A Monograph of the Zephroniidæ inhabiting India, Ceylon and Burmah" by Pocock, will be found in the Journal of the Bombay Nat. His. Society, vol. xii, (1899), pp. 269-285 and 465-474.

Genus *Sphæropæus*, Brandt.

Apex of the legs broad and truncate, the upper angle bearing a long spine above the claw, there being a considerable space between the claw and the spine.

1. *Sphæropæous zonatus*, Pocock. A.+M.N.H. Ser. 6, vol. xvi, 1895, p. 412. Recorded from Malacca.

2. *Sphæropæus bimaculatus*, Pocock. A.+M. N. H. Ser. 6, vol. xvi, 1895, p. 412. Recorded from Singapore.

Genus *Zephronia*, Gray.

Apex of the legs narrowed and pointed, the spine and the claw nearly contiguous.

3. *Zephronia anthracina*, Pocock. A.+M. N. H. Ser. 6, vol. xvi, 1895, p. 413. Entirely black, shining; reaches a length of 52 mm. recorded from Perak.

4. *Zephronia impunctata*, Pocock. A +M. N. H. Ser. 6, vol. xvi, 1895, p. 413. Pitchy black hinder borders of terga obscurely ferruginous, legs olivaceous; length 36. mm. I found a single specimen (the type) in the jungle near the big waterfall in the Botanical Gardens, Penang, in March 1895.

I got specimens of *Zephronia* also from Singapore, Selangor and Kosichang, of so far undetermined species.

Order *Helminthomorpha*,

Sub-order *Colobognatha*.

Small Millepedes, largest about 1½ inches (or 40 mm.) in length, with elongate bodies composed of from about 30 to over 100 segments; head often tucked under the first segment; mouth more or less adapted for sucking, the jaws being degenerate; known from England and also from most warm parts of the world; divided into several families.

Family *Pseudodesmidæ*.

5. *Pseudodesmus verrucosus*, Pocock. A.+M. N. H. Sept.'87, p. 222. Originally described from a Perak specimen, 34 mm. in length. In Sept. '97 I found one specimen of a beautiful pale cream colour at Dumdruan Estate, 700 feet elevation, Gunong Pulai, Johore.

6. *Pseudodesmus* sp. Yellow millipedes, 23 mm. in length. Ten specimens found under logs, etc., in the jungle near Hinlap, 700 feet elevation, and Muok Tek, 900 feet, in the Dong Phya Phai, Siam; November 1897.

Sub-order *Iuloidea*.

This sub-order includes the most typical millipedes, and also the largest, some being nearly 10 inches (254 mm.) in length; it is cosmopolitan. The mandibles are normal, the pedal laminæ united to the terga, and there are from about 30 to over 70 segments.

Families *Spirostreptidæ* and *Spirobolidæ*.

The Millipedes of these two families are numerous in the East Indies both in species and individuals: they may be thus distinguished:—*Spirostreptidæ*, first three segments with a pair of legs each, fourth legless. *Spirobolidæ*, first four segments with a pair of legs each. The collector will soon get to know the form of eye characteristic of each family, a useful way of distinguishing them, but not infallible, some species having eyes of intermediate shape.

Family *Spirostreptidæ*.

Genus *Spirostreptus*.

Ventral grooves short; distance between eyes about equal to half the long diameter of an eye.

7. *Spirostreptus rittatus*, Newport.

Pocock has given a coloured figure and description of this species:—

Max Weber. Zool. Ergebnisse III, p. 387, plate xxi. fig. 8 (1894).

This is a very handsome creature when alive, coloured in alternate bands of black and red-brown. When walking it carries the head low, and the antennæ are constantly employed feeling everything the animal approaches. Each leg seems to move independently, thus crossing each other in walking, and apparently impeding any rapid motion. They are usually found in jungle, crawling on tree trunks or on the ground, in the middle of the day, quite fearless of any enemy, and as far as my experience goes submit quietly to be picked up by a collector. I have found them on Penang Hill from 1100 to 2500 feet elevation (March and Nov. '96), near Chumar, Perak (Dec. '96), and on the Kuala Kangsa Pass, Perak (May '98); this last was the largest specimen I have seen measuring in total length 9¾ inches (= 248 mm.).

I also obtained a *Spirostreptus* of this, or an allied species, at Kulim, Kedah, in 1895: and two specimens near Muok Lek, 900 feet elevation, in the Dong Phya Phai, Siam, in Nov. 1897.

Genus *Thyropygus*.

Ventral grooves long and deep, distance between eyes about equal to or greater than the long diameter of an eye.

8. *Thyropygus perakensis*, Pocock.

Spirostreptus perakensis, Pocock, Linn. S. J. Zool. xxiv, p. 322 (lead figured). [1892].

The type specimen, from Perak, was presented to the British Museum by Mr. J. H. Leech; it is described as a male, 210 mm. in length, with 69 segments, and in colour polished black, with antennæ and legs reddish yellow.

9. *Thyropygus bowringii*, Pocock.

Spirostreptus bowringi, Pocock, Linn. S. J. Zool. xxiv, p. 321 (head fig. p. 322) [1892].

During the rainy season this species is very plentiful in Siam, coming out usually towards evening and wandering about gardens and paths, and also occasionally entering houses: during the rest of the year it seems to quite disappear, presumably it hides away in holes. I have met it in the following localities:—

Bangkok (May, June, July and August).
Ayuthia (June).
Pachim (April).
Kosichang (August).

Adults, of both sexes, have from 60 to 72 segments. The longest male I measured was about $5\frac{3}{4}$ inches (148 mm.), the longest female about $8\frac{5}{8}$ inches (or 220 mm.).

Colour (from life), drawn up from a large series of Bangkok specimens.

The whole animal is of a very rich warm yellow ochre, with these exceptions:—the front surface of the head is a rich red-yellowish brown, sometimes darker between the eyes, it also gets darker towards the mouth shading into black on the upper lip. The antennæ are rich red-yellowish brown. The eyes black. The first segment behind the head is rich red-yellowish brown, getting darker towards its posterior edge. The remaining segments have each on their posterior part a very dark brown band, in some individuals pure glistering black, this band gets narrower and lighter in colour underneath as it approaches

the bases of the legs, and is broadest on the centre of the back, where it is about twice the width of the intervening yellow spaces. The tail (last segment) is yellow, on its broader portion obscurely banded once with reddish-brown, and the hinder portion (as for instance the sides of the anal valves) are picked out with reddish brown, the sharp tip of the tail is, in some specimens, black. The legs are *more or less* shaded with light-reddish brown, differing in individuals. The position of the foramen-repugnatorum is marked on the sides of the somites by a dark grey half-moon shaped line.

These big Thyropygi when caught in the hand do not passively submit as most millipedes do, but twist about, rear up their heads, and bite one's fingers with their jaws, but of course without breaking the skin or hurting in the least; but their show of resistance is so vigorous that anyone unaware of their harmless character would naturally not attempt to touch them twice.

I have kept many individuals of this species in captivity; they feed readily on bananas, etc., but never seem to stop eating as long as food is available. One I noted (as far as I was able to attend to it) eat without stopping for fifteen hours on end. The difficulty of keeping them alive is to strike the medium between starving them and allowing them to overeat themselves, which results in a week or so in diarrhœa, and then death soon supervenes. While eating the lower jaws work away steadily with a lateral in and out motion, and all the time the antennæ keep moving, examining every bit of food just before it enters the mouth. The females seem always ready to eat, but the males (in the early summer in Bangkok) suffer much from sexual excitement, refuse to feed and become very pugnacious.

In the jungle near Hinlap, 700 feet elevation, in the Dong Phya Phai, Siam, I obtained three specimens of a *Thyropygus*, *T. bowringii* or an allied form, in November 1897. A male was 195 mm. in length, a female 180. The female rolled up quietly when picked up, the male struggled hard, rearing its head up off the ground and trying to bite.

10. *Thyropygus sp.*

At about 300 feet elevation on Bukit Timah, Singapore, on the 19th Jan. 1896, I found one crawling among dead leaves in

the jungle at midday. It was about 9 inches in length (230 mm.) I have also found large Thyropygi in Johore, from near sea-level near Johore Bahru, to 1000 feet elevation on Gunong Pulai.

11. *Thyropygus sp.*

Another species of this genus I have found very numerous on Penang Hill from 2200 to 2500 feet elevation; it reaches 4½ inches in length (114 mm.). Its colour, when alive, is as follows: upper parts dark olive brown, with transverse bands of lighter and darker brown, there is a pale yellowish-brown vertebral line, which interrupts the narrow dark brown bands but not the wider paler bands. The lower parts and legs are pale reddish yellow.

Family *Spirobolidæ.*

Genus *Trigoniulus.*

Labral peres 2+2. First dorsal plate acutely angled.

12. *Trigoniulus gœsii* (Porat).

This small round red Millipede is extensively distributed in the East and West Indies, and has got introduced into conservatories in England. I found it numerous in:—

Singapore; Spring of 1896, October 1897.
Penang; Botanical Gardens, March 1898.
Penang; the Crag, 2260 feet elev., March and Nov. 1899, March 1898.
Perak; Taipeng, May 1898; Kuala Kangsa Pass and Batu Gajah, Dec. 1896.
Kedah; Alor Star, June 1898; and I found an allied species near Kulim, Kedah, in May 1895.

13. *Trigoniulus sp.* The red-legged Trigoniulus.

This species was very numerous in Bangkok during the rainy season from April to August, and was also numerous on Kosichang. In Bangkok in June specimens were observed copulating.

The number of segments of adults varies from 55 to 60. Males reach 74 mm. in length, females 80 mm.

Colour (from life), drawn up from many Bangkok specimens. Head red, except forehead between the eyes which is brown. First segment (behind head), brown, anterior border red, posterior border pale reddish brown. Remaining segments brown, posterior border very pale brown, reddish on the back, yellowish at the sides, underneath (about bases of legs) pale yellow. Tail (*i.e.*, last segment) red, shading to brown at the sides. Antennæ, mouth and legs, red. The red of the head, legs, etc., is a rich brick red. The brown of the body is a dark brown, dull in some lights, in others more grey than brown with distinct purple shades in it. In spirits the whole colouring becomes darker and less conspicuous. At any rate, in some cases the males are more purplish-grey in colour, and the females (who are also larger) are more reddish-brown.

14. *Trigoniulus sp.* The blue-green and red Trigoniulus.

Of this very beautiful species, apparently undescribed but allied to *T. caudulanus* of Karsch, I got three specimens in the jungle south of Tahkamen, Siam, on the 19th March 1897. The number of segments varied from 48 to 52, and the largest individual was 64 mm. in length.

Colour (from life). Upper surfaces and sides pale bluish bottle green, each segment with a broad, distinct, black transverse band; along each side is a very narrow black line enlarged into a black spot on each segment; from the eighth segment to the penultimate one the back is bright brick-red; this red line is narrow anteriorly and gets broadest about the middle of the back. The head between the eyes is darkish French grey; the remainder of the head, anterior border of the segment next behind the head, the whole of the legs, and the last segment and tail are bright brick-red, the lower surface of the body (between the legs) is yellowish-red.

Genus *Spirobolellus*.

Labral peres 4+4. First dorsal plate very large, expanded laterally.

15. *Spirobolellus sp.* The white-legged Millipede.

This elegant, elongated Millipede, with its conspicuous little white legs, is one of the most active members of the Class.

We found it fairly common at Pachim in March and April 1897, and in Bangkok in May, June and July. This species is particularly addicted to walking up the vertical walls of houses at night.

I also obtained a species of *Spirobolellus* in Singapore in 1896.

Sub-order *Polydesmoidea.*

The Flat-Millipedes are distributed all over the habitable world. They attain to a length of 5¼ inches (134 mm.), the number of segments is always 19 or 20. They have no eyes. The pedal laminæ are united to the terga. The large platelike processes springing from the sides of the segments easily distinguish these Millipedes from those of the other sub-orders.

Family *Platyrhachidæ.*

Millipedes of large or medium size, in which the body is composed of 20 segments, each segment except the first and last being furnished on each side with a large, more or less square and horizontal plate, which bears the scent-pore; they occur in tropical America and Asia, and attain a length of 134 mm.

16. *Acanthodesmus pinangensis*, Pocock. A. + M. N. H. Ser. vi 1897, vol. 20, p. 433, Fig. 6 + 6a, p. 431.

The type specimen, a male, was obtained by Mr. H. N. Ridley; subsequently in March 1898, I also caught a specimen at 1300 feet elevation on Penang Hill.

17. *Acanthodesmus perakensis*, Pocock l.c.s. p. 434, Fig. 7, p. 431. Obtained in Perak by Mr. J. H. Leech.

18. *Acanthodesmus petersii*, Pocock, l.c.s. p. 434, Fig. 8, p. 431.

The type species, a male, is from the Malay Peninsula.

19. *Acanthodesmus lineatus*, Pocock, l.c.s. p. 434, Fig. 9, p. 431.

This specimen was discovered by Mr. H. N. Ridley in Singapore.

When in the Larut Hills in April 1898 I collected a large series of Millipedes of this family, representing two hitherto undescribed species of *Acanthodesmus*, and two species of a new

genus allied to *Acanthodesmus*; all the specimens being now in the British Museum I am unable to describe them here. Every individual (thirteen were collected) of one species of *Acanthodesmus* had a faint but distinct and pleasant smell, like "vanilla" or "bitter almonds." These Millipedes are all very slow in their movements and easily caught.

20. *Practodesmus ridleyi*, Pocock. l.c.s. p. 438.

The type specimen, a female, was obtained by Mr. H. N. Ridley in Singapore. Another species of *Phractodesmus*, *P. subrittatus* (Peters) has been recorded from the island of Singa.

21. *Anoplodesmus* sp.

I found one specimen of this genus on rotten wood in the Botanical Gardens, Penang, 21st Nov. 1896. Colour, upper parts shiny black, protuberances at sides bright yellow. Lower surface and legs, reddish brown.

Family *Strongylosomatidæ*.

Millipedes of small size, reaching 35 mm. in length, occurring in tropical America, Africa and Asia, and also in Europe (England).

22. *Orthomorpha coarctata* (Saussure).

A widely distributed species in the East Indies, I have met with it in Singapore, Kedah and Bangkok. In the latter place during the month of May, June and July I had opportunities of watching the development of individuals. The smallest I got were 2 mm. in length, cylindrical in section, had 19 segments, were covered with fine bristles of hair and were *pure white* in colour, except for a pair of reddish-brown spots above the base of the antennæ. As the animal grows the hind portions become dark first, and upper greyish brown, then the head and forepart become a reddish-brown, the centre portion gradually following suit; these changes of colour will be observed in animals of from 8 to 12 mm. in length. In individuals of 10 mm. long the body is still cylindrical but the lateral processes are becoming pronounced, and the general colour is now *pale yellow*, the dorsal plates being pale reddish brown; there is also a reddish-brown patch on the head at the

base of the antennæ. The whole Millipede is still sparsely clad with hair, but the hairs are less numerous and much shorter in proportion to the bulk of the animal than in the 2 mm. stage. When the Millipede is about 18 mm. in length all the upper surface is a *rich dark-reddish brown*, the sides are a paler reddish brown, and the underneath, legs, antennæ, tail and lateral processes are bright yellow. The whole animal looks neat and glossy, there are scarcely any hairs on the body except a few large ones under the tail, and many very short, fine hairs on the head, antennæ and legs; and it is at this period that the body becomes slightly depressed.

I observed this species in copula in Bangkok in May 1897, the males seem rather smaller than the females when they clasp by the forepart of the body, and suffer themselves to be dragged along.

23. *Orthomorpha Vicaria*, Karsch.

I found large numbers of this species on the walls of the Government Rest House, Kuala Kangsa, Perak, 10th Dec. 1896.

24. *Orthomorpha crucifera*, Pocock.

This species known from the Mergui Archipelago probably also occurs in Penang; I have collected Millipedes, apparently referable to it, on rocks near "the Crag," 2263 feet elevation above sea, in March and November 1896. Specimens reached a length of 33 mm. (1¼ inches); and their colour in life was, upper parts reddish brown, with dark brown centre line, and narrow transverse dark brown lines, three on each somite, one being central and two marginal. The lateral processes are rich very dark brown, their backward projecting spines being yellow. Sides of body very dark brown, underneath of body buff. Legs yellow.

25. *Orthomorpha gracilis.*

I got one specimen at Ayuthia; February 1888.

Other specimens, some probably representing other species of *Orthomorpha*, I have collected at Chantaboon, Tahkamen and in the Larut Hills of Perak up to 4000 feet elevation, but the most noticeable was a *black and scarlet* form I found in the jungle near Muok Lek, Dong Phya Phai, Siam, in November 1897

IV. Class Symphyla.

Family *Scolopendrellidæ.*

Scolopendrella sp. incert.

In May, June and July 1897, I found Scolopendrellæ very numerous in the Wang Na Garden at Bangkok; they could usually be found under flower-pots. They were most elegant little creatures, about 5 mm. in length (not including the antennæ), very active, and required careful catching to get them alive and undamaged. We found the best way was to drive then into a test-tube by means of a camel-hair paint brush.

They were pure dead white in colour when alive.

The antennæ are long, slender and conspicuous; they usually resemble a row of beads threaded on a string, but in one specimen I examined the left antenna was normal and consisted of 23 bead-like joints, but the right antenna was less than half as long, apparently unjointed, enlarged and rounded at the tip and covered with distally directed hairs (unlike the hairs on normal antennæ which radiate from the centre of each "bead"). These little animals can suspend themselves in the air by a silk line, after the manner of spiders.

On the 22nd November 1897, I found a *Scolopendrella* under a log in the jungle near Muok Lek, in the Dang Phya Phai.

V. Chilopoda.

The Centipedes, Class *Chilopoda*, are invertebrate animals found in all temperate and tropical regions, carnivourous, active and capable of giving a poisonous bite. Some are nearly one foot (305 mm.) in length.

Head. The head is distinct and has a pair of elongate antennæ in front and four pairs of jaws on its lower surface. The 4th pair are large and powerful and project forward below the other pairs of jaws, so as to more or less conceal them from view. The last segment of this 4th pair forms a long fang with a minute hole in the tip, through which the poison is exuded.

Body. The body is elongated, very flattened in section and consists of from 15 to over 121 segments all much alike in structure.

Legs. The legs start from the sides of the lower surface of the body, there is only one pair to each segment, the last pair of legs is generally longer than the rest. The number of pairs of legs is invariably odd.

Native Names for Centipedes.

Malay, "*Halipan*" or "*Lipan.*"
Siamese, "*Takhāp.*"

Centipedes are divided into two sub-classes :—

1st. ANARTIOSTIGMA.

1. *eyes*, large, compound, faceted.
2. *antennæ*, widely separated at base, very long, thread like.
3. *body*, composed of 15 segments, but only 8 dorsal plates, all of which, except the last, are furnished in the middle of the hinder border with a single large respiratory stigma.
4. *legs*, very long, their tansi composed of a large number of minute segments.
5. basal-segments of poison-jaws not united.

Length of head and body (exclusive of antennæ and legs)* reaches over 2 inches (or 55 mm.) contains only one genus *Scutigera.*

2nd. ARTIOSTIGMA.

1. *eyes*, simple ocelli, or entirely absent.
2. *antennæ*, shorter, stouter and not thread-like.
3. *body*, composed of from 15 to over 121 segments, each having its own dorsal plate; the stigmata are arranged in pairs and open on the sides of the body.
4. *legs*, of moderate length, usually tipped with a claw.†
5. basal-segments of poison-jaws united to form a coxal plate. Length of head and body (exclusive of antennæ and legs) reaches over 11 inches (or 281 mm.) divided into three orders, with many families and genera.

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* These dimensions only refer to the largest specimens I have myself measured; they may grow larger.

† In the family *Cermatobiidæ* (Order Lithobiomorpha), known from a single species from Halmahira, the tarsi of the legs are many jointed. *Vide* Pocock, Royal Nat. Hist. vi., p. 205.

Sub-class *Anarstiostigma*.
Order *Scutigeromorpha*.
Family *Scutigeridæ*.

1. *Scutigere longicornis*, Fabr. The long-horned Shield-bearer.

Localities. I have met this fine species in three localities, in each case under quite different circumstances. One was inside a rotten, fallen tree-trunk near the foot of Gunong Pulia, Johore, 13th September, 1897. One I found at night on the outside wall of my house in Bangkok, on the 27th February 1897. And on the 28th June 1898, I saw large numbers of the Centipedes, perhaps 30 or 40 individuals in less than two hours, in deep caverns (where no daylight ever penetrates) of the Batu Caves, near Kuala Lumpur, Selangor; these were easily caught in forceps, if one picked them up as soon as the torch-light showed them, but once disturbed they did not give a second chance of being captured but ran along the wall at immense speed. This species occurs in Java, as well as in Siam and the Malay Peninsula.

Colour (of Bangkok specimen mentioned above).

Upper surface of body moderately dark brown, at the posterior end of each dorsal plate is a double spot of light yellow (very distinct in life). Head yellowish brown with dark brown markings. Antennæ uniform yellowish brown. Legs yellow with narrow bands of dark bluish-grey. Lower surface of body pale yellow. In life the whole animal is slightly iridescent.

Size.	*Bangkok specimen.*	*Batu laves specimen.*
Length, head and body	32 mm. or 1.28 inch.*	55 mm. or 2.16 in.
,, antennæ	64 ,, 2. 5	88 ,, 3.46
,, hind-legs	70 ,, 2.75	187 ,, 7.36
,, from tip of antennæ to end of hind-legs	164 ,, 6. 4	325 ,, 12.75

2. *Scutigera birmanica*, Poc. The Burmese Shield-Bearer.

Localities. On the 16th March 1896 I caught two specimens at the "Crag," Penang Hill, elevation 2260 feet; and subse-

* End of body projects 2 mm. beyond base of hind legs.

quently in March 1898 obtained a third specimen at the same place. They are exceedingly active, running so fast that unless you know them by sight it is hard to tell what sort of animals they are; if found at rest they may be picked up with a pair of forceps or else made to walk into a wide-necked cyanide-of-potassium bottle, but if first frightened all you will probably see of them is a glimpse of (apparently) a spider with an improper number of very attenuated legs disappearing round the corner. It is very difficult to secure a perfect specimen, as when caught they seem to shed their legs voluntarily, almost as if to spite the collector.

District. Burma and Penang.

3. *Scutigera marmorea*, Poc. The Marbled Shield-Bearer.

Localities. On the 14th March 1896 I caught one specimen under the bark of a tree at "Richmond," Penang Hill, elevation about 2300 feet; its general colour was reddish-brown. In March 1898 I got another specimen also on Penang Hill at nearly the same height above sea-level.

District. Burma and Penang.

Sub-class *Artiostigma.*

1st Order, LITHOBIOMORPHA. 15 pairs of legs.

Contains only the Family *Lithobiidæ.* Species of *Lithobius* are known to occur in Java, Sumatra, Burmah and possibly the Nicobar Islands, so will probably be eventually found in the Malay Peninsula; the largest of the known S. E. Asian forms is only 12½ mm. long.

2nd Order, SCOLOPENDROMORPHA. 21 or 23 pairs of legs.

Eyes, either absent or consist of 4 ocelli on each side of the head.

Antennæ, 17 to 29 segments.

Divided into several families.

The usual centipedes met with in Malaya and Siam all come into the family *Scolopendridæ*, which have 21 pairs of legs, 4 eyes on each side of head, and reach nearly a foot (305 mm.) in length.

3rd Order, GEOPHILOMORPHA. 39 to 161 (or possibly more) pairs of legs.

Eyes, absent.

Antennæ, 14 segments.

This order consists of long, thin, worm-like centipedes; some species are at times luminous; they are divided into several families, and individuals reach 130 mm. in length.

Order *Scolopendromorpha.*

Family *Scolopendridæ.*

4. *Scolopendra subspinipes*, Leach. Common Centipede of S. E. Asia.

Localities. Of this species I got several specimens in Penang both from near sea-level (Sepoy Lines) and from the hill ("Crag"), one in Singapore, one in Johore Bahru, one in Bangkok, and one received from Sourabaya, Java: it also occurs in Sumatra and Flores, and is found (possibly introduced) in tropical Africa and in the West Indies.

Colour. Most individuals I have seen were bright reddish brown, but the Johore specimen (mentioned above) and one from Penang Hill were purplish-black above, pale reddish-brown below and had reddish antennæ and legs.

Size. The red and the black individuals seem to attain equal dimensions, the largest I have measured was in length (exclusive of antennæ and hind-legs) 166 mm. or 6½ in.

5. *Scolopendra de haanii*, Brandt. De Haan's Centipede.

This may be only a variety of *S. subspinipes* from which it differs in the absence of spines from the under surface of the anal femora.

Localities. I got several specimens from the hills of Penang, at about 2300 feet elevation; one from Batu Gajah, Perak; four from Kulim, Kedah; and about thirty from the following places in Siam—Bangkok, Ko-si-chang, Chantaboon, Kabin and Muok Sek, in the Dong Phay Phai: it also occurs in the Mergui Archipelago, Java and Sumatra.

Colour (from life.) Above rich reddish-brown, antennæ paler reddish-brown; legs pale yellow, distally dark reddish-

brown, claws black; hind-legs reddish brown, getting darker distally, last segments nearly black; underneath of head reddish brown, last joint of poison-fangs black; lower surface of body brownish yellow.

A young specimen from Kabin was black with orange-red legs and a broad orange-red band behind the head.

A centipede 53 mm. (say 2 inches) in length (excluding antennæ or hindlegs), which Pocock considers to be probably the young of this species, had the upper parts reddish-brown, but the posterior part of each segment very dark, nearly black; the antennæ, head and first two segments of body olive green; legs on remaining segments pale red; and the under surface pale reddish-brown.

Size. The finest De Haan's Centipede I have measured was caught in our compound in Bangkok, 19th December, 1897.

Its dimensions were :—

Total length, from tip of antennæ to claw of hind foot	281 mm.
Length, without antennæ or hind legs	...210
„ antennæ	... 38
„ hind-leg	... 35
Width, 2nd segment	... 16
„ 15th „	... 17
„ 21st „	... 15
„ 22nd (last)	... 11

These two species, supposing them to be distinct, seem similar in habits; they are for the most part nocturnal, but I have met them roaming abroad in the day time; they are to be found in houses and gardens as well as in the jungle, and even on board ship. They run very swiftly, and try to bite fiercely when interfered with; what the effect of their bite on a man could be I do not know, I only once saw one bitten—Surgeon-Captain Smith at Penang in 1895. He felt no ill effects from the bite, but the centipede had previously been biting at some cord, in a loop of which we were trying to secure it, so had probably exhausted its supply of poison. It is said that their claws are poisonous, and I have even been told in Singapore that a centipede ran over a man's face and left a line of bad sores where its feet touched his skin. I cannot believe this—for I have seen Malays allowing a big centipede (with poison fangs extracted) to run about their

bare shoulders and neck without recieving any harm, and I have myself had them crawling over my hands as an experiment but without being able to see, or feel, the smallest wound. Nothing seems to be known about their breeding habits. In Penang I have seen a dead centipede hung from the front axle-tree of a gharry; why this is done I have no idea; perhaps other members of the Society have noticed this?

6. *Scolopendra Morsitans* (Linn.) The Biting Centipede.

I caught specimens of this species at Gunang Pulai in Johore, and at Kabin in Siam, received one from near Raheng, Siam. The Kabin specimen was purplish-green in colour, and measured in length (without hind legs) 71 mm. (with hind legs) 82⅓ mm. Dr. Max Weber obtained this species in Celebes, Saleyer and Flores. It is also found in central Africa and other tropical countries.

7. *Otostigmus scaber*, Porat. The Rough Centipede.

"Takhāp-fai" (fine-centipede) of the Siamese.

Localities. I found this species numerous in Bangkok under flower pots in the garden of the Wang Na, and also got specimens on Gunong Pulai, Johore.

Colour (Bangkok specimens). Above reddish-brown, redder on the margins, browner in the vertebral line; the anterior portion of the head sometimes black; lower surface of body pale reddish-yellow; eyes black; antennæ light-red or else basal portion reddish-brown, turning darker distally till the tips are almost black; legs, basal segment and greater portion of next segment buff, remainder rich dark blue, or in some specimens the legs are grey, basally bright blue, distally buff, the hindmost pair of legs are blue banded with pale buff or white at the joints.

Size (Bangkok specimens). The largest I noted measured 48 mm. in length, without including the hind-legs.

Another was:—

length,	without antennæ or hind legs,	31½ mm.
,,	antennæ	9 ,,
,,	hindlegs	12½ ,,

I also collected specimens of *Otostigmus* on Penang Hill, in the Larut Hills of Perak, in Johore, at Chantaboon (purplish-blue in colour) and at Paknam-Menam, which are difficult to determine specifically, as there are many species of this genus described from Ceylon, Japan, China, Mergui Archipelago, Sumatra, Java, Borneo, Celebes, Flores, etc.

8. *Rhysida longipes* (Newport).

I got two specimens at Tanglin, Singapore, one found under a flower-pot, one running about in my bathroom at night, and several from Siam, from near Raheng and from the island of Ko-si-chang. This centipede usually has its back coloured dark reddish or purplish-brown, the legs may be lighter; it is of small size reaching a length of 68 mm. (2.68 inches). It is distributed in many parts of tropical Asia and America.

9. *Rhysida immarginata* (Porat).

Of this small species I got six specimens near Alor Star, Kedah; one in Taipeng, Perak; a friend found it climbing up his leg inside his trowsers; and two in Singapore, one in the Officers' Mess, Tanglin, and one in a bathroom of Raffles Hotel. In these centipedes the antennæ, when not in use, are carried curled up very elegantly. Dr. Max Weber obtained this species in Sumatra, Java and Saleyer.

10. *Rhysida carinulata* (Haase.)

In January 1896 Mr. Ridley and I found one of these rare centipedes on Bukit Timah, Singapore; it was a female lying curled up round its eggs, hidden under a rock in the jungle. The species was previously known from Celebes.

11. *Rhysida rugulosa*, Pocock.

This species is described and figured (nat-size) by Pocock in Max Weber's Zool. Ergebnisse III, p. 314, Pl. xix, Fig. 6. The type specimen is from Sumatra. In November 1896 I caught one in the garden of "the Crag," Penang Hill, 2200 feet elevation; its colours were:—back purplish black; antennæ

and legs bottle green; underneath pale olive green. Length (excluding antennæ and hind feet) 85 mm. (3.33 inches.)

I also got specimens of *Rhysida* from Blakan Mati, Singapore, and from Chantaboon, that apparently do not fall into any of the above species.

Order *Geophilomorpha.*

Family *Geophilidæ.*

12. *Orphnæus brevilabiatus* (Newport). The Luminous Centipede. Malay *Klamayer.*

I have caught this long, thin red centipede at Tahkamen, Siam, in March 1897, in Government House, Singapore, October 1897, and in Bakar Bata House, Kedah, in May 1898; always in roofs or upper stories of houses. On more than one occasion, I have seen them at night on my mosquito curtains. Each time I tested their luminosity; when disturbed they give out a bright but lurid green "phosphorescent" light, and as the centipede moves it leaves a trail of light behind it on the surface it is crawling over; this trail glimmers for a moment or so, and then goes out.

Besides Siam and the Malay Peninsula this species occurs in other parts of the Oriental Region (Mergui Archipelago, Java, Celebes, Flores, etc.) and also in tropical America.

Family *Dicellophilidæ.*

13. *Mecistocephalus punctifrons*, Newport.

Of this long, thin centipede I got four specimens in the earth at Chantaboon in January 1898 (no luminosity observed), and also found a single individual under a piece of wood on the top of Western Hill, Penang, elevation 2725 feet. This latter measured:—

length (excluding antennæ and hind legs) 52 mm.
„ (including „ „ „ „) 63 mm.

This species is also recorded from the Mergui Archipelago, Sumatra, Java, Flores and Mauritius.

Family *Eucratonychidæ.*

Species of *Eucratonyx* may eventully be found in Malaya as they occur in Burmese territory on the one side, and in islands at the Eastern end of the Malay Archipelago on the other.

VI. Class Gigantostraca.

Order *Xiphosura.*
Family *Limulidæ.*

The King Crabs, or Horse-shoe Crabs.
"*Mengdahn-nām*" of the Siamese.
"*Belangkas*" of the Malays.

1. *Limulus moluccanus.*

I have got live specimens in the Singapore Market on the 5th April, in the Bangkok Market 18th June, and in Brunei, Borneo, on the 2nd October.

I was told in Siam that the King-Crabs usually frequent deep water, but in June, July and August resort to the shallows at the head of the Gulf for breeding purposes; they are then caught in large numbers for the markets. They will live for a few days in a tub of fresh water.

In life the carapace is a beautiful, rich, dark, shining, olive colour.

The largest specimen I measured (at Bangkok) was:—

Total length,	19.7 inches.	= 500	mm.
Length of carapace,	10.2 „	= 259	„
„ „ tail,	9.5 „	= 241	„
Width, „ carapace,	10.2 „	= 259	„

2. *Limulus rotundicauda.*

Easily distinguished from *L. moluccanus* by the round shaped tail.

To be seen for sale in the Bangkok Market with the above.

The largest specimen I measured (at Bangkok) was:—

Total length,	15.25 inches	= 387	mm.
Length of carapace,	8 „	= 203	„
„ „ tail,	7.25 „	= 184	„
Width „ carapace,	7.75 „	= 197	„

3. *Limulus tridentatus*, Leach.

Also known as *Limulus longispinis.* Mr. A. C. Cluneis Ross gave me a large pair caught at Kudat, Brit. North Borneo: the female was the largest and measured:—total length 35.25 inches =894 mm., width of carapace 15 inches = 381 mm.

VII. Class Arachnida.

In this class are included the Spiders, Scorpions, Mites, Ticks and their relatives.

These animals have no distinct head, the head and thorax being fused together, and the result of this union (called the "cephalothorax") and the abdomen may or may not be segmented.

Breathing is carried on by air-tubes, lung-books or both.

The sexes are distinct individuals.

There are no antennæ, such as exist in the insects, centipedes and millipedes.

The cephalothorax bears six pairs of limbs:—

1st pair (the mandibles) composed of 2 or 3 segments, acting as seizing or biting organs.

2nd pair (the chelœ, or palpi) composed of 5 or 6 segments; of which the basal segments (the maxillœ) are used for crushing food, and the remainder variously modified as seizing, feeling or sexual organs.

3rd pair, composed of 6 or more segments, used for feeling (as in the Pedipalpi), or for walking.

4th, 5th, and 6th, composed of 6 to 9 segments, used for walking.

The abdomen bears no true limbs.

The class may be divided into 8 orders, one of these contains the Mites, Ticks and a varied host of small forms, some very degenerate, in some various limbs are lost, in some there are apparently no organs of respiration, and in the "Water Bears," or *Tardigrada*, the sexes are not distinct but are united in each individual.

The following table may be of use to the collector in determining to which Order an Arachnoid beast, he may happen to have caught, belongs.

A. 2nd pair of limbs modified into great seizing organs (chelœ).

A. no "waist" between caphalothorax and abdomen.

3rd, 4th, 5th and 6th pairs of limbs of similar construction and used for walking.

a. posterior segments of abdomen narrowed, forming a distinct jointed tail, ending in a poison-sting.

breathing by means of 4 pairs of lung books.
abdominal combs present.
no silk-secreting glands.
some species attain a length of 8 inches.

(Scorpions). Order *Scorpiones.*

b. no tail.
breathing by means of air-tubes.
no abdominal combs.
silk-secreting glands present.
some species attain a length of $\frac{1}{4}$ inch.

(False Scorpions). Order *Pseudoscorpiones.*

B. a "waist" between cephalothorax and abdomen.
3rd pair of limbs modified into feelers, the last segment being clawless and divided into a number of secondary segments.
4th, 5th and 6th pairs of similar construction and used for walking.

c. no tail, or a thread like one.
breathing by means of 2 pairs of lung books.
no abdominal combs.
no silk-secreting glands.
some species attain a length of 2 inches.

(Whip Scorpions) Order *Pedipalpi.*

B. 2nd pair of limbs not modified into chelæ.

C. cephalothorax segmented.
mandibles form large pincers.
abdomen with ten segments.
palpi leg-like.

d. a long jointed tail.
size minute; only one species known, from South Europe.

Order *Palpigradi.*

c. no tail.
reach nearly 2 inches in length; many genera and species known from South Europe, Africa, Asia and America.

(False Spiders). Order *Solifugæ*.

D. cephalothorax not segmented.
f. a "waist" between cephalothorax and abdomen.
mandibles form a poison fang.
abdomen not segmented (except in sub-order Mesothelœ).
breathing by means of 2 pair of lung books, or else 1 pair lung books and 1 pair of air-tubes.
spinning glands present.

(Spiders). Order *Araneæ*.

g. no "waist" between cephalothorax and abdomen.
a.' abdomen composed of 3 to 8 segments.
mandibles pincer-like.
basal segment of 3rd pair of limbs always adapted for mastication.
breathing by means of air-tubes.
no spinning glands.

(Harvest Spiders). Order *Opiliones*.

b.' abdomen not segmented.
mandibles pincer-like, or simply pointed.
basal segment of 3rd pair of limbs never adapted for mastication.
breathing by means of air-tubes, or without distinct organs.
spinning glands sometimes present.
size usually minute.

(Mites, Ticks etc.) Order *Acari*.

Order *Scorpiones*.

The True Scorpions.

Malay "*Kalajinking*."

Siamese "*Malaang-pon*," or more commonly "*Meng-pon*."
Pantang Kapur "*Simpai*," and "*P'nipet*." (Lake—Kelsall, J. S. B. R. A. S. No. 26, 1894, p. 41.)

The true Scorpions have four pairs of legs, of similar construction, each composed of seven segments, and used for loco-

motion, and two modified anterior pairs of limbs, one (the chelæ) forming great pincers and composed of six segments, and one (the mandibles) forming small pincers and composed of only three segments.

The abdomen is distinctly segmented, and the last six segments are narrower than the rest, forming a distinct tail; the last segment of all (the telson) ends in a sharply pointed poison-sting.

On the lower surface of the second segment of the abdomen are a pair of comb-like organs (the pectines); the exact use of which does not seen to be known, but I have noticed scorpions are continually moving them about as if they were organs of touch.

Scorpions are divided into several families; two of which occur in our region and may be thus distinguished:—

1st. *Buthidæ*. Sternum of the cephalothorax small and triangularly pointed in front.

Two spurs on the articular membrane of the tarsus.

2nd. *Scorpionidæ*. Sternum of the cephalothorax broad and pentagonal.

One spur on the articular membrane of the tarsus.

Family *Buthidæ*.

1. *Archisometrus mucronatus* (Fabr.) The Sharp Scorpion.

"*Mengpon tahkepp*" of the Siamese.

This small yellowish scorpion is widely distributed in the East, being recorded from Burma, Siam, Cambodia, Cochin China, China, Japan, Philippines, Sumatra, Java, Flores, Saleyer, and it is said from New Zealand and Madagascar. Pocock has given an excellent coloured figure of this species, natural size in Max Weber's Zool. Ergebnisse III, Pl. vi, fig. 1, (published at Leyden, 1893.)

Scorpions of this species are to be found inside and outside houses, both downstairs and upstairs, as well as in gardens and in the jungle; they spend the day hidden in crevices, or under stones, rocks, etc., and at night roam about for food; they run about the walls of houses with ease, but I doubt their being able to cross ceilings, as the house-lizards of the family *Geckonidæ* do.

In Bangkok I found this species very common, and also caught specimens at Ayuthia, in the Dong Phya Phai, at Knbin, at Chantaboon and on the island of Ko-si-chang.

When suddenly found under a stone they seem to seek safety rather in remaining perfectly motionless than in taking instant flight.

I have noticed them eating crickets and moths, possibly they will eat any insects they can catch and overpower, but I have watched them encounter and leave unmolested, though hungry, a beetle (*Carabidæ*) and a small green bug. On several occasions I have placed these scorpions with whip-scorpions (*Thelyphonus sekimkewitchii*) and with large spiders (*Heterapoda venatorea*) to see if they would try to tackle other Arachnida, but I found the three sorts all left one another alone. I have not observed them even attempt to feed on insects they have not killed themselves, nor to pay any attention to fruit. I do not know if they ever drink, I find an entry in my diary for the 26th December, 1897:—"*A. mucronatus* caught on the 15th of this month is still alive and well. It has had no water all the time." Unfortunately I find no note as to the further career of this scorpion, or how long it lived in captivity. When walking this species ofter has the combs extended and pointed forward. It seems quite blind (at any rate in a full light), it runs swiftly with both chelæ extended, but if an upright thing, such as a stick which the chelæ pass on each side of without touching, is met with, the scorpion runs right into it and is pulled up short; just as a man feeling for the door in the dark with outstretched arms may, if the door be standing open, suddenly find himself hit in the face by it; but on the other hand I have seen a scorpion pursue a fluttering insect, but this may have been by sound (or smell?).

The following extract from my diary of the 15th December 1897 will give some idea of how these animals feed.

A. mucronatus; in the evening I watched it sitting quite still, body very flat on the ground, chelæ extended, tail curved over back with the point of the sting carefully protected in the usual manner; a small moth settled near it, the scorpion immediately seized the moth in both chelæ and quick as lightning brought its tail over its head, stung the moth and recovered

its tail to the 'rest' position, it then placed the moth's head to its jaws and ate it off, holding the moth in its chelæ and tugging off pieces with its mandibles; aftera few bites the scorpion ran off holding the moth in one chelæ; on the way another small moth came just by it, the scorpion promptly seized it in the disengaged chelæ, and again quick as a thought its tail was thrown forward and again withdrawn; it then ran on with a moth in either hand, when it met a third moth the scorpion transferred the first moth to its mandibles and with the chelæ thus disengaged it attempted to seize the live moth but it fluttered on; the scorpion, pursuing with one moth in its jaws, one moth in one hand and the other hand grabbing at the third moth, was decidedly comical; it failed to catch the third moth, and after running a little way settled down to eat its captives; the first moth was eaten wings and all, only one lower wing and four legs being left, which may have been dropped accidentally, it then began eating the second moth but after a time (whether anything frightened it or not I do not know) the scorpion dropped the moth and ran off; after some minutes another live moth came in its way which it seized and commenced eating; while doing so it caught another, and again ran off carrying one moth in its jaws and one in its hand."

Effect of Sting.

Two cases of scorpion sting have come under my notice; each time the scorpion was caught and identified as *Archisometrus mucronatus.*

1st. 27th Nov. 1897. Basdeoh, a native of India, accidentally put his hand on a scorpion which stung him in the finger; he said he had very great pain all up the hand and arm as far as the shoulder; he applied a small native poultice which somewhat relieved the pain. This happened at 6 a.m. At 7.30 a.m. the finger was very swollen, but not appreciably discoloured, he said there was then no pain above the elbow but it was very bad in the forearm and hand; we got him to put the injured finger in a strong solution of permanganate of potash and keep it there for half an hour, first opening the wound by squeezing it; by 8.30 a. m. he was all right again.

2nd. 26th December 1897. Maa Deng, Siamese woman, stung in her foot in the evening; the effect was at once a rather

swollen foot and much pain: we were able to bathe the foot almost immediately in a very strong solution of permanganate of potash and the pain subsided in a quarter of an hour.

Colour.

Yellow mottled with brown, the four pairs of breathing orifices on the abdomen being very conspicuous as lemon yellow spots. A small specimen (36 mm. in length) was coloured pinkish underneath.

Young.

I have not been able to make out at what times of year these scorpions breed. On the 9th May in Bangkok I caught a young one (10 mm. in length) by itself, and on the 3rd August also in Bangkok found one (11 mm. in length) being carried about on its mother's back.

Sexes.

Mr. R. J. Pocock, in answer to enquiries, writes to me: "In *A. mucronatus* the male has the tail stouter and the claws longer with sinuate fingers, as compared with the female."

Size.

Length from front of mandibles to tip of sting of 38 adult Siamese specimens which I have examined:—

average 44½ mm.	smallest, 36 mm.
largest, 55 mm.	(roughly 2¼ inch.)

Pectinal Teeth.

Usually about 21 on each comb, occassionally there is one more tooth on one side than on the other, and once I found a specimen with two more teeth on one side than the other i. e. 19 and 21.

The fewest I have counted were in a Bangkok specimen, i. e. 18 and 18: the most I have counted were in a Dong Phya Phai specimen, i. e. 24 and 24.

2. *Archisometrus scutilus*, C. K.

This is is a small yellowish-brown scorpion with very long attenuated claws and tail; I caught one specimen under the bark of a fallen tree in the Experimental Gardens, Penang Hill, about 1900 feet elevation, and one in the verandah of "the Crag," Penang Hill, 2260 feet elevation, both in March 1898. This species is also recorded from Tenasserin, Selangor, Singapore, Sumatra and Java.

3. *Isometrus maculatus* (De Geer).

This is another small yellowish brown scorpion; it has been found in Spain, Africa, India, Ceylon, Malay Peninsula, Siam, Hongkong, Java, Timor, Mauritius, Madagascar, Sandwich Islands, West Indies and South America. I caught two specimens in the Officer's Mess, Sepoy Lines, Penang; one in the Officer's Mess, Tanglin, Singapore; one in Raffles Hotel, Singapore; and two in Bakar Bata House, Kedah. I was given two specimens in Bangkok said to have been caught there, but I never myself came across it alive in that city. This species, when suddenly found, will often lie still as if feigning to be dead, till touched, when it tries to run away.

Sexes.

"In *I maculatus* the tail and pincers of the male are very long and thin as compared with the female." Pocock.

Family *Scorpionidæ*.

4. *Chærilus agilis*, Pocock. The Agile Scorpion.

This species was discovered by Mr. H. N. Ridley at the Batu Caves, Selangor, and described by Mr. R. J. Pocock (Annals + Mag. Nat. Hist. Series vii, vol. iii, No. 17, May 1899, p. 416). The general colour is dark reddish brown, not distinctly variegated. Pectinal teeth 4. Length 56 mm.

5. *Chærilus rectimanus*, Pocock. The Straight-handed Scorpion.

Mr. H. N. Ridley discovered this species in Singapore, and it has been described by Pocock (loc. cit. supra, p. 418).

The general colour is ferruginous, variegated with black.

Pectinal teeth 3 (?). Length 24 mm.

Other species of this genus will probably be eventually found in the Malay Peninsula.

6. *Palamnæus oatesii*, Pocock. Oates' Scorpion.

This large species, known as "Kala" by the Kedah Malays, is often identified as *Palamnæus spinifer* (Hempr. + Ehrenberg). L. Wray, jun., J. S. B. R. A. S. No. 21, 1890, p. 148, mentions "a large dark metallic green scorpion (*Buthus spiniger*)" in Batang Padang, Perak; he probably refers to this species.

I obtained one specimen from near Jenan, Kedah; four from Kulim, Kedah; two from Penang Hill (one at 2500 feet

elevation, given me by Mr. L. Brown); three from Johore Bahru, and two from the foothills of Gunong Pulai, Johore.

Colour (in life): very rich dark olive green. The poison-vesicles in the Gunong Pulai specimens were white.

Size.

♂. from front of mandibles to tip of sting, 102 mm. Pectinal teeth, 16+17.

♀. from front of mandibles to end of penultimate segment, 107 mm. Pectinal teeth, 17+17.

District.

Burma, Malay Peninsula, Sumatra (?).

7. *Palamnæus silenus*, Simon.

Siamese, "*Mengpon chang*," = Elephant Scorpion.

Of this fine species I obtained four specimens from Bangkok, three from Tahkamen, one from near Kabin, one from near Raheng, and thirty one from Chantaboon. It seems to be strictly nocturnal; at night roaming about for food, and lying hid by day: at Chantaboon I found most by digging in the soil 4 or 6 inches deep, under fallen logs, to find their burrows, which the scorpions often tried to escape along, but we followed them (digging up the soil) and eventually secured them. In one spot (in Jan. 1898) we found about ten individuals, all of about the same size, huddled up close together in a hole in the ground.

Colour (in life.) shining rich dark green.

Size. A good specimen had the following dimensions:—

Length, from front of mandible to point of sting—135 mm. (about 5⅓ inches).

Length, of cephalothorax (in median line)—18 mm.

Width of cephalothorax	19	mm.
Length of tail	66	—
,, ,, humerus	16	—
,, ,, brachium	16	—
,, ,, pincer (to end of fixed digit)	35	—
,, ,, moveable digit	22	—
Width of hand	16	—

Pectinal Teeth vary in number from about 15 to about 18 on each side.

The usual numbers seem to be 16+16, or 16+17.

Sexes. "In *Palamnæus silenus* and *Hormurus* the male has the two halves of the genital operculum separated so that this can be pulled apart, while in the female, though the suture remains, the two are inseparable. The combs are also larger in the male." Pocock.

District. Siam, and Cochin China.

8. *Hormurus australasiæ* (Fabr.)

Siamese "*Mengpon-ton*" = Tree Scorpion.

This is a small dark brown scorpion with large pincers, a comparatively short, slender tail and a very small sting, commonly to be found under the bark of trees, but I have also obtained it among a pile of logs, and under dead leaves on the ground. Pocock says "this species is found in S. East Asia and all over the Islands of the Indo-Malayan, Austro-Malayan and Australian Region," and mentions it being recorded from the Himalayas, Corea, Sumatra, Java, Flores, Saleyer, New Britain, Solomon, Loyalty and Fiji Islands.

Personally I have caught seven specimens on Penang Hill, at elevations of 1800 to 2300 feet; three in Bangkok; one at Chantaboon: and two on the island of Kosichang. I also received one from near Raheng, Siam.

A *Hormurus*, probably of this species, is found on Maxwell's Hill, Perak; I found the remains of one inside a frog (*Rana macrodon*) caught at 3,300 feet elevation in April 1898.

The largest specimen I have measured was from the front of the mandibles to the tip of the sting, 43 mm.

The pectinal teeth in four Siamese specimens examined were:—6+7, 6+7, 7+7 and 7+7.

Order *Pseudoscorpiones.*

The False Scorpions.

These are the minute and harmless animals sometimes called "Book Scorpions." At Chantaboon I found a species of the genus *Chelifer*; and also in Bangkok under the bark of trees, under flag-stones and in packing cases.

Order *Pedipalpi*.

(see Pocock, Royal Natural History, Vol. vi, p. 217).

Sub-order *Uropygi* (Tailed Pedipalps).

Section *Oxopæi*.

Family *Thelyphonidæ*. (Whip Scorpions).

1. *Thelyphonus skimkewitchii*, Tarnoni.

Siamese "*Mengpon-menn*," i. e. Stinking Scorpion.

Localities. I met this species in Bangkok, Chantaboon and Kosichang. Pocock records it from "Lacan, via Raheng, in Siam" (A.+M. N. H. Ser. 7, Vol. v, March 1900, p. 298).

Description of body from a Bangkok specimen:—

Cephalothorax slightly convex, considerably narrowed anteriorly. The anterior eyes are black, they are separated by a prominent elongated smooth tubercle which extends to the anterior edge of the cephalothorax, which consists of a sharp ridge which curves back on each side as far as the lateral eye where it disappears; the three lateral eyes are pale yellow, the dorsal pair being very conspicuous in the live animal. The whole surface of the cephalothorax is roughly granulated, on the whole more coarsely anteriorly; the cephalic and thoracic grooves are well marked. Abdomen moderately depressed, elongately oval, at its widest part 1/7 wider than the widest part of the cephalothorax; upper surface granular, with the posterior edge of each segment "crenulated"; "the muscular points" are round and well marked on the second to eighth segments.

Colour (in life); drawn up from several dozen Bangkok specimens.

Adults:—Upper surfaces of chelæ, cephalothorax, abdomen, two joints of legs nearest body and lower surface of abdomen very dark brown, almost black, but sometimes the greater part of the lower surface of the abdomen is reddish-brown. Along either side of the abdomen there is a broad pale yellow longitudinal line. The tail, limbs (where not dark brown), lower surface of cephalothorax, and the first two segments on the underneath of the abdomen are a rich red-brown.

Young :—Specimens of about 8 mm. in length have the cephalothorax and abdomen of the usual dark brown colour, but have pale yellowish red chelœ.

Size, of three typical Bangkok specimens, in millimetres ;—

Total length of cephalothorax and abdomen.	28	29	28
Length of cephalothorax,	11	11½	11
,, ,, abdomen, including terminal joints.	17	17½	17
,, ,, the narrow tail,	20	23	26
,, ,, five terminal joints of chelœ, in articulation,	13		
,, ,, first leg, excluding the coxal joint,	35	37	33
,, ,, second leg,		19½	18
Width of cephalothorax,		6½	6

Habits. Strictly nocturnal; hiding by day under logs, stones, etc. and at night roaming about for food. They are chiefly to be seen during the rainy season from April to August. In January and December I have sometimes noticed a very faint and peculiar smell given off by these creatures, but have not been able to detect it at other times of year.

To collect—when found they can easily be picked up by a pair of forceps, the points placed on either side of the hard cephalothorax, and they quickly die in a cyanide of potassium "insect killing bottle." When placed on their back on a sheet of glass or other flat surface these *Thelyphoni* seem very helpless and unable to right themselves.

Food. In captivity they feed readily on dead insects; they first carefully and slowly examine the object, then take it up in their chelœ, and in the case of a moth almost completely devour it, or if a dragon fly eat all but the wings: very rarely I have seen a *Thelyphonus* catch a live insect in its chelœ and eat it; they do not attempt to interfere with beetles or grasshoppers larger than themselves. Besides insects they will eat very small bits of over-ripe bananas.

One that I caught with a broken tail lived 24 days, during this time there was no sign of a reproduced tail growing.

Effects of Sting. These animals are usually supposed to be harmless to man, but in Bangkok on the 30th April 1897 I had a curious experience with one. Seeing a *Thelyphonus*, of this species, running on the ground I picked it up by the cephalothorax between the first finger and thumb of my left hand; it

at once bent its thread-shaped tail over its back (as a scorpion does) and also scratched about my fingers with its legs, but the pincers did not touch me; I thought nothing of its tail, etc., till I felt a sharp pain and found the animal *had* somehow stung me. I went straight into my house, and already the first joint of my finger was very swollen and inflamed, there being a rapidly growing white lump, and the rest was red; at one spot was a fresh puncture as if a needle had been driven in, in a horizontal direction, and gone some little way under the skin. After cutting and squeezing the wound, I put my finger into a strong solution of permanganate of potash, which at once relieved the pain and stopped the swelling, but the little wound continued to smart for some hours. Since then I have been careful never to let a *Thelyphonus* touch me.

Sexes. "You can tell the male of this species at once by the presence of a shallow circular pit upon the fourth ventral plate of the abdomen, by the different shape and size of the first plate, and by the simple structure of the small segments of the tarsus of the first pair of legs, that is to say of the antenniform legs; the tarsal segments of the adult female being peculiarly modified." (R. I. Pocock).

2. *Thelyphonus Johorensis.* Oates.

"Toong-gee" of the Malays of Johore.

I have caught this species in Johore Bahru, and up to about 500 feet elevation on Gunong Pulai. One specimen, out of three caught Sept. '97, smelt slightly. Two *Thelyphoni*, probably of this species, caught in the Botanical Gardens in March '98 also smelt slightly but perceptibly. A specimen obtained at about 3400 feet elevation in the Larut Hills, Perak, in April '98, is referred doubtfully to this species.

3. *Thelyphonus wayi*, Pocock (A. & M. N. H. Ser. 7, Vol. v, March 1900, p. 295).

Found by Mr. Herbert W. L. Way in Battambang, Siam.

4. *Typopettis dalyi*, Pocock. (loc. cit. supra. p. 297).

Found by Mr. Mahon Daly at "Lacan, Via Raheng, Siam."

5. *Hypoctonus formosus* (Butler).

This species found in Burma and on Owen's Island, Mergui, (Pocock, Linn. Soc. Jour. Zoology, Vol. xxxvi, p. 316); is probably the same as that recorded from Penang as *Thelyphonus angustus*, Lucas by Stoliczka, J. A. S. B. Vol. xlii, Part 2, 1873, p. 134.

Sub-order *Amblypygi* (Tailless Pedipalps).

Family *Tarantulidæ*.

6. *Tarantula phipsoni* (Pocock) Phipson's Tarantula.

This species is named after the able Honorary Secretary of the Bombay Natural History Society. The genus *Tarantula* has also been called *Phrynus* and *Phrynichus*.

At Chantaboon in January 1898 I found fifteen individuals of this species on one small hill, by turning over some piles of logs; they can run very swiftly, and rapidly efface themselves from view by going into crevices; but usually, like scorpions, they seem to seek concealment by squatting quite still among their natural surroundings. Daylight seems to confuse them, and when caught they move their pincers wildly about in a most aimless manner.

Dimensions of a Chantaboon specimen:—

Length, from front of mandible (folded at rest) to end of abdomen,	40	millimeters.
Width of cephalothorax,	19	,,
,, ,, ,, abdomen,	17½	,,
Total length of chela limb,	110	,,
,, ,, ,, antenniform limb,	128	,,
,, ,, ,, 1st walking leg,	55	,,
,, ,, ,, 2nd ,, ,,	60	,,
,, ,, ,, 3rd ,, ,,	58	,,

Span from tip to tip of outstretched chela, 220 mm.

An animal allied to Phipson's Tarantula inhabits the Batu Caves, Selangor; I saw one specimens far into the caves in June 1898 but failed to catch it.

Order *Araneæ*.

The True or *Web-Spiders*

Malay "*Laba-laba*"

Siamese "*Meng-moung*"

Jakun "*T'wowoh*" (Lake+Kelsall, J.S.B.R.A.S. No. 26, 1894, p. 56.)

The true Spiders have four pairs of legs, of similar construction, each composed of seven segments, and used for locomotion, and two modified anterior pairs of limbs, one (the palpi) leg-like and composed of six segments, including the basal segment or maxilla, and one (the mandibles) composed of only two segments and containing a poison-gland which opens at the tip of the second segment which forms the poison-fang. The spinning mamillæ, upon which open the silk glands, are situated on the lower surface of the abdomen, and are a characteristic feature of the true Spiders.

The sexes of spiders may be distinguished by the last segment of the palp which is modified into an intromittent organ in the male, while the female, in most families, has a horny plate (vulva) on the forepart of the lower surface of the abdomen.

The true Spiders are divided into two Sub-orders:—

1. *Sub-order Mesothelæ*. Abdomen segmented, its upper surface covered with eleven dorsal plates. Eight spinning mammillæ placed in the middle of the lower surface of the abdomen. This sub-order contains only one family *Liphistiidæ*, and one genus *Liphistius*, known from Burma, Sumatra, Penang and Selangor, where it has been recently discovered by Mr. H. N. Ridley.

2. *Sub-order Opisthothelæ*. Abdomen not segmented. Six, or fewer, spinning mammillæ placed near the hinder extremity of the lower surface of the abdomen. This Sub-order contains a host of forms, divided into two sections of many families; only a few of the more noticeable can be mentioned in the limits of this paper.

Section *Mygalomorphæ*.

Family *Theraphosidæ*.

These are the very large hairy spiders commonly called by the English in the Straits Settlements "Tarantulas", and called by the Siamese "Boum," what the effect of their bite on a man would be I cannot say; it is commonly supposed that the consequences would be very serious, if not fatal.

1. *Coremiocnemis cunicularius*, Simon.

These large dark brown and very hairy spiders are numerous on Penang Hill; most of my specimens were obtained near "the Crag" at an elevation of about 2200 feet. They make burrows, sometimes a couple of feet deep, in the steep banks at the side of the hill paths; the round entrance hole of these burrows is easily seen, and then the spider, if at home, may be carefully dug out. The Kling coolies I employed to help me digging were extremely afraid of these spiders, which they called (in Malay) "*Laba-laba gigi sakit*" (= the spider with the poisonous teeth). These spiders are fierce, very strong and difficult to kill without damaging them; I have found a specimen after three or four hours immersion in spirits of wine still to be so lively that it had to be handled with caution. The length of the caphalothorax and abdomen of one I measured was 46 mm. (1.8 inches), its hind-leg measuring 68 mm. (2.7 inches).

2. *Melopœus albostriatus*, Simon.

This species occurs in Siam; I was given a specimen said to have been caught at Ayuthia, but never came across it alive myself.

Family *Barychelidæ*.

3. *Encyocrypta sp. incert.*

I got this spider near the foot of Gunong Pulai, Johore, in September, 1897, but did not observe whether it had a "trap-door" home or not.

Section *Arachnomorphæ*.

Family *Pholcidæ*.

4. *Artema atlanta*, Walck.

This elegant spider, better known as *Pholcus borbonicus*, with exceedingly long and slender legs is common in disused buildings in Bangkok. It is pale reddish brown in colour, except the abdomen which is grey. They apparently make no webs; they can run very fast, but, as long as these is no crevice to dart away into, are easily caught in the hand. They may be from the tip of one extended fore-leg to the other as much as 140 mm. (or 5½ inches); though the length of the cephalothorax and abdomen is only 10 mm. (or .4 of an inch).

Family *Argiopidæ*.

5. *Argiope æmula*, Walck.

This species, which is widely distributed throughout the Oriental regien, I obtained in Bangkok.

6. *Araneus de haanii*, Dol.

Collected in a house in Bangkok in July 1898.

7. *Herennia multipuncta*, Dol.

Obtained on Penang Hill in March 1896.

8. *Nephila maculata*, Fabr.

This is the most striking in appearance of the Malay spiders I have come across, and is by no means rare. It lives on trees both in gardens and in the jungle, but occasionally wanders into buildings, as I got a specimen in the Officer's Mess at Tanglin in April 1896. Its large web, constructed of beautiful yellow silk, is usually spread between two trees, and the great black and yellow spider sitting motionless, with legs spread out in the middle of it, in bright sunshine makes a fine picture. If taken in the hand, the collector will find this spider can bite hard with its powerful nippers. Besides Singapore I have noted this species in Taiping, Perak, in Bangkok and at Muok Lek in the Dong Phya Phai, Siam: it also occurs in Borneo, Celebes, Halmahera, Ternate, Batchian, New Britain, Solomon Islands, etc.

A Bangkok specimen was coloured as follows:—

cephalothorax, shining intense black.
abdomen, various shades of brown, with black marks and two conspicuous yellow spots.
limbs, red brown, black at the joints.

This species attains a great size; in an individual I measured the length of the cephalothorax and abdomen was 36 mm. (1.4 inches).

9. *Nephila malabarensis*, Walck.

This prettily marked spider is very common, especially about houses, making large webs under the eaves of roofs, in verandahs, etc; when houses are not at hand it seems equally content with rocks. I have noticed this species in Penang (especially near "the Crag"), in Singapore, in Alor Star, Kedah, in Bangkok and in Chantaboon: it also occurs in Java, Halmahera and other places in the East Indies. Quite small spiders will nearly always be found living in the webs of this species. I have not been able to make out so far if they belong to a different species, or if they are the males of the big females which construct the webs.

Colour (in life.) Upper surface of cephalothorax dark brown or dark red; upper surface of abdomen mottled olive brown, or whitey buff with brown marks. The specimens with the brown cephalothorax usually have red or rich orange markings underneath the cephalothorax and abdomen, those with red above have bright yellow markings underneath. The legs are pale yellow, black about the joints, and the last segment in each leg is brown.

10. *Gasteracantha sp. incert.*

This curious looking spider, with hard transversely dilated six-spined abdomen, is not uncommon in the jungle on Penang Hill. I have found it at elevation of from 2000 to 2400 feet during March 1898. It makes a very large, strong, geometrically arranged web of white silk between the stems or branches of trees; this web it keeps very tidy. One web, which I particularly noted, was situated between branches of trees over 15 feet apart, and was about 9 feet from the ground. The transverse width of its abdomen from point to point may exceed one inch (one fine specimen measured 28½ mm.)

Family *Psechridæ.*

11. *Psechrus singaporensis*, Thor.

In the Batu Caves, Selangor, in June 1898, in caverns remote from daylight, Mr. A. L. Butler and myself found certain spiders numerous, which make strong, untidy webs in crevices of the rocks. Specimens of the spiders were sent to Mr. Pocock who considers they probably belong to this species.

Family *Ctenidæ.*

12. *Ctenus fungifer*, Thor.

Known from Penang, (F.O.P. Cambridge, A. + M. N. H. [vi] xx, 1897, p. 334).

13. *Ctenus floweri*, Cambridge (loc. cit. supra. p. 348).
The types of this species I got on Penang Hill in March 1896.

Family *Heteropodidæ.*

14. *Heteropoda venatorea* (L.) The Hunting Spider.

Nearly every resident in the East Indies must know this fine spider which runs about houses, in the evening, catching its insect prey; it makes no web, but the female spins a whitish silk cocoon in which she carries about her eggs, which she looks after with great care and vigorously defends from enemies. What the effect of the bite of this spider on a human being would be I do not know, but it is certainly not prone to bite and I have never heard of its doing so, while as it is known to be very useful to mankind in destroying superabundant insects, it certainly ought to be encouraged and native servants should not be allowed to carelessly or wantonly kill them. It feeds on moths, crickets, etc., especially the big red cockroaches, which are such a nuisance in some places in the Straits Settlements. In a house individual spiders will often take up particular beats, which they occupy regularly night after night; in Bangkok one lived for many months behind my dressing table. Every evening when I placed a lamp on the table the spider came out from its retreat and took up his position by the light; at first we rather mistrusted each other—I being afraid the spider might some day bite me, and he carefully avoiding my coming too close to him, but as the

weeks went by such mutual confidence sprung up that even when I touched him the spider would hardly shift his position.

I have noted this species in Singapore, Johore, Georgetown (Penang), Kedah, Bangkok, Ayuthia, Tahkamen, Chantaboon and also on board local coasting steamers.

It is also recorded from Java, Borneo, Celebes, Halmahera, Ternate, Batchian, New Britain, Solomon Islands, tropical Africa, etc., etc.

A specimen I kept for a time in captivity in a large glass jar together with a small scorpion *Archisometrus mucronatus*, and a *Thelyphonus* did not interfere with them in any way or they with it. Whenever the spider rested on the glass sides of the vessel it put its spinnarets in rapid motion and formed a small anchor of white silk and then let down one fine silk thread as if to help support itself: in a few days it had to some extent obscured the whole surface of the glass by the number of these anchors it had made and abandoned.

15. *Heteropoda thoracica* (C. Koch).

I caught specimens of this very handsome spider in the inner, deepest caves, far from daylight, over an hour's walk from the entrance in the hill side, Gunong Gajah, Kedah, in June 1898. They ran with great agility over the rough walls of rock, and also when we tried to catch them sprang away from the rocks into the air; the Malays were very frightened of them. Although living in darkness the spiders did not seem at all confused by the light of the lamp and torches. On the two occassions I have collected in these caves, in April 1895 and June 1898, we only met these spiders in one part of the caves, the deepest part.

Colour, yellow ochre, marked with rich dark brown.

Size, Cephalothorax,	length,	16	mm.
,,	width	12.5	,,
Abdomen,	length	17	,,
,,	width	8	,,
Palp,	length	27	,,
1st leg,	,,	83	,,
2nd ,,	,,	91	,,

3rd leg length 73 mm.
4th ,, ,, 82 ,,
Total span (across 2nd pair of legs from tip to tip) 194 mm. (= 7⅝ inches).

This species has been recorded from Sumatra, Java, Amboina, etc.

16. *Thelcticopis modesta*, Thorell.

I obtained this species in Penang in 1896.

Order *Opiliones*.

The Harvest Spiders.

Animals superficially resembling the true Spiders; like them they have four pairs of legs, of similar construction, and two modified anterior pairs of limbs; one (the palpi) not pincer-like, but sometimes capable of folding back on themselves, sometimes armed with spines, and composed of six segments, including the basal segment or maxilla, except in the *Ricinulei* which have five segments; and one (the mandibles) pincer-like and composed of three segments, except in the *Ricinulei* which have but two.

The abdomen is segmented, composed of from 3 to 8 segments. In the true spiders the breathing apparatus consists sometimes of four pairs of lung-sacs, but generally the hinder pair are replaced by tracheal tubes; in the harvest spiders the breathing apparatus consists of tracheal tubes, opening by one pair of orifices situated on the sternal plate of the abdomen.

There are no spinning glands.

Family *Oncopodidæ*.

1. *Gnomulus rostratus*, Thorell. (Ann. Mus. Genov. xxx, p. 378. 1890); found in Penang.

2. *Oncopus feæ*, Thorell. (Ann. Mus. Genov. xxx, p. 375, [1890]); found in Penang.

3. *Oncopus truncatus*, Thorell. (Ann. Mus. Genov. xxx, p. 764, [1890]); found in Singapore.

"The British Museum has from time to time received a number of specimens from Mr. H. N. Ridley" (A. + M. N. H.

Ser. 6, xix, p. 288). I obtained one individual of this species in the jungle at the foot of Gunong Pulai, Johore, in September, 1897.

4. *Oncopus alticeps*, Pocock (A. + M. N. H. Ser. 6, vol. xix, 1897, p. 287).

The type specimen I found on Penang Hill, about 2200 feet elevation; 29th November, 1896.

Family *Phalangidæ*.

5. *Gagrella sp. incert.*

I obtained specimens of these very long legged beasts in Bangkok and at Bortong Kabin; at the latter place in March 1897 there were countless thousands of them collected in certain spots, a wonderful sight.

Notes of a Tour through the Siamese States on the West Coast of the Malay Peninsula, 1900.

By C. W. S. Kynnersley.

Having assumed charge of the Consulate in April this year and wishing to become acquainted with some of the Western Siamese States which have not been visited since 1894, I left Penang in the colonial launch *Seabird* at 10 P. M. on

Tuesday 11th December, taking with me Mr. Peel, District Officer, Bukit Mertajam. I elected to go in December as the weather at this season is settled with a N. E. wind blowing from the land. It was a fine moonlight night and we reached the mouth of the Kedah river before daybreak.

Wednesday 12th December.—The Sultan's Secretary came on board at the entrance to the river and we reached the landing place at *Alorstar* about 6.0 A. M. Here I was received by some of the leading officials and a guard of honour and we drove in a carriage and pair to the Sultan's country house at *Anak bukit*. H. H. the Raja Muda accompanied us. I arranged to be at the Consulate at 9.0, previous notice having been given of my intended visit some time before. After breakfast we drove to the Consulate which has been lately repaired. Every assistance was given to me by the Kedah Officials. I enquired into several cases of minor importance and a considerable number of British subjects presented themselves for registration. Having despatched the business in hand and arranged to attend the next day, we drove back to *Anak bukit* where I discussed various questions with the Raja Muda. At 3.0 P.M. I paid an official visit to H. H. the Sultan who is in very feeble health and at times hardly equal to transact public business. Having taken leave of the Sultan we proceeded with the Raja Muda to inspect the Public Offices. The buildings are excellently adapted for the purpose and present quite an imposing appearance, though

the style of architecture may not be of the highest order. They were completed about four years ago and reflect great credit on the designer who carried out the work—MAHOMED LEBBY TAMBI, formerly employed under me in the Police Court, Penang. He is now building a fine new house for the RAJA MUDA.

The offices are admirably arranged—Treasury, Land and Survey, Courts of Law, and lastly an office for the Auditor General. The various officials, including the Judge, were introduced. We were shewn a survey map of the town with all the various lots marked on it. The offices are open from 10.0 to 4.0, Malays being exclusively employed, and in outward appearance at all events our colonial system is followed. So far as we could ascertain the office of Auditor-General is somewhat of a sinecure. He is said to query and examine accounts but there were no papers or books in his office. A census has lately been taken and we were shewn the figures which, however, are still incomplete for some of the up-country *Mukims*. I have on former occasions inspected the gaol, but did not do so on this visit. I noticed that the outside wall was beautifully white but the interior arrangements are I fancy what they have always been and are hardly up to date. Prisoners in chains are employed on outside labour in the town. A Kling *dobi* prisoner sent me a petition complaining that he was kept in gaol beyond the term of his sentence, but his warrant of commitment, which was produced, proved that his statement was incorrect. The RAJA MUDA, his younger brother, a son of TUNGKU DIA 'UDIN, the Auditor-General and two others dined at *Anak bukit*. We were the guests of the RAJA MUDA.

Thursday 13th December.—The RAJA MUDA came at 7.30 A. M. and we went down the river to the Consulate in a house boat, the RAJA MUDA pointing out the place where Lieut. THURBURM, R. N., of H. M. S. *Hyacinth*, was drowned when crossing the river at night after snipe shooting in October, 1891. The current here is strong and the boat must have struck a snag and capsized. The body was recovered opposite the Consulate 1½ miles down the river. The grave in the consular grounds, which has a stone cross over it, is kept in good order. Enquired into a number of cases including a complaint by a Penang China-

man as to the decision of the Kedah Government with regard to a grant of land at Kulim. TUAN BULAT, Collector of Land Revenue, produced the plans and the documents and after a full explanation of the case I came to the conclusion that the Kedah authorities were justified in their action. A certificate had been granted to a Malay man in Penang who claimed to have been born in Province Wellesley, alleging that his father moved to Kedah when he was 6 years old. Good evidence being produced that he was born in Kedah territory I cancelled the certificate. A large number of British subjects were registered. The consular business being concluded we drove back to *Anak bukit*. At 4.0 we went by invitation to tea at the RAJA MUDA'S and found a garden party assembled, all the leading officials having been invited. Having partaken of coffee, ices, etc., in the garden we adjourned to the billiard room. Returning to *Anak bukit* for dinner we left at 10.0, going on board the *Seabird*. The RAJA MUDA and others saw us off and we dropped down stream slowly, anchoring about midnight inside the bar. I have visited Kedah at intervals since 1873 when I spent some weeks there learning Malay and I have always met with the utmost hospitality and kindness on the part of the reigning family and officials.

Friday, 14th December.—Having crossed the bar at high tide about 4.0 A.M. we had a calm voyage with a light cool breeze from the shore. We passed numerous limestone islets and rocks of quaint shapes. At times it came on to blow fresh from the N. E. and the spray from the white waves broke over our bows. Passing Cone Island near which the S. S. *Perse* recently struck an uncharted rock and went down, "Cut Islands" and the twin rocks called in the chart "Darby and Joan" we made for the entrance of the Trang River which for half an hour was hidden from us by a heavy rain squall which came on from the N. E. The Trang River is like the majority of those along this coast, broad and fringed with mangroves, with many channels. Having taken a pilot from Penang we were successful in reaching our destination without grounding on the mud banks. The seat of Government is by no means imposing. There is no town. At the landing place we were met by Mr. KHAW JU KEAT—the Governor's nephew—two pony-traps being sent

down to convey us to the Governor's house which is situated about a quarter of a mile from the jetty. There is a Custom House and a few Chinese shops. We were not expected so early. Mr. KHAW SIM BEE, whose Siamese title is Phya Rasdanupradit, etc., the Governor, received us most cordially and after giving us tea drove us along a new road which he has made round a wooded hill on which his house stands. On the way he pointed out the new Government Offices consisting of Treasury, Court and Land Office which have been commenced opposite the gaol. The prisoners, Chinese and Siamese, are employed in making bricks and on road work. Mr. KHAW SIM BEE belongs to a wealthy Penang family and is an admirable administrator. Being intimately connected with Penang he can do much in the way of extending the trade of that Settlement with Trang and the neighbouring Siamese States. He owns a Steamer which runs regularly between Trang, Pung-a, Penang and Deli.

The old town and mines, where some hundreds of Cantonese and Khehs are employed, are situated some miles up the river and the tin is brought down to the river on elephants four miles by a bad road. We had not time to visit them. Mr. KHAW SIM BEE described how he had effectually suppressed the Secret Societies some years ago, since when there have been no signs of their revival. He also informed me that the Siamese Government had decided to abolish the Gambling Farms and this was gradually being done. There is only one Sikh in the place, who is employed as a detective to see that no Government employée attends the Gambling Farm.

Pepper thrives well in Trang, 25,000 pikuls being produced in a year valued at $28 a pikul. The soil is said to be excellent. Mr. KHAW SIM BEE pointed out a new elephant-road to Nakon on the East coast 70 miles distant. It is dignified by the name of a road but at present hardly deserves the title. About 15 years ago orders were given from Bangkok to connect these Western States by telegraph. Poles were prepared for the connection between Trang and Ghirbi and the wire has been lying at Trang ever since. Many reforms are being introduced by the Siamese Government in these States. The officials of the old school have been removed and are replaced by young men from Bangkok who have had some training in their duties. The

latest innovation is the introduction of the Burma village system of headmen under which police and paid officials are dispensed with up country. Ten houses elect a headman. A group of ten villages has a representative headman. All occurrences such as births, deaths, fires, disturbances, crimes, etc., are reported and no one can move from one village to another without the fact being reported and some one found responsible for him. Mr. KHAW SIM BEE says that since the introduction of this system crime has practically disappeared. The Siamese he says as a rule are well behaved but when they are bad they are desperately bad. The Treasury accounts are kept in the English fashion. The law is framed on European models and everything is up to date. The Opium Farm is run on the same lines as in Penang, the retail prices being the same. Living is apparently very cheap and prices are very much lower than in the Colony. Fowls are 25 cents, buffaloes $30 to $35. A certain amount of timber is exported besides tin and pepper. Giam (used for boat building and other purposes) is exported to Penang and Calcutta. Peacocks and teal are plentiful within easy reach of the Governor's place, also green pigeon, and *pergam*. The revenue is paid as in the other Western States through the Siamese Consul-General in Penang, 60% going to Bangkok. This is a considerable drain on the resources of the States and may help to explain why so many useful public works, which are projected, are not carried out.

There are few British subjects in the place and their interests may safely be entrusted to Mr. KHAW SIM BEE who is himself a British subject.

The Governors of Tongkah and Ghirbi, who were leaving for Bangkok to take part in cremation ceremonies, dined with Mr. KHAW SIM BEE that night as well as two other officials. The Governor of Ghirbi speaks English. I explained to him that I had intended to visit Ghirbi on my return journey but would postpone my visit as he would be absent. Ghibri produces an inferior quality of coal or rather lignite of no commercial value though it is used with other fuel by small steamers.

Mr. KHAW SIM BEE entertained us most hospitably and we slept at his house that night.

Saturday, 15th December.—Mr. KHAW SIM BEE when in Penang had kindly placed at my disposal the small steamer *Damrong Rat*, so I left orders for the *Seabird* to meet us off Telibon Island on our return from Tongkah. Mr. KHAW SIM BEE also very kindly sent his nephew Mr. KHAW JU KEAT, who speaks English and Siamese, with us and he proved of the greatest assistance. A Marine Police Guard (Siamese) was drawn up at the jetty when we drove down and we took leave of the governor about 7.0 A. M., the *Damrong Rat* flying the consular flag. Outside the mouth of the Trang River we found the S. S. *Artsadong*, the small steamer that runs between Penang and Pung-a owned by Mr. KHAW SIM BEE, high and dry on a sand bank. She had left Trang for Pung-a at night and not being able to make out the narrow channel marked by stakes had got on the bank about 2.0 A. M. on the 14th. After passing round Telibon Island the sea got rougher with a strong breeze from the land. The long island of Pulau Lontar sheltered us part of the way. After passing Pulau Lontar the sea got rougher as we got further from the land. Then after rounding a small island we altered our course for Tongkah with a following sea. The anchorage at Puket resembles that of Malacca during the S. W. monsoon. The harbour is very shallow and is exposed to the N. E. The Siamese gunboat *Ran Ruk* and S. S. *Petrel* were lying a mile or so from the shore. Captain RING of the *Ran Ruk* kindly sent a boat off at once, and owing to the heavy sea running we had some difficulty in getting off. However we got ashore in safety about 6.0 P.M. Captain RING met us at the jetty, took us to his house, which is near, and introduced us to his wife, the daughter of Captain WEBER of Tongkah. The Chief Commissioner of the Western Siamese States had sent his carriage for us and we were met by the Acting Superintendent of Police (Siamese) who talks English well, having been formerly employed in the Penang Land Office. We were received by the Chief Commissioner who introduced us to his wife in a large reception room furnished in European style. He hospitably placed rooms at our disposal and asked us to make ourselves at home. His Excellency did not understand English but with the help of the Superintendent of Police and Mr. JU KEAT we got on very well

during dinner. His wife knew a few words of English learnt in Penang where their son is being educated at the Brothers' School. The Commissioner is a person of great importance being over the local governors and corresponding with Bangkok frequently.

Sunday, 16th December.—We had arranged to go early with Mr. Ross CLUNIES, Superintendent of Mines, to see a new road, but we found carriages ready and the Commissioner prepared to show us round himself. We were driven about a mile along a grass covered road till we were brought to a stop by an unbridged stream. This afforded a good example of what we found very common in these Siamese places. Roads, bridges, and improvements generally are talked of but not made. Everything bad is attributed to the late Governor. All sorts of wonderful schemes are going to be carried out by the present man. The old Governor for instance allowed Chinese to bury where they liked. The hills were allowed to be cleared of jungle for hill padi. Anyone could dig for tin anywhere, etc. The old Governor is said to be responsible for the tumble down building which serves as the Post Office and so on.

The explanation for allowing this stream to be unbridged was that all the timber obtained from Penang and Singapore which was lying ready was burnt one night owing to a lamp falling. We were told there was no stone available though I saw plenty within a quarter of a mile. We passed the house of the Superintendent of Police, Mr. HARTNELL, lent from the Burma Police, who is at present on leave in England. Mr. CLUNIES was also to have a house there and we climbed a small hill chosen as the site for a house for the King of Siam. It is nice open grass country interspersed with scrub. The plans are said to be all ready but it is very doubtful if the house will be built or the road ever completed as there is a newer scheme for moving the town about two miles further away to the bay near the Light-house island which is sheltered and is said to have deep water. If this scheme is ever carried out the site of the present town will be given up to mining as it is known to be rich in tin. We then drove to the Central Police Station which was prepared for me to hold a Consular Court and I arranged to be there at 11.30. From there we drove to

the mines. These are interesting from the fact that they are in the former bed of the sea, an embankment being carried a quarter of a mile or so out to sea so as to enclose the mine. Two or three thousand Chinese miners, all Hokkiens, are employed here and there must be quite as many pigs as Chinese. These pigs are exported to Penang. Within the embankment which keeps the sea out the sand and clay have been excavated to a depth of some 50 or 60 feet below sea level. It is an enormous work which may or may not be rewarded by success. I was told that there was a loss of $50,000 during the present year but this may not be true. We saw some tin sand being washed in the usual way. At present the average yield is 12 pikuls a day but it is hoped soon to reach a richer stratum. The particles of tin are very small whereas in the mines near the hills large *biji* are said to be found. After inspecting the mines we drove to the Government Offices and were introduced to the Treasurer and a youthful looking Chief Justice aged between 30 and 35. I wanted to post a letter but we were not taken to see the Post Office, which being a relic of the old Governor's régime is not one of the show places. The Chief Commissioner has a good Office. Here we saw several typewriters in Siamese character at work. On the walls were some recent Siamese maps. During the day we received typewritten formal invitations to dine with our host. After breakfast at 10.0 we drove to the Central Police Station where I was presented with two petitions from Klings. One was about the division of some property of a deceased Kling man. It appeared that he traded in cattle and several persons were indebted to him. Before his death he called his friends and told them to bury him decently and have a feast, collect what was due to him and keep the money for his widow in India. They appear to have carried out part of the trust and the recollection of the goats and fowls slaughtered in honour of deceased was still in their minds. So far as I could ascertain there remained a sum of about $2.50 for the relatives, deposited with a Siamese official. The other petition related to a matter which is still *sub judice*. Two Kling British subjects had a difference about some accounts and one was alleged to have assaulted the other. The case came before the judge and one was mulcted

in damages and ordered to pay $30 or some such amount. Against this decision he had appealed to the Council-General at Bangkok and an answer was expected in a few weeks. Klings cannot exist without litigation and I should think that the Siamese judicial system is well calculated to satisfy them. It must be a great luxury to be able to appeal to Bangkok in any trivial matter even if there are no results. While waiting I noticed a Sikh orderly being measured against the wall for his descriptive roll as a British subject. He was wearing a specially high turban and I asked what his height for the Register was. I was told 5 feet 8 inches, but having removed his turban and boots he only reached 5 feet 4 inches. A large number of Sikhs were formerly employed at Tongkah but they were found troublesome and have been replaced by Siamese, only a few orderlies being retained. When the consular business was finished we inspected the Club where we saw some new Penang papers brought by the *Petrel*. We then paid a surreptitious visit to the office of "the Royal Siamese Posts and Telegraphs." I asked for stamps but was informed that they were not kept and letters must be forwarded on board. We did not ask to telegraph anywhere as we had been told that the telegraph posts and wires which run along the new road lead nowhere. In the afternoon Mr. CLUNIES came and fetched us with a buggy and dogcart. He drove me while Mr. PEEL followed in his pony cart. We drove through the principal streets of the town. We passed over one new plank bridge but all the rest were rotten and there were great pits in the road. Bridges are said to be repaired only on the occasion of a wedding. We drove some distance along the projected new road to the town of the future on raised turfy land through brushwood. Everywhere were excavations for tin. Chinese graves, some newly dug—in spite of the new régime—were also plentiful in the brushwood. We then walked half a mile till we came to a mangrove swamp —then back along a cart track with the deepest ruts I ever saw till we struck the main road to the up-country mines. This road might easily be put in good order but nothing is done to it and there are deep holes in it. Up the valley is a wonderful aqueduct built of scaffold poles by Chinese some years ago which is said to be seven miles long and 100 feet high. We were

shewn a photograph of this and I should have liked to have seen it. Having driven through the town we called on Captain RING and found a gale blowing. The weather looked very bad and it was suggested that we had better delay our departure till next morning. There was a dinner party in our honour that night. Captain RING and two Danish officers of the *Ran Rak*, the Chief Justice, Treasurer, Mr. CLUNIES and others, about 14 in all. A Siamese band played during dinner, Siamese and Chinese tunes, flutes aud fiddles. I took the Commissioner's wife down and she was the only lady. The Commissioner after "the King" proposed our health and I replied. We left about 9.30 and went on board the *Damrong Rat* in Captain RING'S boat. Happily the wind had gone down. It was pretty rough outside with a head wind and the boat pitched and rolled, the sea coming over the bows. We got into smooth water under Pulau Panjang about 3.0 or 4.0 A. M. and anchored in the Pung-a River.

Monday, 17th December.—A lovely cool morning and the view beautiful beyond description with numberless limestone islets and rocks some rising to the height of four or five hundred feet with precipitous sides clothed with verdure. Mr. JU KEAT had started at 5.30 up the river to convey a letter from the Commissioner to the Governor. We were told that he could not be back for an hour or so and we therefore went in a boat— a very leaky one—to explore the river, taking the camera and Mr. CURTIS'S orchid and plant collector. The Pung-a River forms part of a network of broad channels among mangroves out of which rise at intervals great isolated limestone crags and precipitous rocks, some rising to 800 or 1,000 feet in height. Our men climbing up the steep rocks got a miscellaneous collection of plants and orchids which half filled our small boat. We also took several photographs of picturesque rocks and caves. Then we returned to breakfast on the launch. Mr. JU KEAT having returned we went in a boat about two miles up the river, taking a rifle in case there were any crocodiles on the mud banks. We did not see one though the tide was low. The stream or rather mangrove creek got very narrow and at length we reached the landing stage where a Police guard was drawn up, and we were met by

the Governor's Secretary with a pony carriage. The Secretary did not speak English but we learnt through Mr. JU KEAT that this was a new road to take the place of the former Governor's road, which (of course) was bad. Like all the other roads we saw except that at Trang it was in an unfinished state completely grassed over with big holes in it, but further on it was much better. The scenery was very pretty. The road runs through an avenue of ansenas which at this season up north shed all their leaves. The road being covered with dead leaves reminded one of an English lane in autumn. There was nothing tropical about it but an occasional palm in the distance. On either side were broad stretches of fine turf with clumps of brushwood. Through the valley which is about two miles wide meanders the Pung-a River in a sandy bed. The valley is entirely hemmed in by precipitous limestone cliffs some 1,500 feet high. On the left going to Pung-a is a huge block shaped like an elephant. After passing several houses and the gaol enclosed by a palisade, we reached the Governor's place. The Governor received us most warmly and offered us tea and cigarettes in his verandah. He is a most genial man but unfortunately he upset our gravity by his first remark which was translated to us by Mr. JU KEAT with a smile: "This is a poor house to receive you in. It was built by the late Governor. I have plans all ready for a new house". The cigarettes made in Siamese fashion were excellent and the Governor told me they were made of Pung-a tobacco. The soil he says is very rich and will grow anything—100 pikuls of tobacco a year are produced, value $5,000. I asked him to send some tobacco, cigarettes, etc., to the Agricultural Show. He is very anxious to make known the resources of his district and said he was preparing a report which he promised to send to me. He said there was great difficulty in procuring labour for planting. The Chinese all go to the mines. 5,000 pikuls of tin are got—brought in by elephants which only carry 4 or 5 slabs. He is very anxious to get some natives of India for planting. In one island he said there were 500 deer which he hunts with a pack of dogs. Peacocks he said were very plentiful. It is certainly a lovely place—very cool at this time of year and, I should say, extremely healthy. The lunch was so excellent that I asked if

he had a French cook. He said his cook was a Chinaman whom he brought from Bangkok. The Governor has a daughter being educated in the Penang Convent. He had been to Perak where Mr. RODGER had been very good to him he said. Just as we finished lunch three elephants arrived and the Governor asked if we would ride round and see the town, Rest House, etc. I mounted the leading one with the Governor and Mr. PEEL and Mr. JU KEAT followed. My elephant was valued at $1,200. A good number are sold to Burma. We first went along the road, the Governor who knows a few words of English pointing out the present very unpretending Government Offices and saying "no good house—next year estimate." The elephants, as is their wont, left the road wherever a bridge appeared and made a detour. There is only one narrow street in the "town." I noticed a pillar box close to the Post and Telegraph Office. The people are half Siamese and half Chinese and a good many of the houses are dilapidated. After passing through the "town" we struck the river bed and went down some distance. It has a broad sandy bed. In the rainy season it becomes a swollen torrent which at times floods the town. Passing round by the Governor's house we went some distance above the road leading to the river and came to a hill on which a Rest House has been built—a lovely site commanding a view of the valley. The Rest House is commodious but unfurnished. The Governor said that even at that season there were frequent showers which keep the place cool. There was a shower while we were there. The high cliffs clad with jungle no doubt attract the clouds. We were quite sorry to leave and I expressed my regret that as there were no British subjects I could not repeat my visit as Consul. The Governor saw us off at the landing place and as we passed I noticed two men mending some of the worst holes on the road. We found the *Damrong Rat* had left her anchorage and gone to the mouth of the river to take in firewood. This entailed an extra two miles pull for the men. We lay that night off the Custom House and slept on the deck peacefully.

Tuesday, 18th December.—A pilot came off early and we left at 6.0 to visit the Kesum cave. This is some miles up a river similar to the Pung-a River with limestone rocks rising out of

the mangrove. Following one branch the river narrows and passes through a great limestone rock—forming a natural arch fringed with stalactites. It was so beautiful with the sun shining on the water seen through the arch that we took several photographs Having passed under the rock and admired the scene we returned to the mouth of the river leaving for Trang about 9.0 A.M. It was blowing fresh and the sea was pretty rough—a glorious morning with a cool breeze from the land. Passing numberless limestone rocky islands we got under the lee of Pulau Lontar and before dark sighted Telibon Island. Off the Custom House we found the *Seabird* lying together with the *Artsadong* which had only just floated off the bank on which we found her when we first arrived at Trang. We slept on deck and had a cool peaceful night.

Wednesday, 19th December.—At daylight we started in a house boat to see some caves up a river which were said by Mr. KHAW SIM BEE to surpass those of Kedah. The caves are very disappointing and as we had no torches we could not explore them except by match light. It took us three hours to go and return and we regretted the delay as we could not reach the Langkawis before dark. Having taken leave of Mr. JU KEAT who had proved most invaluable to us we made for Pulu Terutau and anchored about 5.0 P. M. under the shelter of a small rocky island separated from the shore, where there were a few native huts, by a narrow channel. We were glad to get into smooth water for the night. We landed and searched for orchids till it got dark but the rock proved barren and unclimbable. Noticing after dinner that we were dragging our anchor and drifting into rough water I got the Captain to let out two fathoms more of cable.

Thursday, 20th December.—Made an early start for Kuah where we had arranged to meet His Highness the RAJA MUDA. It was still blowing fresh from the land. We reached Kuah about 9.0 and found the RAJA MUDA who had expected us the night before had gone on to Dayang Bunting so we followed. His small steamer was at anchor. He came on board and we went through an inland sea of wooded islands till we came to a small bay where we anchored and went ashore in boats to a long temporary jetty put up years ago for the King of Siam. We

then followed a good jungle path through a plantation of durian and other fruit trees planted by the late WAN MAT. Having mounted to the top of a low ridge we descended to the shore of the lake Dayang Bunting where a long Malay house has been built on piles on the edge of the lake. Here elaborate preparations were made for a feast, tables, chairs and everything being brought by the numerous Malays who accompanied us. Mr. PEEL ventured on the lake in a small canoe. We then sent a man out to take soundings with the *Seabird's* lead. In the two places selected it was found to be 9 fathoms deep.

The lake is surrounded by jungle-clad limestone cliffs some 500 to 1,000 feet high which enclose the lake except at the lower end where a low rocky ridge separates it from the sea. The lake (fresh water) is about 500 yards long. We took a sample of the water which I brought to Penang for analysis. After an excellent meal we went round by boat to what once must have formed the inlet to the present lake from the sea. Masses of limestone rock have blocked the entrance so that there is now no connection between lake and sea. After climbing some rocks about 40 feet high we looked right down on the lake the surface of which, so far as we could judge, appeared to be some 10 feet above the sea level. This is a mere conjecture. From Dayang Bunting we should have gone to *Telaga tujoh* but the RAJA MUDA wanted to show us the Goa Cherita (Legend Cave) which they said could be reached in an hour. As a matter of fact it took us 2½ hours to get there. The scenery of this Archipelago is lovely as you wind about among the wooded hills. The highest hill is Gunong Raya which is over 3,000 feet high. A striking feature in the distance is the serrated range known as Gunong Chinchang. Once more we were destined to be disappointed in the matter of caves. The cave is a very ordinary limestone cave and the only interest that attaches to it is an inscription in Arabic character high on the limestone cliff at the entrance. Certain Arabic words and names can be made out but whether it is ancient as the Malays like to believe or only some hundred years old it is impossible to say. Below Malays and English visitors have inscribed their initials with charcoal and we were told to do the same. It was nearly dark when we started to return to Kuah. Fortunately we had a pilot who was

able to direct our course through the winding channels sometimes very narrow and between high rocks. It was intricate navigation in the dark but we got safely back to Kuah about 8.0. We then landed and had dinner in a house built by WAN MAT after which we left with a Kedah pilot kindly lent by the RAJA MUDA.

Friday, 21st December.—Reached Penang about 7.0 A. M.

General Remarks.

The best season to visit these States is undoubtedly December-January when delightful weather may be counted on. It is the dry season and a cool breeze blows continuously off the land. The *Seabird* is not fit for such a trip. The *Damrang Rat* though not much bigger is a better sea boat. When I describe the sea as "rough" I mean for a launch. In the *Sea Belle* the trip at this time of year would be a delightful one, Pung-a especially being worth a visit for its lovely scenery.

One thing that struck us was that during all the while we were at sea—always in sight of land—we hardly saw a junk, boat or sign of population. In Trang and to the Northward the Malays or Samsams resemble the Siamese. They do not speak Malay but are said to be Mohamedans. Mr. MAXWELL'S remark in 1889 that the Siamese Government neither makes nor maintains roads is true now. Neither has the telegraph made any progress since that time. Mr. MAXWELL remarks further that these States all suffer from being regarded in Bangkok not as provinces to be developed but as mere sources of revenue to be spent at the capital. Sixty per cent. of the revenue still goes to Bangkok. There is evidently now a desire on the part of the Government at Bangkok to improve the local administration of these Western provinces and no doubt many reforms have been carried out in the last few years. At Trang there were many signs of progress visible. This I attribute to Mr. KHAW SIM BEE'S energy and good administration.

Tongkah is a land of promise. A large number of schemes are going to be carried out but these promises evoke a smile from those who have been used to the administration of the palace. The country is evidently full of tin but the Government does nothing to improve the roads or open up the place. The

harbour has silted up and a vessel of any size has to anchor a long way out. I cannot say whether the new harbour will be adopted and the town moved as is talked of.

Puket, by the way, is the name ot the town, *Tongkah* being the name of the island or what is really a peninsula as the narrow strait (Pa Prak) is only half a mile across and fordable by elephants at low tide.

The Strait is between *Salang* and *Takuatong* on the mainland hence the Malay name for Tongkah *Ujong Salang* corrupted to Junk Ceylon. No one can visit these places without seeing how dependent they are on Penang. Under a Government such as that of the Federated Malay States they could soon be changed into rich provinces and trade would expand in a wonderful manner. With mineral wealth and a fertile soil the population would increase and Chinese would be attracted to invest capital there. Under the present régime in spite of many reforms in the selection of officers, the administration of justice, etc., it may be doubted whether any substantial progress will be made toward opening up the country, at all events unless the revenue is spent on public works and improvements. Formerly when the mines were more prosperous 60 Sikhs were employed under Captain WEBER but these have been dispensed with and the only British subjects beyond a few Penang-born Chinese appear to be Klings who trade in cattle with Penang. Capital punishment is not inflicted in these States—those convicted of capital offences being sent to Bangkok.

From the islands in this archipelago which are scarcely inhabited are procured edible birds' nests and guano.

Captain RING of the Royal Siamese Navy showed us a collection of small clay figures of Buddha said to have been found by the collectors of guano buried in caves. Whether these are ancient as supposed or modern I am unable to say. Mr. KHAW JU KEAT promised to send me some which I will forward to the Curator of the Raffles Museum.

The long wooded island of Pulau Lontar (said to be coveted by the Germans) lying to the North Trang fringed on the west by a sandy shore appears to be scarcely inhabited except by a few fishermen. The Langkawi group of islands are sparsely inhabited by Malays and there are said to be about 100 Chinese. Achinese

are planting pepper in one place. Pulau Adang, one of the Butong group lying to the North of the Langkawis and further out to sea, is visible on a clear day from Penang Hill. This lies near the track of the British India boats on the way to Rangoon and would be worth a visit.

I enquired into the health of the place we touched at. In Kedah there is a Eurasian doctor (BOYER) who told me that there was little sickness. The drinking water is derived from the Kedah river which passes the Consulate and *Anak bukit*. The water is somewhat brackish and must be much polluted. Trang was said to be very healthy. In the early part of the year a few cases of plague occurred among the miners in Tongkah but this appears to have died out soon and the health of the place is now said to be good. The Siamese Government on the representation of our Government decided to appoint a Medical Officer to reside there. No one has yet been appointed and the Commissioner consulted me as to whether a Dr. AMNER who has been residing there for some time was fitted for the place. I could only say that I believed he had the necessary qualifications but could not be sure. The Governor of Pung-a assured me that his place was extremely healthy and that there was no sickness.

I had not visited Kedah, with which I was formerly well acquainted, for many years. It is a fine country—a vast tract of padi land interspersed with low hills. The revenue has increased very considerably of late. The Sultan spends the revenue as he likes, sending the "Bunga mas" to the King of Siam as Suzerain. A Penang Chinaman advances money to the Malay cultivators and mills the rice purchased from them. Another Chinaman has opened up a sugar estate on the banks of the river below *Alor star*. The Sinkep Tin Mining Company are working with success near the base of Kedah Peak while there are large tapioca plantations near the Muda. Kulim at the back of Bukit Mertajam is a thriving place with Chinese tin mines and plantations. It would be an advantage if the railway were extended from Bukit Mertajam to Kulim as has long been proposed but the Sultan of Kedah is at present in such a feeble state of health that he hesitates to take any action in the matter though he says he will not object to the railway.

It is interesting to see how a purely Malay Government without European interference or guidance has endeavoured to model the administration on our colonial lines even to the appointment of an Auditor General. Only Malays are employed in the public offices most of them being men of good position. Here there is a real Post and Telegraph Office, the Telegraph Department being superintended by a son of the Government Munshi at Singapore.

I cannot conclude without referring to the hospitable and kind way in which we were everywhere received, the authorities doing everything that could be done to make our visit agreeable and assisting me in my consular work.

The Relations between Southern India and the Straits Settlements.

By W. A. O'Sullivan.

A few years ago, a very able paper was read by Mr. C. O. Blagden before the Straits Philosophical Society, on the subject of "Arabian Influences in the Far East," and evoked a warm discussion. I thought with others at the time that Mr. Blagden claimed too great an influence for the Arabs, both as a converting and civilizing agency in the Far East. I have since so far modified that opinion, from wider reading, that I am now fully convinced that it was the Arab traders, or rather the Arab bandits whom they brought in their train, who effected the conversion to Islam of the vast majority of the people inhabiting the Malay Peninsula and the Indonesian Archipelago. To this belief I have been induced, not so much by the discovery of any additional historical data beyond what the essayist put forward, as by the living testimony afforded by language, a proof more to be relied on than a thousand traditions. Almost every word in Malay connected with religious worship is pure Arabic, only modified by the difficulty the converts experienced in pronouncing the language of their teachers. The same is the case with the Achinese, Sundanese, Javanese—in a word, with all the languages of the Archipelago whose speakers have embraced Islam; the Malays, it may be added, have also adopted the Arabic character.

It is not, then, to India that we have to look as having imparted to Malaya the present religion of its inhabitants, or such elements of its civilization as are bound up with their creed. But civilization and social development, much as they may owe to religion, are not coincident with it, and I think still that Mr. Blagden went too far in claiming for the Arabs the lion's share of influence on the social life of the Malays. Right throughout the Indian Archipelago (which I take for convenience sake to include this Peninsula) there co-exists with *hukum*, or religious law, a great unwritten code of native custom, known as *adat*. This

not only flourishes side by side with the *hukum*, but often overrides it when the two come into conflict. Of this *adat*, part is immemorial usage, with its roots so deep in the past that they may not be uncovered. Part, however, is of more modern growth, and under this I should class all that these peoples have derived from foreign influence. We have no historical data full enough to enable us to separate these with accuracy; yet to presume that the present civilization of Malays, over and above what is included in their religion, was wholly indigenous and pristine, is to reject such data as we do possess, to scorn the testimony of language, and to assume that the Malayan races possessed an ancient civilization of their own, of which there is not a particle of evidence.

The Arabs came to the Far East purely as traders accompanied, no doubt, by a few pandits or religious teachers, to whose proselytizing agency was due the establishment of the Mohammedan religion in the Archipelago. Some few would seem to have settled down, but, beyond the teaching which found such ready listeners, they appear to have had little influence on native social life, and especially on the *adat*. Indeed as good Moslems, they would feel bound to uphold the *hukum* in opposition to the latter. Whence, then, did the Malays get the balance of their civilization, from the simpler arts which separate them from the rudest of savages to the code of native custom which, just as much as the Arab creed, gives them a right to be regarded as a civilized race? I unhesitatingly reply, from India, and probably, by virtue of its proximity, from Southern India.

There are abundant traces, both in Sumatra and Java, but especially in the latter, of the existence, long anterior to Mohammedanism, of a very complete Hindu civilization. How this came about, whether by conquest or pacific conversion, it is now impossible to say. Nor have we any historical records to show us what Hindu nation it was that exercised the first civilizing influence. In Java, indeed, a great Hindu empire continued right down to the year 1475 A. D., when the conversion to Mohammedanism took place, and numerous runied shrines testify how widespread was the earlier faith. But the conquering or proselytizing Hindu stranger has entirely disappeared, for al-

though the kings of Manjapahit claimed to be descended from princes of Hindustan, the purely Javan appearance of their descendants somewhat belies this tradition. The visible traces of such a civilization in Sumatra and the Malay Peninsula are much more feeble than in Java; they are, indeed, confined to a few ruins and inscriptions on stones and rocks, the former of doubtful import and the latter practically undecipherable, though the character is either Sanskrit or Pali.

In the absence of such visible tokens, we turn again to that infallible guide, the language of the people. As I have said above, the influence of the Arabs on the Malay language is almost confined to religion and religious law, but does not otherwise enter into the social life of the people. Far otherwise is it with the influence of the Hindus. Marsden (Asiatic Researches, vol. iv, pp. 223-7) writes as follows:—"The language (i.e. Malay), it is true, abounds at present with Arabic words, which their writers affect to introduce, because this display of literary skill is at the same time a proof of their religious knowledge; but they are generally legal or metaphysical terms borrowed from the Koran or its commentaries, are never expressive of simple ideas, have not been incorporated into the language (a few excepted), and are rarely made use of in conversation. The Hindu words, on the contrary, are such as the progress of civilization must soon have rendered necessary, being frequently expressive of the feelings of the mind, or denoting those ordinary modes of thought which result from the social habits of mankind, or from the wills that tend to interrupt them."

Of a truth Malay abounds in Sanskrit words, the significance of which is ably traced in the preface to Maxwell's Malay Manual. To go no further, the fact that the common Malay words for "religion" (agama), "a plough" (tenggala), "time" (kali, masa), with many others of the same kind, are derived from Sanskrit, points to Hindu influence as having first raised the Malay from barbarism, taught him some of the very crudest arts of civilization, and supplied him with a religion. Now, the Sanskrit element in Malay can only have come from India, and it fully justifies us, taking also into consideration the existence of a complete Hindu civilization proved by historical data to have subsisted in Java, in concluding that there must have been in

earlier ages a domination of intellect, if not of conquest, by some Hindu power of Hindustan over the whole of Malaya.

The defect of the language-test is that it does not aid us, except inferentially, in fixing the date of the commencement of this domination or in determining the length of its existence; but it may help us to decide from what part of Hindustan the civilizing influence proceeded. As to the former, all we know for certain is that the Hindu influence was antecedent to that of Islam; while as to the latter, in addition to the very slender evidence of history and tradition, and comparison with the relations of India with neighbouring countries, we can take as our guide the various Indian elements which have found their way into the Malayan tongue.

Sanskrit—that is, the pure Sanskrit of the Vedas—ceased to exist as a living language about 300 B.C. Various dialects, however, more or less debased from Sanskrit, but having a vocabulary largely identical with the parent tongue, continued to subsist as spoken languages. It is not inconceivable that the Hindu influence on Malaya may have begun when Sanskrit was yet a living language. As regards Java however, the Dutch scholars have fixed the introduction of Hinduism at the beginning of the 6th century A.D., and it would seem probable that its extension to Malaya took place about the same epoch or even later. Be this as it may, it is most unlikely that this early civilization of the Malays, which coloured their language so strongly with Sanskrit words, proceeded from any other than a genuine Aryan race, of Hindustan, speaking Sanskrit or a dialect closely akin to it. But within historic times the South of India has been inhabited by Tamulic or Dravidian races; and had their first civilization been imparted to the Malaya by Hindus of this stock, the Sanskrit words would have been filtered through a Dravidian medium, and appeared in Malay in a quite different form from that which they have actually assumed. It must be taken for granted, than, that this earliest influence proceeded from a genuine Hindu race inhabiting central or northern India, and perhaps commanding a part of its seaboard in the South by virtue of conquest or commerce, and who made this the starting-point for their pioneering work in the Far East.

I think we may entirely reject Crawfurds' theory that these first civilizers were Telegus. Had it been so, they must have left traces of their own vernacular on the Malayan speech, for it is inconceivable that the priests, as Crawfurd thinks, could have introduced into Malay elements of a dead language, used only for sacred purposes, as part of the common speech, while not a word of their own colloquial crept in to testity to the identity of the dominating race. For I think I am right in saying that there are few or no Telugu words in Malay, or, at all events, not one which might not equally well have come from Tamil.

None the less is it true a Dravidian race has had a very important influence on the language and social life of the Malays, and this in spite of Marsden's statement that "from the Telinga or the Tamool the Malayan has not received any portion of its improvement." This influence was probably brought to bear on Malaya a good deal later than the Sanskrit, and was, without doubt, the direct result of trade. Commercial intercourse was maintained from a very early date between the South of India and the trading towns which formed the emporia of the spice islands, notably Johor, Singapore, and Malacca. When the Portuguese, at the commencement of the 16th century, first visited these places, they were amazed at the concourse of foreign vessels assembled there. When this intercourse began it is impossible to say, but it was probably much earlier than the above. Snouck-Hurgronje, writing of Acheh, says that the settlement of Klings from Southern India in that country is of great antiquity; and that the Tamils were the leaders in this commercial enterprise in Malaya is clearly shown by the pure Tamil words—chiefly connected with commerce, though not altogether so—which have found their way into Malay.

These words are not numerous, but they are names of familiar objects, and we must remember that, as a test of the social influence of one race on another, the presence of one common word for some necessary thing is of more significance than a thousand technical or scientific terms, which are really only a part of the language of books, and do not enter into daily life. The Malay for "ship," *Kapal*, is pure Tamil, so are *Kedei*, "a shop," and *gedong*, "a storehouse." *Peti*, "a box,"

though it has a Sanskrit equivalent has also probably come through Tamil, for in Sanskrit it means "bag" or "basket," while in Tamil it has exactly the same meaning as in Malay. What can be clearer evidence of commercial intercourse—nay, of the Tamils having actually introduced the Malays to trade in bulk? They also imported and brought into use certain articles of commerce and animals with which the Malays were previously unacquainted, as is shown by the wards *cherutu*, "a cigar;" *badam*, "an almond;" *kalde*, "an ass;" the fruit *belimbing*; *beludu* "velvet;" *bedi*, "a gun" (from the Tamil word "vedi," an explosion or report). All the above are pure Tamil. The derivation of *kuda*, "a horse," from *kuthirai* is not certain; but the pure Tamil *padagu*, "boat," may reasonably be taken to be the parent of the Malay *prahu*. If this be so, it would seem as if the Tamils first introduced the Malays to even the most elementary navigation, and, as they also gave them *kapal*, taught them to "go down to the sea in ships." A large number of words derived from the Sanskrit are common to both Tamil and Malay, the greater number of which were acquired independently by the two languages. The following are examples:—Mal. *Kali*, Tam. *kalam*; Mal. *denda*, Tam. *thendam*; Mal. *bahaya*, Tam. *bayam*; Mal. *muka*, Tam. *mugam*, &c. In nearly all these the terminal "m" is characteristic of Tamil; and where we find words derived from the Sanskrit which have this termination in Malay as well as in Tamil, we may fairly conclude that they come through the latter language and not direct from Sanskrit: e. g. *kolam*, "a pond" Tam. *kulam*, Sans. *kola*; and *manigam*, "a ruby," Tam. *mânikkam* and Sanskrit *manikya*. *Mampelam*, "a mango," is said by Maxwell to be derived from the Sans. mahâ pala= "great fruit," through Telegu; but the Tamil for mango is also *mâmpalam*, and I can see no reason for assuming it to be derived from the Telegu. Some other words derived from various languages, such as Persian, Hindustani, and Arabic, would seem to have also come through the Tamil, whose influence on Malay was undoubtedly antecedent to that of Arabic. As examples I may quote *mêja*, "a table" (Pers.), Tam. *mêsai* or *mêsa*; *baki*, "balance" or "remainder" (Ar.), Tamil *bakki*; *kapi* (Beng.), "a pulley," Tamil *kappi*; *topi* (Beng.), "a hat," Tamil *toppi*; *apam*, "a cake" (given by Marsden as

from Hindustani), Tam. *appam*. To the above list may be added the curious Malay word for "a bridegroom," *mempelai*, which is derived from the pure Tamil *mâpillai*, "a bridegroom." This, again, is indicative of a very early Dravidian influence on the Malays. Their previous Hindu civilization had given them the ceremony of marriage, but it was left for the Tamils to super add a special title for the man on the eve of marriage, to whose position as such the Dravidians attach an unusual amount of dignity and importance.

I think I have said enough to show the fallacy into which Marsden fell in refusing to ascribe to the Dravidians of Southern India any influence on the language of the Malays, and to make it plain that the influence of the former people over the speech and social life of the latter began at a very early date, though not so early so that of the unknown race of Hindus who reclaimed Malaya from its pristine barbarism. The Southern Indians came as traders pure and simple, bartering for the wealth of the rich tropic forests the products of civilization. They do not seem to have settled down or intermarried with the Malays to any great extent—not, certainly, so much as in Acheh, where considerable colonies of Tamils took up their permanent abode. Their object being merely commerce, they went as they came, returning year by year as the monsoon favoured. In the earlier stages of this intercourse the Malays were probably Hindus like themselves, and would thus have admitted their visitors to a greater degree of familiarity and fellowship than is now the case. Then came the Arab conversion, favoured, no doubt, by such Tamils as had already embraced Islam; but from that time forth the Hindus became *kafirs* to the Malays, and the closeness of their intercourse declined. The commerce, however, continued as before. and the relations which the Portuguese found existing in the beginning of the 16th century were practically those which subsisted until the influx of European trade imported a new factor into the question, and the establishment of British settlements on the shores of Malaya crystallized the connection between Southern India and the Straits into what it is at the present day.

Had it not been for the successful introduction of Islam into the Far East by the proselytizing Arabs, we may suppose that

the Tamil influence would have grown in strength, and perhaps eventually have led to a considerable fusion of the races, especially along the coasts. Some such fusion has in later times produced the mixed race known as Jawi Pekan; but in this the Bengali element is quite as strong as the Tamil, owing to the large number of north Indians who came to the Straits, either as voluntary immigrants or against their will as convicts, in the days when the Straits Settlements still formed an appanage of the East India Company.

The Evolution of Malay Spelling.

BY REV. W. G. SHELLABEAR.

Much has been written in the last hundred years on the theory of Malay spelling. Europeans, both Dutch and English, have worked out elaborate systems of orthography, and have laid down what they considered the proper rules to be followed, but the Malays have continued to spell as they please in spite of the efforts of the foreign scholars.

There is, however, at the present time so much diversity and inconsistency among the Malays themselves in regard to the spelling of even the commonest words, that it is very widely felt that a recognized system of orthography is most desirable; but Europeans have hitherto made the mistake of trying to bend the Malays to an elaborate, scientific system of foreign manufacture, the beauties of which the Malays are unable to appreciate.

A more practicable plan would seem to be to make a thorough historical investigation of the evolution of the art of spelling among the Malays, with a view to determining what is the natural trend of the changes which have taken place in the past. It seems not unreasonable to expect that such an investigation may provide a clue to the possibilities of such spelling reform as will not be distasteful to the Malays themselves, and may therefore eventually commend itself to them for universal adoption.

The materials available in Singapore are not by any means adequate for a complete and exhaustive investigation of the history of Malay spelling, but it is hoped that the following contribution to the study of this subject will at least establish some important principles of spelling reform, and will if necessary stimulate others to further search.

It is generally agreed that the Arabs gained their religious ascendancy over the Malays during the 13th century, and that it was from them that the Malays received their present written character. The earliest Malay manuscripts now extant, however, do not date back more than half of that period. In No. 31 of this

Journal I have already described some of the most interesting of these MSS., and particular care was taken to reproduce as exactly as possible the spelling of the originals. On page 107 of the paper above referred to, will be found a reference to certain MSS. belonging to the Cambridge University Library and described by Dr. van Ronkel in Part 2 of Series 6 of *Bijdragen tot de Taal-Land- en Volkenkunde van Nederlandsch-Indië*. This paper by Dr. van Ronkel provides valuable material for the present investigation, the spelling of his extracts having also been reproduced with considerable accuracy. The Cambridge MSS. were taken to Europe from the East in the first decade of the 17th century, and one of them bears the date 1604. The earliest of the Oxford MSS. bears a Mohammedan date (A. H. 1011) equivalent to the year 1602 of our era, another is almost certainly of the same date, a third is dated 1612, and a copy of the *Hikayat Sri Rama* was probably also obtained at that time, as it belonged to the same collection, and came into the Bodleian library in 1633. For information in regard to the two Leiden MSS. and the Harleian MS., which I have also made use of though they are of a somewhat later date, the reader is referred to my paper in Journal No. 31. I have also in my possession careful copies of four other manuscript letters belonging to the Leiden University, but for the purposes of this paper I will confine myself to the manuscripts mentioned above, which have already been fully described by Dr. van Ronkel and myself and are available to the reader in the Journals referred to.

As compared with the changes which have taken place in the spelling of the English language since the days of Queen Elizabeth (to whom the oldest of the Oxford MSS. was addressed) it must be said that the differences between the Malay spelling of to-day and that of three hundred years ago are very few and very insignificant indeed—an exemplification of the well-known fact that the Oriental is slow to change. Manuscripts and even printed documents of the date of Queen Elizabeth are so entirely different from modern English writings and books that they can only be read by those who have made them a special study. Our oldest Malay manuscripts, however, could be read to-day by any school boy with the greatest ease, with the exception of perhaps an unusual word or an obsolete spelling here and there.

It is remarkable that these Malay MSS., written in many different places and as far apart as Acheen and Celebes, exhibit far less divergence from one another in regard to spelling than can now be found in native letters and even in printed works from different parts of the Archipelago. In those days, no doubt, the art of writing was practised by comparatively few persons, and they may have been scribes specially instructed in the art, whereas to-day thousands of comparatively uneducated natives write letters in Malay, and even print commercial and other documents in any kind of spelling. Moreover, the old manuscripts which have survived to tell us how the Malays wrote their language in those days are mostly official documents or religious and literary productions, all of which would naturally be written by the best educated natives of the time. These considerations will in a great measure account for the greater diversity of Malay spelling which now exists, but the remarkable uniformity in the spelling of the MSS. of the 17th century can only be adequately explained by the existence of some fixed standard of spelling to which the scribes felt it necessary to conform. That fixed standard, we may presume, was the Arabic system of orthography. It was undoubtedly directly from the Arabs that the Malays received their present written character, and it is quite probable that for many years, perhaps for centuries, the art of writing may have been almost entirely confined to those Arabs who had learned the Malay language.

It should moreover be remembered that at the time of the advent of the Arabs the Malays were already scattered all over the Archipelago, from the north of Sumatra to the extreme east of Java, and even as far as Celebes and the Moluccas, and must be regarded as having been at that time merely a number of independent units divided up under the rule of a great number of petty chiefs or rajas, who were often at war with one another, and none of whom were sufficiently powerful to exercise any commanding influence over the remainder. This makes it even more remarkable that there should be such striking uniformity in the spelling of the Malay language throughout the Archipelago at the period with which we are dealing. If the Arabs had attempted to make an adaptation of their own system of spelling to suit the peculiarities of the Malay language, the result would

undoubtedly have been that in different parts of the Archipelago there would have been different modifications of the Arabic spelling, and a variety of Malay spellings would have been unavoidable. The uniformity in the spelling of the earliest manuscripts would therefore lead us to expect that the system of orthography according to which the Arabs originally began to write the Malay language and which they subsequently taught to the Malays, was precisely the same as they themselves used in writing their own language. Whether this was so or not is the first point which we will examine.

It should first be stated, that Arabic can be written either with or without vowel points, and books are printed at the present time in both styles. The plain or unvowelled style is the more common, but as the entire omission of vowel points would frequently cause ambiguity, the Arabs find it necessary in certain words to use one or more vowel points. This description of the way in which modern Arabic is printed applies exactly to the way in which Malay was written 300 years ago. Several vowelled Malay MSS. are extant. One of the old Cambridge MSS. contains twelve pages of Malay fully vowelled, and in the other MSS. mentioned above, vowels are used in isolated words. In committing an unknown language to writing, it is pretty certain that the Arabs would at first use all the vowel points, if only for the purpose of recording for their own use the sounds of the new language, and in all probability Malay would continue to be written with vowels for many years, until the scribes had become thoroughly familiar with the forms of all the common words, after which they would begin to drop the vowels from such words, retaining them only in the case of unusual words or peculiar derivatives. This is precisely the way in which we find that Malay was actually written at the beginning of the 17th century.

We will now proceed to show (I) that at the time when our MSS. were written the spelling *as a general rule* conformed exactly to the rules of Arabic orthography; after which it will be shown (II) that words which at that time were sometimes written otherwise than in strict accordance with Arabic orthography were being gradually introduced with the deliberate intention of doing away with the necessity for the use of vowel points and orthographical signs, and for the purpose of making

such words more legible: and lastly we will consider (III) what alterations could be made in modern Malay spelling which would produce uniformity without destroying the Malay ideal of obtaining legibility without the use of vowels, that is to say without a retrograde movement in the direction of Arabic orthography such as has hitherto been advocated by European scholars.

I. With few exceptions the spelling of manuscripts 300 years old conforms exactly to the rules of Arabic orthography.

(1) One of the first peculiarities which would be noticed by a person only acquainted with modern Malay spelling is that final *wau* and *ya* are only used in these MSS. for the purpose of forming the diphthongs *au* and *ai*. Thus we find the following words, which I have taken from all the different MSS. spelt without final *wau* or *ya* as the case may be:—

aku bagi batu berhenti bertemu bersuchi biji besi bumi bungi chuchu

چوچ بُوْنِ بوم بس بيچ برسوچ برتم برهنت بات بک اکُ

dhulu dato deri diri diri-mu di-turuni erti hari hati ini isi

ايس اين هات هار ارت دترون دِرِيْمُ دير در دَاتُ دَهُوْلُ

itu jadi kali kami kamu kayu keji kembali lagi laki lalu

لال لاک لاک کمبال کچ گَايُ کام کَامِ کال جَادِ اِيْتُ

mandi mati mau mimpi memli menchabuli memri menyampu

مڠمف ممر مَڠَبُوْلِ ممّل مِمْفِ مَاُو مات مند

menjadi negri oleh-mu pergi prahu puji ratu sa-kali seperti seri

سر سڠرت: سکال رات ڤوج ڤراه ڤرڠ اولهم نڠر مڠجاد

sa-ribu suatu suchi suka tahu terlalu Ternati tinggi tetapi

تناڤ تڠڠ ترنات نرلال ناه سڠ سوچ سوات سريب

But the following words ending in a diphthong are spelt with final *wau* and *ya* in every case in which they occur in these MSS:—

angkau atau bagai berchrai birau kai harau hijau jikalau kalau

كالو جكلو هيجو هارو هي بيرو برچري باكي انو اڠكو

kerbau limau prisai rambai rantai rantau sungai tajau

تاجو سوڠي رنتو رنتي رمبي ڤريسي ليمو كربو

We find however that the scribe who wrote MS. G. had a strong prejudice in favour of final *wau* and *ya*, even in words which do not end in a diphthong, for he writes:—

bri brani budi chuchu hari kasturi lembu mentri madeli nafiri

نفري مدلي منتري لمبو كستوري هاري چچو بودي براني بري

negri pri putri sakti sendiri sri bahru

بهرو سري سندبري سفتي ڤتري ڤري نكري

But he also spells *hari* without the *ya*, and all other words of this kind are spelt without the *ya* as *aku*, *hati*, *lalu*, *kembali*, *menyampu*, *tetapi*, etc.

The Leiden MSS. E. and D., which were written at the end of the 17th century, contain five of such words written with final *wau* or *ya*, and F., which is also of a later date, contains three. In all the other MSS. the only instances are *kati*, which is found once, and *negri*, which is sometimes spelt with the *ya* and sometimes without, and a few names of places in MS. C. which being unvowelled would hardly be recognized without the final weak letters.

It should be remarked that some of the words given above are spelt in a way which would be quite inexplicable on any other supposition than that they were originally vowelled, and these peculiar spellings are just the ones which never vary in any of the MSS. and are still in use at the present day, as for instance:

itu	*ini*	*jikalau*	*seperti*	*suatu*
ايت	اين	جكلو	سڤرت	سوات

But though their spelling appears at first sight so peculiar, it must be remembered that according to the rules of Arabic orthography these words could not be spelt in any other way, except that perhaps جكلو might be spelt جكالو but it will be noticed later on that only one weak letter appears to have been used in any word, and that therefore, the *wau* being required to form the final diphthong *au*, the *alif* which would otherwise be inserted to mark the stress has been omitted.

It is interesting to note that the Dutchman van Elbinck, who with his own hand copied portions of the Cambridge MSS., adhered rigidly to the Arabic orthography of the originals from which he was copying, but when left to his own unaided genius in writing out a list of Malay words with their meanings in Dutch, he followed the more natural method of spelling to which the Malays have now attained, as will be seen from the following examples taken from his vocabulary, dated 1st June, 1604:—

anak	*d'ara*	*paha*	*susu*	*hati*	*jari*	*buku*	*giyi*	*bulu*	*api*
انق	دارا	ڤها	سوسو	هاتي	جاري	باهو	كيكي	بولو	اڤي

At the present time the use of final *wau* and *ya* has become almost universal, and many Malays would be quite unable to read the words given above if they were spelt thus.

2. In modern Malay, for the sake of legibility, a final *alif* is usually written in such words as *bawa*, *ara*, etc. In the Arabic system of orthography, the sound of the short final *a* as it is pronounced in most Malay words is represented merely by the vowel *fathah* placed over the preceding consonant; the addition of *alif* would indicate a lengthening of the vowel. The number of Malay words, however, which have the long *a* sound in the last syllable is very small, the following being a few of them:—

bla	*tra*	*sela*	*kra*	*depa*
بلا	ترا	سلا	كرا	دڤا

These and a few Arabic words such as

dunia ulama hukama

حكما علما دنيا

are the only ones which by the rules of Arabic orthography will allow a final *alif*. In modern Malay, however, the following forms are common :—

ara antara bawa bichara bila buta bahwa dua jala

جالا دوا بهوا بونا بيلا بچارا باوا انتارا ارا

jawa jua kala kota kuda lada mulia pala perkara pinta roda

رودا ڤنتا ڤركارا ڤالا مليا لادا كودا كوتا كالا جوا جاوا

sabda sahya sedia sigra setia tara tanda tua

توا تندا تارا ستيا سكرا سديا سهيا سبدا

This spelling will not be found in these ancient MSS. It is therefore very evident that in this respect the Malay has a tendency to depart from the strict Arabic spelling of former times. Such words as the following, on the other hand, continue to be spelt without the final *alif*:—

ada anyaya apa apabila bapa biasa binasa daya dia hamba ia

اد انياي اڤ اڤبيل باڤ بياس بناس داي دي همب اي

jika kacha kata kaya kerja kuasa lama mata masa manusia mula

جك كاچ كات كاي كرج كواس لام مات ماس مانسي مول

nama pada puasa pula raja rasa rupa serta suara suka sayala tanya

نام ڤد ڤواس ڤول راج راس روڤ سرة سوار سوك سكل تاڽ

(3) In the old Malay MSS. the weak letters *alif*, *wau* and *ya* are not used in the middle of a closed syllable to lengthen the vowel sound, except in words of Arabic origin, such as :—

fakir huruf islam jawab kitab maidan miskin

مسكين ميدان كتاب جواب اسلام حروف فقير

These words are pronounced by the Arabs with the stress on the last syllable, but the Malays, though retaining this spelling, put the stress on the penultimate, where it is found in the great majority of Malay roots. There are quite a number of words in the Malay language which have the stress upon the final syl lable, and in many cases this final syllable which bears the stress is a closed syllable, but the long vowel sound which the Arab gives to the words quoted above is never heard in a Malay word, it is therefore not to be expected that the Arabs would teach the Malays to write the quiescent weak letter in such words as *sebot*, *renong*, *prang*, *dras*, *kring*, etc. As a matter of fact we never find the weak letter in such words in the old MSS.* though in modern Malay these words are frequently written

سبوت رنوغ ڤراڠ دراس كريڠ

and we now even find such forms as the following, where the stress is distinctly on the penultimate :—

êkor habis menangis sakit sayur tanjong tulus tikus

تيكوس تولوس تنجوغ سايور ساكيت مناڠيس هابيس ايكور

The nearest approach to the long vowel sound in a closed syllable in Malay, is to be found in the two mono-syllables *pun* and *dan*, and it is a remarkable thing that these two words are invariably written with the weak letters *wau* and *alif* respectively in all of our old MSS. and are so written up to the present time. Robinson in his "Malayan Orthography" rejects this method of spelling *pun* and *dan*, which he considers ought to be spelt ڤُنْ and دَنْ: the evidence of the old MSS. is,

* The spelling ترسبوة on p. 116, line 12, R. A. S. Journal Str. Br. No. 31 will be found on reference to the photographie reproduction of MS. A. to be a misprint.

however, strongly in favour of the received method of spelling these words.

(4) Another remarkable difference between the spelling of our MSS. and modern Malay spelling is in the use of the orthographical sign *tashdid*, which means "strengthening," and indicates that the letter over which it is placed is to be doubled or sounded twice. This sign is now hardly ever used by Malays, except in Arabic proper names, such as Allah اللّٰه and Muhammad مُحَمَّد but in our MSS. it is used with great frequency.

(*a*) It is used over the weak letters *wau* and *ya* whenever the preceding consonant bears the corresponding vowel sound, thereby showing that the said weak letter answers the double purpose of vowel and consonant. Thus the word *dia* is considered as consisting of the two syllables *di-ya*, and is written not دِيَ but دِيَّ and *buat* is considered as consisting of the two syllables *bu-wat* and is written not بُوَوَتْ but بُوَّتْ This use of *tashdid* appears to be precisely the same as is found in the Arabic words *iyak* اِيَّاكَ *niyat* نِيَّة and in the termination يَّة This appears to be sufficient to account for this method of spelling, which is found in the following words in the old MSS.,

buat	*dia*	*diam*	*dua*	*ia*	*jua*	*luar*	*muat*
بُوَّتْ	دِيَّ	دِيَّمْ	دُوَّ	اِيَّ	جُوَّ	لُوَر	مُوَتْ

This double use of the weak letter, first as vowel and then as consonant, finds its counterpart in the Dutch language, where one meets such words as *huwen*, *vrouwen*, etc., and it is therefore not unnatural that the Dutch have adopted this peculiar spelling of Malay, even in the roman character, thus:—*diya*, *buwat*, *diyam*, *duwa*, *iya*, *juwa*, *luwar*, *muwat*, etc., though one or two of the Dutch scholars have protested against the use of the *w* and *y* as being redundant. For instance Dr. Gerth v. Wijk writes in his grammar, p. 21: "Although in the Javanese, for instance,

"owing to the nature of its spelling, in such words as "*boewang*, *tijang*, the *w* and *j* are written, and must be used in "tranliterating them in our character, if one wishes to reproduce "the original spelling exactly, these letters are quite superfluous "in Malay transliteration. The union of *oe* and *i* with the follow- "ing *a*, *i*, *oe*, takes place of itself in the pronunciation; we do not "write *boewa*, *kniejen*, but simply *boea*, *kniren*; and even less is *w* "or *j* necessary in *boeang*, *tiang*, etc. If the Malay wrote the "*tashdid*, it would be reasonable to represent it in the translitera- "ation. Being opposed to superfluous letters, I write *ia*, *tiap*, "*loear*, etc., which seem to me quite sufficient, as this method of "spelling represents the pronunciation as clearly as one can de- "sire."

The Malays appear to prefer to divide the syllables as follows:—*bu-at*, *du-a*, *di-am*, *ju-a*, *mu-at*, etc., for the modern Malay spelling of such words is

buat	*dua*	*buah*	*jua*	*muat*	*luar*	*sia-sia*
بوات	دوا	بواه	جوا	موات	لوار	سيا٢

(*b*) Another frequent use of *tashdid* in the old MSS. is for the purpose of doubling the consonant which follows the short vowel, called by the Javanese *pepet*, the sound of which may be described as equivalent to the short *a* in the English words "baloon," "machine," etc.

Among our old MSS. we find that Ii. 6. 45 of the Cambridge MSS. is the most consistent in this use of the *tashdid*, the following words which contain short vowels being thus spelt in the brief extract given by v. Ronkel.

bahwa	*besar*	*benar*	*dengan*	*kekal*	*kras*	*lebeh*	*telah*	*tengah*
بهو	بسر	بنر	دغن	ككل	كرس	لبه	تله	تڠه

A portion of another Cambridge MS., Gg. 6. 40, in the handwriting of the Dutchman v. Elbinck, has the following words

bahwa	*besar*	*belah*	*gumetar*	*kechil*	*sru*	*sudah*	*telah*	*tetap*
بهو	بسر	بله	كمتر	كچل	سرو	سدهله	تله	تتڤ

and Dd. 5. 37 of the Cambridge collection, which is in the same hand-writing, has *sa-blas tebus*

تبس سبلس

but also *bahwa dengan lebeh telah* without the *tashdid*.

تله لبه دغن بهو

The only other Cambridge MS. in which I have found the *tashdid* used in this way is Ll. 6. 5, which has دغّن once, and ترسدّر

In the Oxford MSS. marked A. B. and C. in my paper in No. 31 of this Journal, we find the following words:

bri blum Chelang Deli dengar dengan glar kapal kapitan

كڤتن كڤل كلر دغن دغر دلي چلغ بلم بري

kati kekang keji megat memegang memeli meli negri netiasa

نتياس نكري مل مل ممكغ مكت كج ككغ كتي

pesan petrana Rekan suka suka-chita Samudara sudah seni telok

تلق سني سدهله سمدر سكچت سک ركن ڤترن قسن

But these MSS. have also some of these very words, and several others of the same kind, spelt without the *tashdid*. *Dengan* has the *tashdid* only once, in B. *Bahwa*, which almost always has *tashdid* in the Cambridge MSS., never has it in the Oxford MSS. *Dengar* is spelt without *tashdid* in A.

The Oxford MS. of "*Hikayat Sri Rama*" has the following

blas besar betul genap kechil selang sa-telah sudah

بلس بسر بتل كنف كچل سلغ ستله سده

but one or two of these are also found without the *tashdid*, as well as some which have it in the other MSS., as,

bahwa	*bri*	*dengan*	*menengar*	*tengah*
بهو	بري	دغن	منغر	تغه

It is a remarkable fact that the early Dutch translators of the Bible made a wide use of the *tashdid*, and even when spelling such words in the roman character they were in the habit of placing a stroke over a letter in place of the *tashdid*. Thus we find: "*suddah, kenna*," etc., and even the following words, which are not found in our MSS. viz.,

"*makka, padda, derri, sagalla, adda, appa, laggi.*"

Curiously enough the use of *tashdid* with the short vowel, after having completely gone out of use, was introduced once more in the middle of last century by the lexicographer van de Wall. This writer, however, does not use the *tashdid* indiscriminately with all words containing the short vowel, as appears to have been done in the old MSS.; but confines its use to those words which have the accent on the short vowel. Such words for instance, as,

kras	*kekal*	*betul*	*blum*	*pegang*	*bli*	*keji*	*glar*	*blah*
باه	كلر	كج	بلي	ڤكڠ	بلم	بتل	ككل	كرس

which carry the *tashdid* in the old MSS., are written by van de Wall without it, and we find him using this sign only in such words as:—

"*dĕngngan rĕdda kênna pĕtjtjah*"

ڤچّه كَنَّ رَدَّ دَغَّنْ

In regard to this use of *tashdid* he himself says in his introduction to the first volume of his uncompleted dictionary, p. xvi: "As in the case of the vowel points and other signs, the "Malays in their ordinary writing disregard the *tashdid*, 'sign of "strengthening,' which when placed over a letter shows that that "letter must be doubled; but that is no indication of its non-exis-

"tence or of its being unnecessary. The Malay who has learnt "to read the Koran, not only knows what the *tashdid* is, but also "feels the advantage of it in Malay, for if one gets him into a cor- "ner he will at last say: *buboh-lah tashdid*, 'just put a tashdid "over it.'

"The non-use of the *tashdid* leads the Malay sometimes to "the most peculiar spelling. For instance he is conscious that in the "word *rĕdda*, 'to abate' (as a storm or sickness) the accent lies "on the first syllable and ought to be expressed, which it is not by "رد or ردا; therefore he lengthens the vowel of the ر (ĕ) and "writes راد, without troubling himself about the fact that it is "absurd to lengthen the ĕ. Some words, which are written with "the same letters and vowel points, could not be distinguished "from each other without the *tashdid*, as لَتَق *lètak* (accent on the "2nd syllable) interj. for a certain clinking sound, and لَتَّق *lĕttak* "to place. I therefore use the *tashdid* everywhere in my diction- "ary, where the pronunciation demands it, and write رَدَّ *rĕdda*, "دَغْن *dĕngngan*. مَتَّ *mètta* 'raging.' And do we not ourselves "write for instance *kud-de*, *kun-ne*, indifferent as to the reason "for doing so. It should be noted that in Malay words the "double consonants only appear after the ĕ."

From this it is evident that the Malay writers of the beginning of the 17th century used the *tashdid* in a different way to that advocated by Werndly, Robinson and van der Wall, and moreover none of these methods of using this sign can be regarded as being directly based upon the Arabic system of orthography. The methods invented and used by Werndly, Robinson and van der Wall were purely arbitrary, and soon fell into disuse, and there seems to be every reason to believe that the use of *tashdid* as found in our MSS. was also purely local and arbitrary, for it is a remarkable fact that all the MSS. in which this use of *tashdid* is found almost certainly came from Acheen, and I have not been able to find the *tashdid* used with the short vowel

in any of the MSS. which we know to have been written elsewhere. The Oxford MSS. A. B. C. have already been proved to have come from Acheen; of the Cambridge MSS. Gg. 6. 40 contains a vocabulary written by Pieter Willemsz. van Elbinck, and dated Acheen, 1st June, 1604; Dd. 5. 37, and the 2nd part of Gg. 6. 40, which contains the writing in question, are both written by the same hand as the vocabulary, and the former closes thus (in Dutch) "end of the Story of Joseph, written the 1st October, 1604, by Pieter Willems." The only MS. therefore about which there remains any uncertainty as to whether or not it was written at Acheen, is Ll. 6. 5. of the Cambridge MSS. but there seems, from what Dr. v. Ronkel says, to be no reasonable doubt that this MS. came into the hands of Erpenius with those bearing the name of the same Pieter Willems, whom he believes to have brought all these MSS. from the East, with the exception of Dd. 9. 55., which never belonged to Erpenius.

It should not be forgotten that, at the time when these MSS. were written, Acheen was one of the most powerful Malay States. In his letter to King James (Oxford MS. C.) the King of Acheen claims sovereignty over all the rajas in Sumatra as well as Perak and Pahang on the Peninsula, and from the accounts of Lancaster's voyages he seems to have been able to enforce his authority at least as far south as Priaman (near Padang). In this connection I was interested to find the statement made by van de Wall, in his introduction mentioned above, that the original Malay spelling is known as "Achinese spelling." Where van der Wall obtained his information in regard to the name *heja Acheh* I have not been able to discover, but if it is a fact that this method of spelling, found in all its purity in our Acheen MSS. of 300 years ago, is still known by tradition among the Malays as "Achinese spelling," this would seem to point to Acheen as having been the chief centre of learning and literature at that time, and perhaps even earlier. This would entirely agree with the accounts of Lancaster's first voyages, which state that the educated Malays at Acheen spoke Arabic fluently, and Lancaster himself held intercourse with the Malays at that place in the Arabic language, having as his interpreter a Jew who spoke Arabic.

My contention therefore is, that the use of *tashdid* to indicate the short vowel sound was merely a local custom at Acheen, which the influence of even such a comparatively powerful State did not avail to bring into general use in the Archipelago. If this usage had been in accord with the Arabic orthography, it would undoubtedly have been universally adopted in the same way as the *tashdid* over *wau* and *ya* mentioned in the last paragraph (4. a.).

(5) We next come to the use of the weak letters *alif*, *wau*, and *ya* in open syllables. Their use at the end of a word has already been considered in (1) and (2). We will now inquire when and for what purpose these weak letters were used in the old MSS. in the middle of (*a*) root words, (*b*) derivatives.

(*a*) In root words, the weak letters are found in the open syllable upon which the accent falls, except in the case of the short vowel. The accent being usually on the penultimate, that is the syllable in which the weak letter is usually found.

In accordance with the rules of Arabic orthography, a weak letter when thus placed in an open syllable after a corresponding vowel is "quiescent and then serves only to lengthen the vowel which precedes it." * Thus in the word قاد "sufficient," the vowel of the penultimate is lengthened by the *alif*. The preposition قد is, however, never spelt with an *alif*; not that there is any very appreciable difference in the pronunciation of these two words, but rather perhaps on account of the fact that in conversation less stress will naturally fall upon a preposition than upon a noun, adjective or verb. This seems to be the only possible way to account for the absence of the *alif*, *wau* and *ya* in such words as

sudah *maka* *pada* *deri* *sagala*

سكل در قد مك سده

which in our MSS., as far as I have noticed, are the only words which do not have the lengthening weak letters in the accented syllable, with the exception of the foreign word *saudagar* which

* Faris' Arabic Grammar.

is spelt سودکر in every case, the *alif* being perhaps omitted in the penultimate on account of there being already a weak letter in the first syllable to form the diphthong *au*.

The following are words of two or more syllables having the weak letter in the penultimate,

beniaga chilaka guru hanya itu jalan kiling plihara suatu

سَوَاتُ ڤلهار كليلغ جَالَنْ اِيْتُ هَانَ كُوْرُوْ چِلاَكَ بنياک

Kerna is invariably spelt كَارَنَ which would indicate that this word was at that time a three syllable word with the accent upon the first syllable; now it is sometimes pronounced as if it were a two syllable word.

(*b*) In derivative words formed by the juxtaposition of two roots, the lengthening weak letter is almost invariably found only in the penultimate, being entirely omitted in the first of the two words forming the compound, as:

apabila hulubalang suka-chita

سكچيت هلبالغ اڤيل

The same is the case in reduplications wherever the *angka dua* is not used, as,

dagang-dagang. mudah-mudahan. raja-raja

دكغداكغ مُدَهْمُدَاهَنْ رجراج

The omission of the weak letter in the first word in such cases is undoubtedly phonetic, the stress being strong on the penultimate of the compound.

When, however, we come to the case of derivative words formed by the addition of suffixes, we immediately meet with a difficulty which, as far as my reading has gone, has never yet been explained by any European writer, namely that when the suffix, pronoun or other particle is added to the root, the position of the lengthening weak letter is changed, and is found in the penultimate of the derivative word thus formed. For instance:

كود by the addition of the preposition ن becomes in the old MSS. كدان although the pronunciation is not *kudá-nya*, but *kúda-nya;* and جاد becomes جديكن although the word is pronounced *jádikan* and not *jadíkan.*

The first of the Dutch scholars to point out this discrepancy between the spelling of derived Malay words and their actual pronunciation appears to have been van de Wall, who in the year 1859 wrote as follows in the *Tydschrift voor Indische Taal-, Land- en Volkenkunde*:—"But the change of position of the lengthening letter to, or its appearance in the penultimate of root words, has in most words no influence upon the accent, or at least very little; that is to say, the accent is in such cases not inherent in the long vowel. In general, the Malay retains in such cases the original accent, and says: *bàntu*, *bàntuï*, *perbàntuan*, *bàntu-nya*, etc., *sèwa*, *sèwakan*, *sèwaï*, *persèwaän*, *sèwa-nya*, etc. But as the literary Malay always has an inclination to modify the pronunciation of the people according to the way a word is written, he also lays a stress to some extent on the syllable which has the long vowel, so that there come to be, as it were, two accents—a strong or commanding one, the natural accent of the root, and a weak one, the grammatical accent on the long vowel. The variations between strong and weak are very numerous, in different words and with different individuals, and there exists no fixed rule; there are even words, though very few, in which owing to the change in the position of the long vowel the natural accent of the root is entirely lost and only the grammatical accent remains; e.g. *katà-nya*, from *kàta; tambàngan* from *tàmbang;* though one also hears *tàmbangan.*"

Three years later, in Vol. XII of the same Journal, A. B. Cohen Stuart raises a somewhat half-hearted protest against van de Wall's statement in regard to the pronunciation of such words. He says (page 68): "It is not without hesitation that I venture some objections to this proposition. I feel how unfavourably I am situated as compared with Mr. van de Wall

"in regard to a subject about which he is in such an infinitely "better position to form a correct opinion. I was therefore at "first inclined silently to accept as information his observations "as to accent; after further consideration, however, I found it "preferable to come forward fearlessly with my doubts, and to "expose myself if need be to a crushing reproof, if this should "be able to bring me, and perhaps others also, to a better view "on the subject.

"I confess then that I have hitherto been under the convic- "tion that in Malay the accent in derived as well as in root "words fell as a rule upon the penultimate; that on the addi- "tion of a suffix the position of the accent changed as a rule "from that which was originally the penultimate to that which "was originally the last syllable; and that the pronunciation "which according to Mr. van de Wall is the true and natural "one, was quite peculiar to Europeans. It is so, I believe, in "Javanese. It is true that there the accent does not come out so "clearly as in Dutch, and in the Javanese grammar of T. Roorda "(§ 87) the very existence of any accent in Javanese is denied; "but what is there called 'a slower or more sleepy pronunciation "of the two last syllables of every polysyllabic word' is more cor- "rectly interpreted, as it seems to me, as being a real accent on "the penultimate, and a drawing out or longer holding on to "the last syllable. Indeed, if one pronounces *túlis*, for instance, "in the pure Dutch style with a clear accent on the penultimate, "though this may not give the exact Javanese pronunciation, it "is certainly much nearer to it than if one should say *tulìs*, with "an equally plain accent on the last syllable; and similarly the "pronunciation of the same word with the affix *an*, would, I "believe, be better represented by *tulíssan* or *tulísan* than by "*túlisan* or *tulisàn*. If the word is again increased by the addi- "tion of another suffix, so that the original accented syllable is "separated from the new suffix by one or more syllables, then "besides the principal accent, which goes over to the last, the "original accent again makes its appearance to some extent, as "in *túlisáne*, *ngáturáken*. In a word, without digressing further, "my proposition in the main is this: that in Javanese at any "rate there actually is in the pronunciation of every word of "two or more syllables a sort of stress, which can properly be

"called an accent, and is usually situated in the penultimate, "and with the addition of an affix changes its position to the "new penultimate. The fact that Europeans pronounce both "Javanese and Malay words so frequently, I might say almost "always, with the accent on the ante-penultimate, even when "this is merely a grammatical prefix, and say for instance "*túlisan*, *Pángeran*, *Kálitan*, *Páchitan*, would surely be the "strongest argument against that assertion, if that pronunciation "must be considered as having its origin in an unprejudiced con- "ception of the native pronunciation. But the Javanese and "Malay words which are most used by Europeans are generally "learned not so much by conversation with the natives as from "writings, in which owing to faulty transliteration the exact "pronunciation and particularly the accent are left quite uncer- "tain. For one European who first learns to pronounce say the "word *Pangeran* from the Javanese, there are perhaps twenty "who became acquainted with it only or in the first place "through European conversation or writings; and even if one "afterwards had the opportunity of hearing it pronounced by "natives, then one would have to pay a good deal of attention "and must have some interest in the subject in order to re- "cognize and to abandon a wrong pronunciation which one has "once appropriated; especially when it is so generally accepted "among our fellow countrymen that it would appear to be "pedantic or eccentric to deviate therefrom. If one considers "that in Dutch and kindred languages the accent, far from "having any preference for the penultimate, usually falls fur- "ther back, one will not be surprised to see this tendency in the "European pronunciation of native words. This phenomenon "therefore has in my opinion no more value in deciding the true "native pronunciation, than one would be justified in doubting "that the name Palembang should properly be pronounced "Palémbang (Javanese *pa-lém-bang*) because the majority of "Europeans, even if they have lived there for years, called it "Palĕmbàng; or that the place where I am writing this is called "Sålå, because Europeans, although they know better, never "call it anything but Solo among themselves.

"As regards Malay, no one is less able than myself, espec- "ially in opposition to Mr. v. d. Wall, to refer to my own

"observations on the native pronunciation. So let us rather "consider what others have said on the subject. In Marsden "(Elout's translation p. 202) I only find the general statement, "that the accent usually coincides with the long vowel, and "falls by preference upon the penultimate, but without further "elucidation of peculiarities. De Hollander (*Handleiding tot "de beoefening der Mal. taal- en letterkunde*, 2nd ed., Breda, "1856) says on the accent in words having only one suffix "(page 23, § 7), that they are pronounced both ways, either "with the accent on the syllable which had the accent in the "root (*mendápatkan*, *karáljaän*) or on the penultimate of the "derived word (*mendapátkan*, *karajáän*), and nothing further. By "Werndly (*Mal. Spraakkunst*, Amst. 1736) the subject is treat-"ed more fully (p. 45 *et seq.*), and in the following manner, "namely that the suffixes *kan*, *i*, *an*, *ku*, *mu*, *nya* always cause the "accent to change its position to the syllable immediately pre-"ceding them, whether that syllable be open or closed; that "the same thing takes place before *kah*, *tah*, *lah*, if a vowel, "diphthong or *h* precede them; while on the other hand, if "another consonant precedes one of these three suffixes, the "accent shifts to the preceding syllable or remains un-"changed at will (*sambót-lah* or *sámbot-lah*); and that "the change of accent results in the change from long "to short vowel and vice versa, except when the final "consonant meets the initial consonant of the suffix, as "*jálankan*. In the new edition of Werndly's grammar by "Angelbeek (Batavia 1823, p. 38) it is only stated in general "that in words of two or more syllables, whether they be roots, "or compound or derived words, the accent falls usually upon "the penultimate, and that 'the syllable on which the accent "falls must naturally be pronounced longer than the others.' I "do not know how much reliance can be placed upon the testi-"mony of these writers on such a point as this; certainly under "the most favourable circumstances they can hardly outweigh "the dictum of Mr. van de Wall; but their rule, as regards the "cardinal point, seems to me to find such strong support, on the "one hand in the analogy of the Javanese language, and on the "other in the indications given by the spelling of Malay in the "Arabic character, that even the dictum of Mr. van de Wall,

"while it shakes my belief in their accuracy, has not been able to "destroy it; and so much the less because Mr. van de Wall's "presentation of the subject is itself not quite clear. He says "(73, 399) 'the first result of the suffixes *kan*, *i*, *an*, *nya*, *ku*, *lah*, "*tah*, *kah*, on roots which end in an open syllable is, that they leng- "then the vowel of that syllable and cause the original long "vowel of the root to drop out; . . . . . the suffixes *an* and "*i*, since they begin with a vowel, cause the same result in "words which end in a closed syllable, and in that case the final "consonant of the root becomes the initial letter of the suffix "with the corresponding vowel . . . . . while the other "suffixes leave such words unchanged . . . . . ; but the "change of position of the lengthening letter to or its appear- "ance in the penultimate of root words (read, of *derived* words? "or in the *last* syllable of root words) has in most words no in- "fluence upon the accent, or at least very little; that is to say, "the accent is in such cases not inherent in the long vowel.'

"Here first of all the question arises: is the change of posi- "tion of the lengthening letter a mere graphic phenomenon, "does it only exist in the Malayo-Arabic character and the trans- "literations thereof, or does the same change in the length of "the vowels take place in the pronunciation? If this is maintain- "ed, I must then further ask how such a rule can have arisen in "the written character, a character which so to speak does not "belong to the language, and if such were the case might be "expected to have preserved in this respect the traces of a long "obsolete condition of the language or perhaps of some kindred "dialect, but which, borrowed from an entirely foreign language "and probably first applied to the Malay in comparatively recent "times, must be reckoned as rendering the native pronunciation in "common use as accurately as the foreign characters will allow? "I could understand that the retention of the original spelling of "a root ending in a consonant when followed by a suffix beginning "with a consonant, might arise from an idea of producing legi- "bility, so as not to entirely deprive the word of vowel signs, "and that one might therefore write for instance مندافتكن "although perhaps (according to Werndly) مندفتكن might better

"represent the pronunciation; but how could anyone think of "writing فندڤاتن if in this derivative, as in the root, the first *a* is "to be pronounced long and the second short, or above all things "how could this spelling come into general use? If, however, in "this respect the pronunciation agrees with the spelling, "then though allowing that the length of the vowel is some- "thing quite different from the accent, it would be difficult for me "to imagine such a change in the first syllable and in the division "of the syllables otherwise than in connection with and a result "of a corresponding change in the position of the accent. Even "if it be admitted that the first change could be imagined with- "out the last, and that it actually exists in Malay, how can one "conceive that the 'inclination to modify the pronunciation of "the people according to the way a word is written,' could lead "to the alleged tendency of literary Malays to place, in addition "to the natural accent, a second, grammatical accent on a syl- "lable which properly had no claim whatever to any accent at "all? Indeed in that case the written word is already, without "that misplaced accent, in entire agreement with the true pro- "nunciation; but then the Malay himself must comprehend too "well the difference between length and accent to confuse the "one with the other and thus to let himself be misled into such "an unnatural pronunciation.

"Moreover, that the Arabic character, by its imperfect re- "presentation of the pronunciation and especially owing to the "habit of omitting the vowel points, has really exercised some "influence upon the pronunciation, can, I believe, be properly in- "ferred from some corruptions which find therein a complete ex- "planation. I find a strong example of this in the word مرکستو "which is pronunced *margastoewa*, instead of *mrega-sattwa*, as it "should be sounded according to the Sanskrit spelling. There "would certainly be nothing astonishing about this corruption "in itself; but it is difficult to ascribe to mere chance the fact "that the corruption is just of such a kind, as is favoured by the "illegible manner of writing without vowels; to which the fact "that it is probably not an everyday word may also have con- "tributed. The same thing, though with less foundation, may

"be supposed in regard to سڤي منسي pronounced *satia*, *manusia*, "with three and four syllables, in place of *satya*, *manusya*, with two "and three syllables. Perhaps in the same way the spelling "مندافتكن might have caused the change in the pronunciation "from *mendapátkan* to *mendápatkan*; but in grammatical forms it "is more difficult to admit that much an influence upon the "pronunciation of the people could have come from a compara- "tively recent written character. And for the influence which "Mr. van de Wall ascribes to it, I can not even find a reason- "able cause."

These extracts have been translated from the Dutch, and are given here at such great length for the benefit of those to whom the Dutch Journals are not available. Before stating my own views on this question of the spelling and pronunciation of derived words, it seemed only fair to give the reader the facts and arguments which have already been used on both sides.

There can be no question but that, as stated by Cohen Stuart, the Dutch scholars up to the time of van de Wall universally held that the Malays actually pronounce such words as they are written. How they can have been led to this conclusion can perhaps be understood when it is considered that their study of the Malay language was prosecuted for the most part in Java or in places which are under strong Javanese influence. Robinson formed this opinion because he learnt the language in Batavia and Bencoolen. Marsden also studied at Bencoolen, and wrote his grammar and dictionary in England, where of course he had not the advantage of native help.*

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*The Dutch scholar H. N. van der Tuuk seems to have had no personal knowledge of the way in which the Malays of the Peninsula pronounce derived words, for he wrote in 1866 in his notes to Abdullah's *Pancha Tandaran*:—"دكنهوڤيله The writer always spells thus, and not "دكتهوڤياله and so also he spells ماتيله and not متيله بكانكه and not "سيافكه ;بكمناكه and not سيڤاكه. In the Menangkabau dialect the accent

Whether the Dutch scholars of the present generation have universally accepted van de Wall's dictum in regard to the change of accent in derived words, I am unfortunately not in a position to know, the Library here not being very well supplied with the latest Dutch works on the Malay language, but as far as I am able to discover, the grammar of Gerth v. Wijk, published in 1893, is now considered the best Dutch work on the Malay language. This author is in entire agreement with van de Wall, for on page 46, para. 96, he writes: "The original, "natural accent (of the root word) is usually retained when the "word takes a suffix, e. g., *bànding, bàndingan ; kùmpol, kùmpolan ;* "*dàpat, mendàpati ; lèmpar, melèmparkan.* And the phenomenon here "presents itself, that if the accent is not very easily distinguishable "in the root word, it sometimes comes out clearer in the derived "word, e. g., *bĕngis, kabĕngisan.*"

After quoting from van de Wall part of the passage which we have given above, Gerth v. Wijk adds: "The tendency "to change the position of the accent more or less is chiefly "noticeable, as it seems to me, in words which have the *a* sound "in the last syllable; such a pronunciation, however, as *kudà-*"*nya* from *kùda*, *padà-nya* from *pàda*, whereby the first syllable "of the root entirely loses its accent, which falls wholly upon "the second, as is the case with *katà-nya*,† can only be attribut-"ed to European-Javanese influence; one never hears it from "the Malay."

We shall see later on that van Wijk is probably correct in attributing to Javanese influence this mistaken idea about the change of the accent to the penultimate in all derived words. It seems necessary, however, before going into that question, to inquire first of all which are the words in the Malay language that actually do undergo a change of accent. In order to make an independent investigation of this subject I have written out a list of derived words and have caused them to

"of a word does not change its position on the addition of the particles *lah*, "*kah* and *tah*. From the spelling of Abdullah it would appear that this is "also the case in the Malay of Malacca."

† Where van de Wall and van Wijk came across this pronunciation of *kata-nya* I cannot imagine. The Malacca and Johor pronunciation certainly gives an accent identical with *kùda-nya*.

be read in my hearing by a number of Malays, with the result that I have only been able to detect an entire change of accent in the following classes of words:

(*A*) In some words derived from roots ending in *ang* by the addition of the prefix *an*, as *tímbang*, *timbángan*; *lárang*, *larángan*; *bílang*, *bilángan*; *dágang*, *dagángan*; *pándang*, *pemandángan*.

(*B*) In some derived words formed by the addition of the suffix *i*, as: *búka*, *bukâ'i*; *sérta*, *sertâ'i*; *múla*, *mulâ'i*; *túrun*, *turúni*; *táhan*, *tahâni*; *kásehan*, *mengasehâni*.*

(*C*) In some polysyllabic derived words formed with the suffix *i*, the accent is carried forward to the suffix *i* on the addition of the possessive pronoun *nya*, as, *jálani*, *di-jalani-nya*; *mengóbati*, *di-obati-nya-lah*. This should probably be attributed to the difficulty of pronouncing the consonant *nya* following the vowel *i*, which necessitates a pause.

In the majority of words the root most distinctly retains the original accent, as for instance *jádi*, *jádikan*; *mákan*, *mákanan*; *dégar*, *kedégaran*; *óbat*, *mengóbati*; *sálah*, *kesálahan*; *súrat*, *di-súrat-nya-lah*. It would be ridiculous to pronounce these words, *jadíkan*, *makánan*, *kedengáran*, *mengobáti*, *kesaláhan*.

There are, however, a large number of derived words, chiefly words of four or more syllables, in which the original accent almost or perhaps entirely disappears, without, however, any particular accentuation of any other syllable, the word being pronounced with an equal stress on all the syllables. Such words are: *perkata'an*, *kekaya'an*, *menjalani*.

Taking the pronunciation of the above-mentioned words into consideration, it would be easy in the case of the words in (*A*) and (*B*) to account for the position of the strengthening letters, *alif*, *wau* and *ya*; and even in the case of the words given above where the stress is equal on all the syllables, one could understand the omission of the strengthening letter from its proper place in the root, though its transference to the penultimate would be difficult to explain; but when we come to such a spelling as,

* It should be noted that in such roots as *turun* and *tahan* the stress is nearly equal on the two syllables, the change of stress in *turuni*, *tahani* is therefore very slight.

perbuátan perarákan pekerjá'an jadíkan katákan di-perlakúkan

دڤرلكوكن كتاكن جديكن ڤكرجأن ڤرراكن ڤربواتن

it becomes simply impossible to account for it on any theory of phonetics, unless indeed one is prepared to admit the possibility of a complete change of pronunciation in the short space of 300 years, which appears to me to be out of the question.

There is, however, it seems to me, a much more feasible explanation of this peculiar discrepancy between the spelling and the pronunciation of those words, and that is to be found in the existence of a cognate language, the Javanese, in which it is admitted that the accent in derivatives actually does change its position and fall upon the penultimate. Moreover the probability that Javanese was the pattern from which this peculiar Malay spelling was copied becomes still stronger when it is pointed out that Javanese words of this kind are written in the Javanese character in a way which has quite a strong analogy to this peculiar use of the strengthening letters in the penultimate. As the Javanese characters are not obtainable in Singapore it has been necessary to resort to the arrangement given below, which represents as nearly as it is possible in Roman characters the way in which such words are spelt in the Javanese character.

i	*i*				
éb gl.	*éb gl n.*	*gn*	*gn y*	*run h.*	*run h hn.*
l		*t*	*t*	*tu*	*tu*
bé-gal	*bé-gal-lan*	*gan-ti*	*gan-ti-ya*	*run-tuh*	*run-tuh-han*
بيكل	بيكلن بيكللن	كنتي		رنته	رنتوهن رنتههن

		ing		*ing i*	
a nk.	*a n ék k*	*p*	*r*	*m*	*r ng*
a-nak	*a-nak-ké*	*pa-ring*		*ma-ring-ngi*	
انق	انقكي اناكي	قارغ		مارغغ مارينغ	

It will be seen from the above that in Javanese the addition of the suffix *an*, *a*, *ê* or *i* doubles the preceding letter. Thus, the addition of *ê* to *anak* produces not *anakê*, but *anakkê*, the accent being shown in this way to be on the penultimate. When Javanese is written with Arabic characters, the weak letter *alif*, *wau* or *ya* is substituted for one of the double letters used in the Javanese character.

The resemblance* between these Javanese forms* and the spelling of Malay derivatives is so close that it amounts almost to a demonstration that the Javanese or some similar character was the medium through which the use of the strengthening letter in the penultimate came into Malay spelling, regardless of the pronunciation. The question has been raised before whether the Malays had a written character of their own, before they adopted the Arabic character. If that were so, analogy would naturally lead us to suppose that such a character would, like the Javanese, be based upon the Sanskrit, and that would make the step from the Javanese to the Malay spelling of derivatives which has been outlined above still easier. †

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* These Javanese double-letter forms can still be traced in Malay in the double *k*, which has no doubt survived owing to the existence of the two letters *kaf* and *kuf*. Thus we find that the Malays invariably use this method of spelling the words given below :

كاڤكن ممايكي منايكي ڤرانكن كأيسكن

although the Dutch scholars have endeavoured for more than a century to introduce what they consider more correct forms of spelling, namely :

كيڤاكن ممايكي منايكي ڤراناكن كأيسوكن

The fact that the Malays refuse to adopt these European spellings and retain the double-letter forms, is to my mind at once a strong argument in favour of their retention and an additional evidence in favour of the theory that the spelling of Malay derivatives can only be explained as being based upon the Javanese system of spelling.

† Werndly, in the introduction to his grammar, written 170 years ago, says on page 50 : "The first language from which the Malay language has "borrowed some words is her neighbouring and kindred friend and sister the "Javanese language, *with which many persons conjecture that she for-*

We will now proceed to inquire:

II. What changes have the Malays introduced in their spelling during the last 300 years with a view to greater legibility.

It has already been pointed out in I. (1) that it is now the almost invariable custom of the Malays to write final *wau* and *ya* in words which end in the vowels *e* and *i*, *o* and *u*, as well as in those which end in *ai* and *au*. This change has been accepted by van de Wall, Pijnappel, Klinkert, v. Wijk, Wilkinson, and all other modern European authorities.

(2) The use of final *alif* for words ending in the *a* sound, has not, however, been accepted by any of the above-mentioned lexicographers, except in those words which have the stress on the final syllable, as *sela*, *kra*, etc. The extent to which the final *alif* is now used appears, however, to justify the practice, in view of the fact that it renders a large number of words far more legible, and in the absence of any counteracting disadvantage. In the new Malay Spelling Book, No. 1, now used in the vernacular schools of this Colony, the following words are found with final *alif*:

bangsa *bawa* *bisa* *benda* *buta* *china* *chobа* *chita* *dada*

بڠسا باوا بيسا بندا بونا چينا چوبا چيتا دادا

denda *depa* *gila* *hasta* *hêla* *hêja* *kena* *kuda* *lada* *lusa*

دندا دڤا كيلا هستا هيلا هيجا كنا كودا لادا لوسا

muda *nyala* *rusa* *sahya* *sisa* *semoa*

مودا ڽالا روسا سهيا سيسا سموا

Whereas the following are written without final *alif*:

ada *apa* *bacha* *bapa* *bagimana* *biasa* *buka* *choba* *dia*

اد اف باچ باف بكيمان بياس بوك چوب دي

"*merly had one and the same written character in common*, and now still has "in common a large proportion of words, which cannot well be distinguish- "ed except by those who know how to compare them, and by some deriv- "ations which are peculiar to the one language rather than to the other."

guna hamba herga herta kata kerja kerna kita kota

كوت كيت كارن كرج كات هرت هرڬ همب كون

lama lima luka lupa mana masa mata muka nama

نام موك مات ماس مان لوڤ لوك ليم لام

ngata pada punya raba raga rasa rata sana serba

سرب سان رات راس راڬ راب ڤوڽ ڤد ڽات

siapa suka werna werta

ورت ورن سوك سياڤ

In the lithographed 1st editions of the *Hikayat Abdullah*, and *Pancha Tandaran*, which Munshi Abdullah wrote with his own hand, such words are in almost every instance spelt in precisely the same way as the Spelling Book, as the following will show:

bangsa bawa bichara bila blanga blanja bunga china chendana

چندانا چينا بوڠا بلغا بيلا بچارا باوا بڠسا

dada depa dosa dua êja kapala kena nama nyata onta

دادا دڤا دوسا دوا ايجا كڤلا كنا نما ڽاتا انتا

perkara pinta penglima penjara preksa sabda sahya seksa

ڤركارا ڤنتا ڤڠليما ڤنجارا ڤرقسا سبدا سهيا ڠقسا

senjakala singa telinga

سنجاكالا سيڠا تليڠا

and without *alif*,

ada apa bacha bahasa berniaga benchana cherana derhaka

اد اڤ باچ بهاس برنياك بنچان چران درهك

dia juga kata kerja kerna kita kreta mana mata minta

دي جوك كات كرج كارن كيت كريت مان مات منت

pada pula punya rupa sayaja senjata

سنجات سڠاج روف ڤون ڤول ڤد

(3) The insertion of the weak letters *wau* and *ya* in closed syllables appears to be a growing habit. It is this tendency of the Malays to use the weak letters which van de Wall sarcastically characterises as "kitchenmaid spelling." No amount of sarcasm, however, will counteract this inevitable tendency, which is not the result of ignorance at all, but rather of a set determination to make words more legible. The only concession along this line which van de Wall is willing to give the Malay is: "If the last letter of a word is a final *h*, a mere aspir-"ate, then he is free to express the vowel of the previous letter "if it is a *kasrah* (*i*, *e*) or *dlammah* (*o*. *u*) by the corresponding "lengthening letter, e. g. ڤديه *pedih* رنتوه *rantoh*."

Robinson went further than this, and wished the weak letter to be inserted in some words which are ambiguous, as,

ampat umpat tulis tulus

تولوس توليس اومڤة امڤة

The modern practice of the Malays themselves, however, goes further still. Abdullah wrote:

apit banyun blum betul gantong gadoh hanchor hidoyg ikut

ايكوة هيدوغ هنچور كادوه كنتوغ بتول بلوم باغون اڤية

kawan-nya kechil keping kris kulit lantek masing menangis pedeh

ڤديه مناغيس ماسيغ لنتيق كولية كريس كڤيغ كچيل كاوانث

ringgit sabot saudagar sebot sungkor tanggoh taroh tekun

نكون ناروه تڠكوه سڠكور سبوة سوداكر سابوة رغكية

telut trus tuan

توان تروس تلوة

He retained, however, the old form of spelling in the words:

balek gantong habis hidop kampong panggil puteh telok tinggal

بالق كنتغ هابس هيدڤ كمڤغ ڤڠكل ڤوته تلق تغكل

The new Spelling Book referred to above goes even further than Abdullah, giving

angin banyan blum gantong ganting minum payong

اڠين باڠون بلوم كنتوڠ كونتيڠ مينوم ڤايوڠ

rumput sakit sedikit takot tanjong tidor tongkat tinggal

رمڤوة ساكية سديكية تاكوة تنجوڠ تيدور توڠكة توڠكل

tumpah umpat

تومڤه اومڤة

But retaining the old forms

bintang habis kampong panggil tinggal

بنتڠ هابس كمڤڠ ڤڠكل تغكل

(4) As stated above, the *tashdid* is now never used.

(5) The insertion of the lengthening letters in the penultimate of derived words appears to have become firmly fixed in the mind of the Malay, and is still very generally practised. We find the following in the new Spelling Book:

angkatan bacha'an makanan pemandangan pemblian

اڠكاتن بچأن مكانن ڤمندڠن ڤمبلين

perkata'an tanaman tangkapan

ڤركتأن تنامن تڠكاڤن

which are absolutely in accord with the spelling of our MSS.

But we also find several words which are not written in the same way, e.g.

bangunan minuman panggilan pembunohan pencharian pendapatan

قندافتن قمچارين قمبونهن قڠكلن مينومن باڠونن

pengharapan penglihatan petarohan petutoran pukolan tulisan

تولیسن قوكلن قتوتران قتارهن قڤلبهتن قڤهارڤن

which according to the old spelling should be

قڤهراڤن قندڤاتن قمچربن قمبنوهن قڤڠكلن منومن بڠونن

تليسن قكولن قتتورن قتروهن قڤلهاتن

The new spelling of these words is certainly a very strong confirmation of what is stated above in regard to the position of the accent, and surely no one can deny that the new spelling is very much more legible than the old.

Abdullah writes:

apa-kah bacha'an-nya bantahan bagimana-kah di-bachakan

اڤاكه باچأنث بنتاهن بكيمانكه ديچاكن

di mana-kah fikiran hadapan hampiri ia pun jambatan

ديمانله فيكران هادڤن همڤيري ايڤون جمباتن

kbêbasan kerja-nya kedengaran kedudokan ke'êsokan

كبيباسن كرجاث كدغرن كدودقكن كأيسقكن

kelakuan kelihatan kesalahan kesenangan kesudahan kesusahan

كلكوان كليهاتن كسلاهن كسناڠن كسداهن كسوساهن

kurongan mendatangkan pakaian peranakan perhatian permula'an

كوروڠن مندتڠكن ڤكاين ڤرانقكن ڤرهاتين ڤرملأن

penganan puasa-lah rupa-nya tambahan

تمباهن روڤاڽ ڤواسله ڤڠانن

It will be seen that the spelling of many of these words is nearer to the spelling of the 17th century than the new Spelling Book, but the strong tendency to change the spelling in the direction of the pronunciation is very evident.

III. Is it possible to formulate rules which will fix the spelling of Malay according to the modern native ideal, i. e., legibility without vowel points?

Undoubtedly it should be accepted as an axiom that the Malays should continue to spell the common words as they have been accustomed to do for centuries; the spelling of these few words is easily learnt, and it would now be next to impossible to change them, e. g.,

ini itu jikalau kerna sagala seperti suatu deri-pada

اين ايت جكلو كارن سڠكل سڤرة سوات درڤد

melainkan ketahui

ملينكن كتهوي

Also Arabic words, which have retained the original spelling although the pronunciation has changed, should not now have their spelling altered, as,

dunia jawab miskin umur

دنيا جواب مسكين عمر

The first rule (1) would be, spell with final *wau* and *ya* respectively all words which end in any of the sounds *e*, *i* and *ai* or *u*, *o* and *au*.

(2) All words ending in the *a* sound should be spelt with final *alif*, except those words in which the last consonant is ب ج چ ك ک ڽ and a few common words such as

ada apa apabila dia ia kerna manusia mula pada pula

ڤول ڤد مول مانسي كارن اي دي اڤيل اڤ اد

serta siapa

سياڤ سرت

Provided, however, that the final *alif* may also be omitted when the last consonant is ت س م ن or ي whenever those consonants are preceded by an *alif*, as in the following words:

bagimana biasa daya kata kaya lama mana masa mata nama

نام مات ماس مان لام كاي كات داي بياس بكيمان

nyata puasa rasa rata sama sana supaya

سڤاي سان سام رات راس ڤواس پات

(3) The following rules are suggested to govern the insertion of the weak letters *wau* and *ya* in closed syllables (it being understood of course that *alif* is never thus used except in the monosyllable *dan*).

(*a*) In two-syllable roots, when one syllable is open and the other closed, the weak letters *wau* and *ya* shall be inserted in the closed syllable, except when the vowel sounds of the two syllables are similar. Examples of words with similar vowels:—

bilek bodoh bohong bongsu bunoh dusun fikir mimpi sorong susun

سوسن سورغ ممڤي فيكر دوسن بونه بغسو بوهغ بوده بيلق

tinggi titek tolong tulus turun

تورن تولس تولغ تيتق تغكي

Examples of words with dissimilar vowels:—

angin blum gadoh hidop ikut kasut kechil keping

كڤيڠ كچيل كاسوة ايكوة هيدوڤ كادوه بلوم اڠين

kring *payong* *taroh* *tidor* *timpa* *tonda* *tulis*

كريغ ڤايوغ ناروه تيدور تيمڤا توندا توليس

(b) When both are closed syllables, the weak letter should only be inserted in the second syllable if the vowel sounds of the two syllables are similar.
Examples:—

benteng *dinding* *ringgit* *tindeh* *tumboh* *tundok* *tunggul* *unjok*

بنتيغ دندينغ رڠكيت تندوه تمبوه تندوق تڠكول انجوق

(*c*) If the sounds are dissimilar, one being the *a* sound and the other *wau* or *ya*, the *wau* or *ya* must be written in whichever syllable it occurs. Thus:

bimbang *banting* *bintang* *kambing* *kumbang* *tanggong* *tunggang*

بيمبغ · كمبيغ كومبغ بينتغ بنتيغ تڠكوغ توڠكغ

(*d*) If the vowel sound in one syllable corresponds to *wau*, and in the other to *ya*, then both should be written, as: كونتيغ

It will, of course, be understood that it is quite impossible in this way to represent all the possible permutations of vowel sounds that may be formed with the same consonants. This could only be done with vowel points. The great majority of words in ordinary use will however be covered by the above rules, and something must be left to the imagination of the reader.

(*e*) In such common words as *tinggal* and *panggil*, it is doubtful whether the insertion of the *ya* would be of any use. The Malays are so accustomed to the spelling تڠكل and ڤڠكل for these words that careless readers invariably pronounce these forms *tingal* and *pangil* even when they stand for *tanggal* and *penggal*, and would certainly continue to do so even if *tinggal* and *panggil* were spelt تيڠكل ڤڠكيل and as most Malays strongly object to the insertion of the *ya* in these words, I would advocate

its omission, for the present at any rate. Similarly a few other very common words might be spelt without the weak letters, as:

minta pinta pintu jumpa chinta habis putch timbul boleh oleh

اوله بوله تمبل ڤوته هابس چنتا جمڤا ڤنتو ڤنتا منتا

ratus mulia himpon êsok lebeh

لبه ايسق همڤون مليا راتس

(4) The *alif* should be used, as explained above, in all words where in the old MSS. a *tashdid* is found over *wau*, as in

buah buat dua jua prempuan tuan luar

لوار توان ڤرمڤوان جوا دوا بواة بواه

This use of *alif* does not appear to be necessary where *tashdid* is found over *ya* in the old MSS., for the Malays never spell otherwise than

سكين كنتين ڤمبلين

(5) (*a*) In root words, the use of the weak letters to lengthen the vowel sound in open syllables requires but few remarks. In words of two syllables, these lengthening letters are almost invariably found in the first syllable, the exceptions being those words in which the accent falls on the last syllable, the first syllable having the short vowel sound, as:

bla kra sela tra

بلا كرا سلا ترا

In three-syllable roots, the lengthening letter is placed in the penultimate; but in one or two words which have final *alif* the lengthening letter is omitted from the penultimate, as

بهيا چهيا سهيا اوسها رهسيا كڤلا

(*b*) In derived words the aim should undoubtedly be to bring the spelling into agreement with the pronunciation as far as possible without making an entire revolution in the present

system of spelling. As a general rule, the spelling of the root should remain the same as it was before the addition of the prefixes and suffixes. No change of spelling is necessary when the vowel sound of the last syllable of the root is *e*, *i*, *o*, or *u*. This will be made plain by the following three sets of examples:

b^1. The final syllable open:

ganti gantikan gantian laku laku-nya lakukan

لاکوکن لاکوڽ لاکو کنتين کنتيکن کنتي

b^2. Final syllable closed and containing a weak letter:

kaseh kaseh-nya kasehi unjok unjokkan unjoki *

انجوکي انجوقکن انجوق کاسيهڽ کاسيهي کاسيه

b^3. Final syllable closed but without a weak letter:

fikir fikirkan fikiran bunoh bunohkan pembunohan

ڤمبونهن بونهکن بونه فيکران فيکرکن فيکر

(*c*) If the last syllable of the root has the open *a* sound, the *alif* must always be written when a suffix is added, even if the root does not require final *alif*, as,

ada ada-lah rasa rasa-nya raja rajakan

راجاکن راج راساڽ راس اداله اد

(*d*) If the last syllable of the root is closed and has the *a* sound, the addition of a suffix commencing with a consonant produces no change in the spelling of the root, as,

dapat dapatkan susah susahkan susah-nya

سوسهڽ سوسهکن سوسه داڤتکن داڤة

but if the suffix commence with a vowel sound, the *alif* is usually written in the last syllable of the root:

* *Unjoki* may also be spelt انجوقکي. See page 102, footnote.

dapat dapati kras mengrasi senang kesenangan susah kesusahan
كسوساهن سوسه كسناڠن سنڠ مڠراسي كرس دافاتي دافة

(*e*) When both syllables of the root have the *a* sound, and the addition of a suffix requires in the last syllable an extra *alif*, the Malays invariably omit the *alif* of the first syllable of the root, unless it follows one of the letters د ر or و ; thus,

bacha bachakan di-bacha-nya bapa bapa-nya kata katakan
كتاكن كات بڤاڠ باڤ دبچاڠ بچاكن باچ

perkata'an karang karangan makan makanan nama namakan
ڤركتأن كارڠ كراڠن ماكن مكانن نام نماكن

nama'i salah kesalahan tanam tanaman
تنامن تانم كسلاهن ساله نمأي

But with words commencing with د ر or و the spelling is,

dada-nya dagangan dalam-nya perdayakan rasa-nya wayangan
واياڠن راساڠ ڤردایاكن دالمڠ داكاڠن دادڠ

With roots in which *ya* is a consonant, the omission of *alif* would cause ambiguity; it should therefore be retained, as,

انياي انیایاكن اوڤاي اوڤایاڠ برنیاك ڤرنیاكأن بیاس بیاساڠ

(*f*) The suffix *an* requires *alif* when the root ends with the letters د ر or و

fikiran kedengaran kelakuan petutoran
ڤتوتران كلاكوان كدڠران فیكران

In such words, the *alif* which would otherwise be required by rule (5) (*d*) in the last syllable of the root must be omitted, as,

بابران كبسران كبنران كدڠران كسوكران

(*g*) The further addition of suffixes or particles to derived words should cause no change in spelling. Some persons write *alif* after the possessive pronoun *nya* when it is followed by the particles *lah*, *kah*, etc., but this appears to be unnecessary. Examples:

bapa-nya *bapa-nya-kah* *kasehi* *di-kasehi-nya-lah*

بڤاڽ بڤاڽكه كاسيهي دكاسيهيڽله

nama'i *di-nama'i-nya-lah*

نمأي دنمأيڽله

(6) The orthographical sign *hamza* ء, which was very seldom written in the manuscripts of the 17th century, is now in common use among the Malays, chiefly for the purpose of introducing a syllable which commences with a vowel; they never employ it however for this purpose at the beginning of a word. The *hamza* is placed over *alif*, *wau* or *ya* according to the vowel sound of the syllable in which it is used.

(*a*) Root words commencing with the vowels corresponding to *wau* and *ya* are written with an initial *alif*, but this *alif* drops out on the addition of the prefix *sa*, its place being taken by the *hamza*: with the prefix *ke* the *alif* is retained and *hamza* written over it.

sa'orang *sa'olah-olah* *sa'isi* *sa'ekor* *sa'umpama* *ke'inginan*

سورغ سؤله٢ سئسي سئكور سؤمڤام كأيڠينن

In the following words the *alif* is the lengthening letter of the preceding syllable,

ia'itu *ka'il* *ra'eh* *da'irah*

دائره رائيه كأبل يأية

(*b*) In similar derivatives formed from words commencing with the *a* sound, the *alif* is retained and the *hamza* written over it, as,

ke'ada'an *ke'ampat* *ka'atas* *sa'akan-akan*

كأدأن كأمڤة كأتس سأكن٢

Hamza is used in the same way with the suffix *an* following an *alif*, as,

kenyata'an *perkata'an*

كڤركتأن كڤتأن

(*c*) *Hamza* is also used with the suffix *i* when it follows an *alif*, but not when it follows *wau*, as,

mula'i *nam'i* *serta'i* *bharui* *ketahui* *lalui* *tuggui*

تڠكوي لالوي كنهوي بهاروي سرتأي نمأي مولأي

(*d*) *Hamza* is sometimes placed at the end of a word instead of final ق to indicate a shortening of the final syllable, as

bêng'ko' *dato'* *inche'* *ma'* *poko'* *tûngo'*

نيڠكو ڤوكو ما انچي داتو بيڠكو

(*e*) It also appears in a few Arabic words:

mala'ikat *aja'ib* *mu'min*

مؤمن عجأيب ملأيكة

IV. For the sake of brevity and clearness the proposed rules for Malay spelling are now recapitulated, without the explanations which were necessary above.

PROPOSED RULES FOR MALAY SPELLING.

(1) Final *wau* and *ya* must be used in all words ending in the sounds *u*, *o*, *au*, and *i*, *e*, *ai*, respectively, except

اين ايت يأين يأيت سوات سڤرة

(2) Final *alif* must be used in all words ending in the *a* sound, except (*a*) when the final consonant is ب ج چ ك ڠ ن ; (*b*) when the final consonant is ت س ف م ن ي preceded by *alif*, or (*c*) one of the following exceptions:

مول مانسي سرت اقبيل كارن ڤول ڤد دي اي اد سكل

(3) (*a*) In two-syllable roots having one syllable open and the other closed, the weak letters *wau* and *ya* are to be inserted in the closed syllable having the *e*, *i*, or *o*, *u* sound respectively, except when the sounds of the two syllables are of the same class (*o* and *u*, *o* and *o*, *u* and *u*; or *i* and *e*, *e* and *e*, *i* and *i*). (*b*) When both syllables are closed and have similar sounds, the weak letter must only be used in the second syllable; but (*c*) if the sounds are dissimilar, one being the *a* sound and the other *wau* or *ya*, the *wau* or *ya* must be written in whichever syllable it occurs; and (*d*) if the sound in one syllable is *wau* and the other *ya*, both must be written. (*e*) The following common words are exceptions to this rule, being written without the weak letters,

اوله ڤڠكل تڠكل هابس ڤوته بوله راتس مليا ايسق جڤا ڤنتو منتا
همڤون ڤنتا چنتا

Three-syllable roots must be treated similarly.

(4) Where a syllable commencing with the *a* sound follows a syllable ending in the letter د ر or و the *alif* must always be written. Examples:

لوار مواة جوا بواه بواة دوا بواغ

(5) (*a*) In root words, lengthening letters are used in those open syllables on which the accent falls. Several words of Arabic origin, however, are exceptions to this rule, and a few other words, such as,

مك ڤد سه كڤلا سكل جكلو تتكل مانسي ملينكن كتهوي

(*b*) In derived words, when the vowel sound of the last syllable of the root is *e*, *i*, *o* or *u*, the spelling of the root remains unchanged. (*c*) If the root ends with the open *a* sound, an *alif* must be written in the last syllable of the root when a suffix is added. (*d*) If the last syllable of the root is closed and has the *a* sound, an *alif* is usually written in the last syllable of the root on the addition of a suffix commencing with a vowel sound, but if the suffix commence with a consonant the *alif* is not required, and the spelling of the root remains unchanged.

(*e*) When both syllables of the root have the *a* sound, and the addition of a suffix requires an extra *alif* in the last syllable, then if there is an *alif* in the first syllable of the root it should be omitted, unless it follows one of the letters ر د و or ي (*f*) When the root ends with one of the letters ر د و an *alif* must be written before the suffix *an*, the *alif* required by rule (5 d) is then omitted. (*g*) The further addition of suffixes or particles to derived words causes no change in the spelling.

(6) (*a*) When *sa* is prefixed to a root commencing with a vowel sound corresponding to *wau* or *ya*, the *alif* drops out, and *hamza* takes its place; with the prefix *ke* the *alif* is retained and *hamza* is written over it. (*b*) When the root commences with the *a* sound, the *alif* is retained and the *hamza* written over it. *Hamza* is also employed in the same way with the suffix *an* following an *alif*. (*c*) It is used with the suffix *i* following an *alif*, but not when it follows *wau*. (*d*) At the end of a word, *hamza* sometimes takes the place of final ق . (*e*) It also appears in a few Arabic words.

In order to show the application of the principles of Malay spelling reform suggested in this paper, the first chapter of *Hikayat Abdullah*, spelt according to the above rules, is here appended, with a few notes on words which are spelt in an unusual way. A glossary of the words used in this paper as examples is also appended. The root words are arranged in the order of the Malay alphabet, and, wherever necessary, the spelling of one or more derivatives is given after the root. In order to make this list more complete, several words have been inserted in the glossary which will not be found among the examples; these include a number of words in the spelling of which the Malays are very inconsistent, so that it seemed desirable to suggest a fixed standard of spelling in such cases.

It will be seen that this method of spelling is essentially the same as is at present in use among educated Malays throughout the Malay Peninsula, which is admitted, even by the Dutch scholars, to be the home of the purest form of the Malay language.

In this paper but little more has been done than to explain the rationale of this modern Malay spelling, and to reduce it to a system which would enable those who are prepared to adopt it to spell uniformly and consistently with themselves. It has been sought to adhere as closely as possible to the spelling employed by the best educated Malays at the present time in writing their own language, in the firm belief that it is very much more feasible for the few Europeans who use the Malay character to accommodate themselves to the native way of spelling, than for them to attempt to coerce a whole nation of intelligent and self-reliant men into a return to the antiquated Arabian system of orthography illustrated in the manuscripts of the 17th century, which the Malays have been doing their best to improve for hundreds of years past.

APPENDIX A.

بهوا مك اداله كفد تتكل هجرة سنة ١٢٤٦ ناهون كڤد ليما ليكور هاري بولن شعبان المكرام يأية كڤد دوا ليكور هاري بولن اڤتوبر تاريخ مسيحي سنة 1840 ناهون بهوا ديواس ايةاداله سورغ صحابتكو يأية اورغ ڤوته يغ كوكاسيهي اكندي مك اياله ممنتا ساڠة٣ كڤداكو يأية هندق مڠتهوي اكن اصل اوصلكو دان ڤري حكاية سكل كهيدوڤن ديريكو مك اي ممنتا كارڠكن سوات كتاب دڠن بهاس ملايو مك اداله سبب سكل حال دان ڤركارا يڠترسبوة اية منجادي مشغلله اكو سرت برتله راسان اڠكوتاكو سبب دودق برفيكركن كهندق ككاسيهكو يڠدمكين كارن سكل حال احوال يڠترسبوة اية سموان ڤركارا٢ يڠتله لالو زمانن سباكيلاكي يغ مندانڠكن دكچيتا دالم هاتيكو سبب بهوا سسڠكوهن اكو ابن سورغ بوده لاكي دڠن كورغ بوديكو دان فهمكو دالم علمو بهاس مك برتمبه٢ ڤول ڤچق

ڤغتهوانكو دالم علمو مڠارڠ اداڽ شهدان لاكي اداله حالكو اين تمبول تڤكلم
دالم ڤكرجأن جواتنكو 1 مك اوله سبب سكل ڤركارا يڠترسبوة ايتله
مندانڤكن ڤرچنتأن دالم هاتيكو سباكيڤول مك كتاكونتله اكو اكن دبريكو
سبب كودڠر دان كوليهة كچواليڽ كباڤكن ڤول اورڠيڠ مڠاكو دبريڽ ڤد
زمان اين ڤندي دان چاكڤڽ ڤون برلبه٢هن سڤاي دڤرچاي اورڠ اكندي
ڤندي تنافي چاكف اڠين سهاج مك اڤبيل دسورهكن اورڠ اكندي بربواة
بارڠسوات ڤكرجأن انو كراڠن انو دربحال توليس منوليس ارتي بهاس
نسچاي دداڤاتيله اكنديأية كوسڠ سبب سكل چاكف دان كڤندينڽ اية بوكن
دڠن ڤلاجران ملينكن منڠر٢ سهاج سڤيڠ جالن مك سبب ايتله تياد
بركتهوان هولو هيلرڽ دانلاكي ڤول كباڤكن اورڠيڠ ببل يڠتياد بربانو اوجي
دناڠنڽ اڤبيل اي منڠر چاكف اورڠ بربكي٢ اية يا 2 بوكن اداله كلاكوانڽ
سڤرة اورڠ مڠنتوْ دسورڠكن بنتل مك للڤله سهاج اي يعني ڤرچياله اي
اكندي دڠن تياد دچوبان ياكه انو تيدق سوْمڤام سبانڠ بولوه 3 ترديري
مك ڤد سڤكان اينله سبانڠ كايو يڠ بايك لاكي لورس تياد بيڠكڠ بيڠكق
ڤستي اد برترس دالمڽ مك جكلو كيران اورڠ يڠ ممڤوڤأي بودي نسچاي
دبلهڤيله دهولو دليڤتڽ دالمڽ نسچاي دداڤاتيڽ كوسڠ اداڽ تنافي اداله سڤرة

1. The spelling of this word *jawatan* is somewhat ambiguous, and the word is sometimes pronounced *juatan* by ignorant persons, but this spelling agrees with Rule (5) (*e*).

2. Many Malays spell the affirmative monosyllable *ya* in the same way as the two-syllable pronoun *ia*. But this spelling seems better.

3. To distinguish *buloh* from *boleh*, it is better to insert the *wau* in the last syllable of this word, through contrary to Rule (3) (*a*).

كات عارف بهواسڠ جوهاري جوكڠ يڠ مڠنل مأنيكم مك استميوا ڤول ڤد
زمان اين سمڠق سلة ناله منجادي نكري بلالڠ نله منجادي لڠ دان ڤيجة٢ ڤون
نله منجادي كورا٢ دان چاچيڠ ڤون نله منجادي اولر ناك برمول ادڤون
اصلڠ سكل عجأيب اين تريتڠ دري سبب هرنا دنيا اين مك جكلو هينا
دان بوده سكاليڤون اصل اد برهرنا نسچاي ايااله ڤندي دان ترمليا مك
جكلو ڤندي دان مليا تناڤي تياد برهرنا نسچاي ترهينا جوكڠ سبرمول ادااله
سكل ڤركنأن دان مثل دان اومثمأن اية سموان كوامبيل عبارة باكي دبريكو
ڤرنام٢ هينا كأدأن دبريكو دان كدوا مسكين حال كهيدوڤنكو دان كتيك
كورڠ علمو دان فهمكو دان كأمڤة بوكتڠ اكو اين اهلي باكي ڤكرجأن كارڠ
مغارڠ اية مك بهواسڠ تيادااله باكيكو قواة 4 كواس دان داي اوڤاي ملينكن
درڤد الله ادان دان لاكي سكالي٢ تياد سوڤي دبريكو دربحال برصفة ككوراڠن
دان كلماهن ڤد تيڤ٢ ماس دان كتيك ادان كلكين ستله هابسله فيكرانكو
يڠدمكين مك تيبا٢ ترسدرله سؤله٢ دكجوتكن اورڠ اكنداكو درڤد تيدوركو
سميل بركات دمكين جكلو كيران اڠكو هينا ممنتااله ڤد يڠمليا دان جكلو
اڠكو مسكين ڤنتااله ڤد يڠ كاي دان جكلو كورڠ فهمو ڤوهنكنله كڤد
توهن يڠتله برجنجي بارڠسياڤ يڠ ممنتا اي اكن مندافة مك جكلو كيران
دمكينله كموراهنڠ توهن ايت انشأ الله تعالى اكو ممنتا تولڠ جوكڠ دڠن
سبوله٢ن كڤدان يڠ تله ممبنتڤكن لاڠية يڠ سبسر اية دڠن تياد برتوڠكة

4. I have spelt this word in the same way as *buat*.

سڤاي دڤنوهيڽ اكن كهندق ككاسيهكو اية مك جكلو اكو اين بوكنڽ اهلي باكي يڤدمكين سكالي ڤون بهوا هارڤله جوك اكو كڤدان اكن مپرتأي اكو انس ڤكرجأن يڠ سديكة اين ادان

APPENDIX B.

انور انوري انوران	ادو ڤڠادوان
اجر اجري ڤڠاجران	استان استانڽ
اد اداله كأدأن	اڠكة اڠكاتن (1)

1. From the examples given in this glossary (which was completed after the paper was already in print) it would seem possible to make Rule (5)(d) more definite as to whether or not the *alif* should be inserted in a closed final syllable having the *a* sound, on the addition of a suffix commencing with a vowel. It appears that the Malays usually insert the *alif* when the last consonant of the root is ت or ه but not otherwise, unless the stress in distinctly on that syllable. Thus :

اڠكاتن اوباني ايڠاتن ايكاتن سوكاتن ملبهاني حرماني

اوڤاهن بنتاهي تكاهن تمباهن ڤرسمباهن كسوساهن ڤجاهن ڤرنتاهن

كلماهن ملوداهي كموراهن كموداهن

Roots ending in ت and ه which are exceptions to this rule are :

كڤايهن كساڠتن سورتن كاكهي

The following are examples of roots ending in other consonants, the derivatives being written without *alif* :

كأمسن بالسن تڠكڤن كنڠكلن رمڤسن ڤڤهارڤن

But the following have the accent on the last syllable of the root and take *alif* :

تلاني كديامن ڤساني مڠنالي ككلاڤن مڠكناڤي كلڤاسن

اغكوتا	اودارا
اغين	اوسغ اوسڠن
اڤ اڤاكه	اوسها
اڤيل	اوڤاي اوڤايان
اڤية	اوڤه اوڤاهن
آكام آكمان	اوكر اوكران
امبيل	اوله ڤراولهن
امس كأمسن	اومڤام ڤراومڤأن سؤومڤام
امڤة كأمڤة	اومڤة
انتارا	اونتا
انتوغ	اوندغ
انجوق انجوقكي (2)	اي اياله
انجي	ايت ايتله
انق ڤرانقكن	ايريغ (3)
انياي انياياكن	ايسق كأيسقكن
اوبة اوباني	ايڠة ايڠاتن
اوتس اوتسن	ايغين كأيغينن

2. See footnote p. 102.

3. Three words in this list are almost invariably spelt with the weak letter *ya* in both syllables, contrary to Rule (3)(a):

ايريغ ايغين كيريم

ايكة ايكاتن	بتينا
ايكوة	بجارا بجاراكن
ايكور سيكور	برة ممبراتي
ايلوق كأيلوقكن	براف براڤكه
ايمام	برس
ايمان	برنياك ڤرنياكأن
اين اينله	بدن
بانوق	بسر كبسران
باچ بچاكن بچأن	بڤسا
باڤون باڤونن	بڤسو
باف بڤاڤ بڤاپكه	بكيتو
بالس بالسن	بكيمان بكيمانكه
باليك باليقكن	بلا
باؤ	بلاڤا
باوا	بلنجا
باير بايران	بلوم
بايك ممبايقكي	بلي ڤمبلين
باپق كباپقكن	بناس بنساله
بتول ممبتولي	بنته بنتاهي ڤرينتاهن

بنتيغ	بهاس بهساڽ (5)
بنجان بنجناڽ	بهكيا
بنركبنران	بهوا
بندا	بهيا
بواة قربواتن	بياس بياساڽ
بواه بواه٢هن (4)	بيبس كبيبسن
بوتا	بيسا
بوده كبودهن	بيڠكوء
بوغا بوغا٢ن	بيلا
بوڠكر	بيلغ بيلاڠن بيلڠكن
بوك بوكاي بوكاكن	بيڽى
بوله بولهله	بيمبغ
بونه ڤمبونهن	بينتڠ
بوهڠ	تاروه ڤتاروهن
	تاريك

4. In reduplications with the suffix *an*, the last consonant of the root is repeated in the suffix, and if the root ends with *alif* a hamza is written with the suffix.

5. This word is sometimes spelt بهاسڽ or بهاساڽ but this spelling, which is in accordance with Rule (5)(c), seems perfectly legible.

ناڠن ناڠني د ناڠنين (6)	ڠكوڠ
ناڠيس	ڠكول
ناكوة ناكوني كناكوتن	ڠكوه
نانم ننامن	ڠكي
ناون ناوانن	نكون
ناهن ناهني (6)	نكه نكاهن
ناهوكنهوي ڤغتهوان	تلن تلاني
ناهون	نلور
ناڽ ڽاكن ڽاڽي	نلوق
نخنا	نليغا
نرا	نمبول
نرڠ كتراڠن منراڠي	نمبوه
نروس	نمبه نماهن نماهي
نربق *trek* / *triak*	ننتوة
نربا	نجوڠ
نڠكڤ نڠكڠن	نندوق
نڠكل كنڠكلن	نندبه

6. According to Rule (5)(e) these words should be نغاني and نهاني and they are occasionally so spelt, but the Malays seem to find some difficulty in reading these words if they are spelt in that way.

نواغ نواغي	تيمغ تيمباغن
توان	تيمب
توتر ڤنوتران	تيمڤا
تونڤ تونڤن	تيمور
تورن توروني كتورنن (7)	جادي كجادين
توڠكة	جاڬ جكاله
توڠكغ	جالا
توڠكل	جالن جلاني ڤرجلانن
توكر توكران	جاوه
تولغ ڤرتولغن	جاهة كجهاتن
تولس	جكلو
توليس	جمڤا
تومڤه	جوا
توندا	جواب
تيتق	جوال
تيدور	جوڬ
تيغوء تيغڤله	جيك (8)

7. This spelling of *turani* does not follow Rule (3)(a), but تورني is not easily read, and as the accent is *turáni* it seems better to insert the *waw*.

8. This word is often spelt جڬ

چاري فنجارين	خواطر
چلاک چلاکان (9)	دانغ مندانغي کدانغن (10)
چمنا	دانو
چنتيک	دادا
چندان	دافة ددافاني کدافانن
چوب دچوبان چوبأي	دآکغ داکاغن
چوچو	داون
چوما	داي دايان
چنا	دائره
چينا	درس
حال	درقد درقدان
حرمة حرماني	درهاک درهکاله
حکم حکمن	دريحال
حکيم	دستا
حيران	دسيتو
خبر خبران	دغرکدغران
خلاصي	دقا

9. The form چلکان which would be in accordance with Rule (5) (c), is unusual and not easily read.

10. See Note (6).

دچيتا
دمكين
دندا
دنديڠ
دنهاري
دنيا
دوا
دوري دوربن
دودق كدودقكن مندودقكي
دوسا
دوسن
دوݢ دچيتا
دهاݢ دهݢاث
دي دياله
ديم كديامن منديامي
ديواس
راب
رات راتاكن
راتڤ مراتڤي

راج راجاكن كراجأن
راس راسأي
راݢ راݢاث
رايه
ربان
رڠكية
رمڤس رمڤسن
رمڤوة
رنتوه
رندو
روسا
روسق كروسقكن
روڤا
ساڠة كساڠتن (11)
سأكن٢
ساكية
ساله كسلاهن
سام سماث
سان دسانله

11. See Note (1).

سأوه	سكارڠ
ساوه	سكچيل
ساهوة	سكلين
سبدا	سكرا
سبوة	سكل
سرب	سلڠ كسلاڠن
سرت سرنأي بسرت	سلوار
سده كسداهن سدهكن	سلا
مڤودهكن (12)	سليسه ڤرسليسهن
سديا	سمبليه ڤرسمبليهن
سديكة	سمبه ڤرسمباهن
سڤاج سڠجاڠ	سمبيل
سڤكور	سمڤرنا
سڤكوه	سموا
سڤاروه	سنتوسا
سڤاي	سنجات سنجتاڠ
سڤرة سڤرتيڠ	سنجاكالا
سڤسا	سنڠ كسناڠن

12. The spelling of the root is irregular, and wherever possible the derivatives are spelt in the same way as the root.

سوات	سياف سياڤكه
سوارا	سيسا
سواڤ	سيغ
سورة سورتن (13)	سيڤا
سورڠ	سيمڤن
سُورڠ	شك
سوروة	شكور
سوره سورهن	عجأيب
سودارا	عمر
سوداكر	فيكر فيكران
سوسن	ڤاكي ڤكاين
سوسه كسوساهن	ڤابوغ
سوك كسوكأن سكچيتا	ڤايه كڤايهن (14)
سوكة سوكاتن	ڤچه ڤچاهن
سوكر كسوكران	ڤراهو
سُوله٢	ڤرچاي كڤرچيأن
سومڤه	ڤرغ ڤڤراڠن ممراڠي
سهيا	ڤركارا

13. This is the usual spelling.
14. See Note (1).

ڤرقسا	ڤوتر ڤوتران
ڤرلاهن۲	ڤوتس كڤوتسن
ڤرمڤوان	ڤوته
ڤرنته ڤرنتاهن	ڤوكل ڤوكلن
ڤد ڤداڽ	ڤوكو
ڤديه	ڤول
ڤسن ڤساني	ڤوله
ڤڤكل ڤڤكلن	ڤوڽ ممڤوڤأي
ڤڤسا	ڤها
ڤكڠ ڤكاڠن	ڤيله ڤيلهن
ڤليتا	ڤواة ككواتن
ڤليهارا ڤليهاراكن	ڤوم
ڤنة	كاث كناكن ڤركناڽ
ڤنتا	كأنس
ڤنتو	كارڠ كراڠن
ڤندڠ ڤمنداڠن	كارن
ڤنوه ڤنوهي	كاسوة
ڤواس ڤواساله *puasa*	كالا
ڤواس ڤواسله *puas*	كأمڤة

كاون كاونث	كلكين
كاي ككيأن (15)	كلوار
كأية	كلورك كلوركان
كأيل	كمبيغ
كتاب	كمدين
كچيل	كمقوغ
كرا	كنا مغنأي
كرج ڤكرجأن	كنل مغنالي
كرس مغراسي	كواس كواسان
كرنيا	كوالا
كريتا	كونا
كريس	كوتر
كريغ	كورغ ككوراغن
كستا	كودا
كڤل	كولية
كڤلا	كومبغ
كڤيغ	كيت كيتاله
كلاڤ	كية

15. By Rule (5)(e) this should be ككايأن but the word is always spelt as it is here given.

كيرم كيرمن	لابر ڤلابران
كادوه	لأبن ملينكن
كاكه كاكهي (16)	لاين لاياني
كلر كلران	لبه كليهن
كلف كڤلاڤن	لڤس كلڤاسن
كمر كڤمران	لڤسا
كنتوڠ	لمه كلماهن
كنتي كنتين	لنتيڤ
كنف مڤكناڤي	لوار
كونا	لواس
كونتيڠ	لوده ملوداهي
كيلا	لوسا
لارڠ لاراڠن	لوك لوكاڠ
لادا	لوڤا
لاكو كلاكوان	ليما
لاڤر كلاڤران	ليمڤر مليمڤري
لام لمان	ليهة مليهاتي
لاوة لاوتن	مأ
لاون لاوانن	مات متاڠ

16. See Note (1).

ماتي كماتين	منتا
ماس مساڠ	مواة
ماسوق ماسوقكي	مورہ كموراهن
ماسيڠ	مودہ كمودهن
ماكن مكانن	موك موكاڠ
مان مانله	مول مولاڠ
مانسي	مومن
مانيكم	مينوم
مأين ڤرمأينن	نام نماڠ
منهاري	نايك نايقكي
مريك	نجيس
مريكيت	وأيڠ واياڠن
مسكين	ورنا
مڠاڤ مڠاڤكه	ورنا
مك	وقتو
ملأيكة	هابس ڤڤهابسن
مليا	هارڤ ڤڤهارڤن
مليڠكن	هادڤ هدادڤن
ممڤي	هاڠ هپاله

هرنا	هيدوغ
هستا	هيدوف
هيڠك	هيلا
همب همباڽ	هيلغ كهيلاغن
همڤون ڤرهمڤونن	هينا
همڤير همڤيري	يا
همچور	يأيت
هندق كهندقكي	پات پتاڽ
هيجا	پالا
هرك هركاڽ	پاموق

Short Notes.

On the Occurrence of Mus. surifer, G. S. Miller, in Perak.

In the Proceedings of the Biological Society of Washington, vol. xiii, April 21, 1900, Mr. Gerrit S. Miller, of the U. S. National Museum, describes no less than seven new species of Rats collected in 1899 by Dr. W. L. Abbott in the mountains of Trong, a small Siamese State on the west side of the Peninsula, about 500 miles north of Singapore.

This paper should not be overlooked by students of the smaller Malayan mammals, and Mr. Miller would probably kindly supply any one interested in the subject with a copy on application. The new rats described are *Mus vociferans*, *M. ferreocanus*, *M. validus*, *M. cremoriventer*, *M. asper*, *M. pellax*, and *M. surifer*. I am able to record the last of these new species from the Larut Hills, Perak, and it is probable that at least some of the others follow the main range down the Peninsula. *Mus. surifer* was obtained by Dr. Abbott in February 1899. I first met with it in February 1898, catching a single example in a steel trap near the Hut, Maxwell's Hill. Unfortunately the hinder portion of the specimen had been eaten by some small carnivorous creature, and, after noting its appearance I threw it away. Last year on revisiting the hills I remembered this rat and succeeded in trapping a specimen alive. It was a charmingly pretty and fearless little creature, quite tame from the time of capture, and I was overruled by feminine influence into keeping it alive, with the result that it escaped eventually in Kwala Lumpur! At the same time I got a very damaged specimen from same coolies, and sent it in spirit to Mr. Oldfield Thomas, who identified it as the newly described *M. surifer*.

Mr. Miller's paper above referred to is a good example of the exceedingly thorough and careful work of the new school of American mammalogists.

A. L. Butler, F. Z. S.
4th July, 1901 Khartoum, Soudan.

Rambong Beetle.

From two localities in Selangor specimens of a common longicorn beetle *Batocera octomaculata* and its grub have been sent, as serious pests destroying the India-rubber tree, Rambong, *Ficus elastica*. The grub over two inches long bores up the stem of the tree, while the beetle itself gnaws the bark, bites off the buds and then proeeeds to demolish the leaves, eating them quite voraciously. The grub is when full grown about two inches and a half long and a quarter of an inch wide, flattened soft and white except for its hard brown chitinous head and the upper surface of the first two segments. Like all longicorn grubs it has no feet. It makes the usual tunnels elliptic in section through the length of the larger boughs and trunk of the tree, and also attacks in the same way *Ficus indica* and the Waringin, *F. Benjamina*, and probably others of our wild figs. It pupates in the tube it has made, and eventually hatches out into a handsome large beetle, one and a half to two inches long, without the antennae. The head is brown, with large eyes and powerful jaws. The antennae, fairly stout, longer than the body, dark brown, and rough with short processes in the lower surface. The thorax, short and broad with a conic thorn on each side, is dark brown with two red crescents in the centre. The elytra three quarters to an inch and a quarter long, oblong, blunt, broadest at the shoulder, dark brown with black shining raised dots in the upper part near the shoulder, smooth below. There are four pair of white spots on the elytra, the uppermost pair small and round, the next larger and more or less oblong sometimes with an extra white spot near the upper edge, the next pair nearly as large, the lowest pair much smaller. The form and size of the spots vary, but appear to be always eight. The scutellum is also white. The under surface of the body is light brown and a broad white stripe runs on each side, from behind the eye to the tail. The legs are powerful, over an inch long, and brown. The beetle feeds during the day, and also moves about at night. It is attracted by light and often flies into the house after dark. Like most longicorn beetles it squeaks loudly when caught and it can also bite severely. The amount of injury a beetle of this kind could

do in a plantation of large sized trees would be very great. Fortunately it is easily caught and very conspicuous, and by abolishing all unnecessary fig trees from the neighbourhood of a plantation and carefully attending to the young plants, the pest out to be easily kept in check.

H. N. R.

In Memoriam

ALLAN MACLEAN SKINNER, C. M. G.

The death of Mr. Skinner will be deeply regretted by all who knew him, and as one of the original members of the Society it is fitting that some special notice of the loss the Society has sustained by his death should appear in the Journal. At the preliminary meeting held on 4th November 1877, it was Mr. Skinner who proposed that the gentlemen present should form themselves into a Society to promote the collection and record of information relating to the Straits Settlements and neighbouring countries. Of those present at the first meeting the majority have died and the Bishop of Singapore and Sarawak, the first President, is the only one still resident in the East.

At a meeting held in February 1878, was exhibited a skeleton map of the Malay Peninsula showing how little was then known of the Native States. Under the personal direction of Mr. Skinner the blank spaces were partially filled in and the first map of the Peninsula was published by the Society.

In the first number of the Journal is a valuable paper by Mr. Skinner on the Geography of the Peninsula, with maps.

In 1883 Mr. Skinner was Vice President and in the Journal published in December 1882, appeared his 'Outline History of the British Connection with Malaya,' a most useful compilation which is reproduced in the Singapore and Straits Directory.

Among his other contributions may be mentioned papers on 'The Java System' and 'Straits Meteorology'. In 1885 Mr. Skinner was elected President. He received the cordial thanks

of the Government for the valuable results of the action of the Society with regard to the publication of 'Eastern Geography,' which he edited.

In 1888 he was again elected President, but from the time of his transfer to Penang in the following year as Resident Councillor, he ceased to take an active part in the work of the Society. Since his retirement in 1897 Mr. Skinner was engaged in writing a History of the Straits Settlements.

C. W. S. K.

Singapore, 17th August, 1901.

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