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A HANDLIST OF  
MALAYSIAN MAMMALS

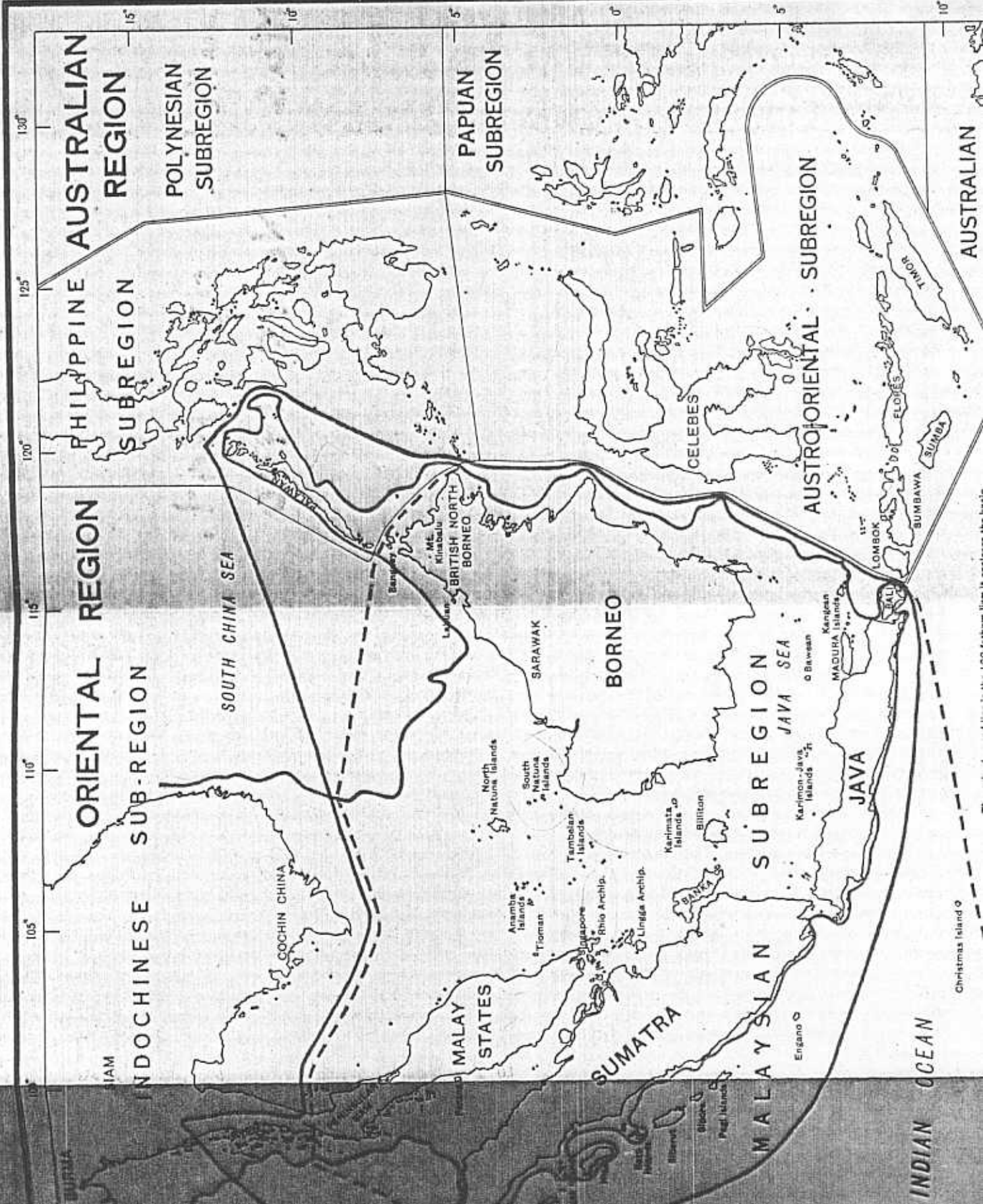
A SYSTEMATIC LIST OF THE MAMMALS OF THE  
MALAY PENINSULA, SUMATRA, BORNEO AND  
JAVA, INCLUDING THE ADJACENT SMALL  
ISLANDS

BY

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## INTRODUCTION.

### I. ZOO-GEOGRAPHICAL.

*Malaysia* is here regarded as a sub-region of the Oriental Region, embracing the Malay Peninsula, Sumatra, Borneo, Java and all the adjacent small islands.

To the faunist this restricted *Malaysia* is more homogeneous than the larger sub-region *Indo-Malaya* of Wallace, within which the Philippines are sharply divided from the Malay Peninsula and Sunda Islands.

Excluding the Palawan group and Sibutu, the Philippine Islands lie outside the 100 fathom line. Their fauna is poor compared with that of *Malaysia*. It lacks many Malaysian genera, but on the other hand includes many peculiar forms.

The exact boundaries of a zoo-geographical zone must always be of an arbitrary nature, and as it is obvious that such a zone is basically physiographical, rather than zoological, it is reasonable to try to fix its natural boundaries with regard to geographical facts and then, as Kloss has observed, to regard as anomalous any zoological features that do not conform, and to seek an explanation for the latter.

A basic, or physiographical *Malaysia* can soon be defined as all land standing on the Sunda Shelf below about Lat. 10° N. It is an area in which the sea-depths are less than one-hundred, and usually less than forty fathoms: it leaps to the eye from a bathymetrical map.

As a zoo-geographical zone of any kind, however, the unmodified Sunda Shelf is not satisfactory and it needs modifications on zoological and geographical grounds, as well as on those of expediency. For instance, on zoological grounds a case can be made out for including Tenasserim to about the latitude of Tavoy in a northern extension on the *western* side of the Peninsula. The Nicobar Islands also have a strong claim to inclusion, but it has been thought expedient to exclude both Tenasserim and the Nicobars. They are fully covered by regional publications dealing with British India, and their inclusion would be undesirable bibliographically; furthermore, I have no collections or detailed knowledge of these areas.

On the other hand the Sunda Shelf includes the Palawan group of islands and Sibutu of which the fauna is strongly Bornean with a conspicuous Philippine element. As these islands are also politically Philippine and fully covered by other publications they are excluded from the present work.

Lastly, entirely on grounds of geographical proximity the Cocos-Keeling Islands, and Christmas Island in the Indian Ocean are included, although the fauna of the former is *Oceanic*, and of the latter, largely *Austro-Oriental*.

GENERAL FEATURES OF THE MALAYSIAN  
MAMMAL FAUNA.

This book is concerned with recent mammals only. For the Malay Peninsula there is little else to record, and teeth of the Pleistocene *Elephas "namadicus"* are the only fossil vertebrate remains I have seen from the Peninsula. In Java, rich Pliocene and Pleistocene mammal faunas with both Indian and Chinese affinities have been discovered and studied (see especially von Koenigswald, Proc. Kon. Akad. Wet. Amsterdam, XXXVIII, 1935, p. 188). A "prehistoric" fauna associated with neolithic man in the Malay Peninsula includes extant forms only, but the collections so far are meagre. The neolithic in the Peninsula probably extended well into the Christian era. In Java, similar but much larger collections have been revealed. The deposits seem to be only three or four thousand years old, but they include the remains of *Cervus eldii* and *Elephas*, neither of which is now found in Java.

The present Malaysian mammal fauna is fairly even, pointing to land connections geologically not remote. Nevertheless, subspecies of varying degrees of distinctness are usually developed on each of the large land-masses.

Broadly speaking the faunas of the Malay States and Sumatra are much alike; those of Java and Borneo are more specialised and different.

The affinities of the extant mammal fauna of Malaysia are largely with the continental Indo-Chinese sub-region, and the Philippine sub-region. Excluding some weak links on the eastern boundary, there is little affinity with the Austro-Oriental sub-region lying on the other side of Wallace's Line.

The fauna is more or less sharply divided at about 3,000 feet, but a small group of submontane forms does not conform. The montane forms may, or may not, be representatives of species occurring in the lowlands. Usually they are not, but sometimes the high-level form seems to be only a *subspecies* of its lowland neighbour, the two being linked by a minority of specimens intermediate in appearance.

Occasionally a close relationship cannot be disputed, but the absence of intermediates, coupled with a greater degree of divergence in appearance than in the case of the subspecies, causes the systematist to hesitate in the use of trinomials, and although the highland and lowland forms are mutually exclusive altitudinally, we speak of *representative species*.

Ignoring all details, the following is a very broad appreciation of the extant mammal fauna. A now purely Sondaic element (predominantly montane); much stronger in Borneo than elsewhere, for this island seems most favourably constituted for

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the retention of old and the production of new animal forms, may or may not be common to all three Sunda Islands.

A much larger association can be regarded as the *Malaysian*, or taking a broader view the *Indo-Malayan* element. The species are often spread over the whole sub-region, but in many cases they are absent from Java.

Northern influences from the Indo-Chinese sub-region are apparent in western and eastern drifts. In the case of some purely continental species of the western drift, the southern limit is on various latitudes in the Malay Peninsula. Montane and lowland forms probably mark older and more recent movements respectively: some species, e.g. *Bos gaurus*, seem to be very recent arrivals. Other Indo-Chinese ("Himalayan") species extend to Sumatra, or even further.

The eastern drift entered by way of Borneo where many of the species stopped; but others went on to Java. A few reached Sumatra and turning to the north along the edge of the Sunda shelf, certain of these eastern forms established themselves on the Mentawi Islands off the west coast of Sumatra.<sup>1</sup> It seems not improbable that even the Malayan fauna has received additions from across the Straits of Malacca.

In the recognition of these two northern influxes, originating at different points, but often including representatives of the same species, I find a feasible explanation of many of the puzzling points raised by the present distribution of mammals in Malaysia.

Eastern and western branches of the same species are always at least subspecifically distinct, and often widely divergent in appearance. The southern limit of each wing is very variable. *Bos sondaicus* for instance only reaches the north of the Malay Peninsula, but in the east it is found in Borneo and Java: it has not spread to the south of the Peninsula, or to Sumatra.

In certain cases the ends of the two streams seem to have mixed, and then we find two "species" differing from each other

1. One of the most interesting zoological specimens I have ever handled is a pale (mostly cream and tawny) aberration of the curious pig-tailed langur, *Simias concolor*, from the deep-water Mentawi Islands, off the west coast of Sumatra. This isolated genus, so unlike any other known monkey genus, with its retroussé nose, short and almost naked tail, dark pelage, and blackened hands and feet has long been a mystery to zoogeographers, but I now see that the aberration reflects the actual colour pattern and colour of the Proboscis monkey of Borneo, *Nasalis larvatus*, which can now be accepted as a direct link between *Simias* and certain eastern Indo-Chinese species. Most of the Mentawi mammal forms are characterised by their very dark colour, and we know that the tail is a very plastic organ in monkeys, but I am sure that few observers confronted with normal skins of *Simias* and *Nasalis* would venture to suggest any close relationship.

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in characters that can be described, although vaguely, as quantitative rather than qualitative, existing side by side on one, or more, of the land masses. Physiological intolerance must here have played a part in perpetuating the differences between the stocks, once so closely related.

It is significant that in such pairs the least widely spread species (maybe it is absent from Java, the separation of which is usually regarded as having taken place earlier than the severance of many other land connections in Sundaland) is usually less common, has developed fewer subspecies, and is less adaptable ecologically, than the commoner, more widely spread form.

I should not, however, in all cases ascribe to the mingling of the two drifts of the Indo-Chinese stream, this very noticeable phenomenon of "pairs", for in some cases it seems more likely that one species may be, for want of a better word, the antediluvian representative of a second form still purely Malaysian in distribution, and possibly of local origin.

In a number of instances a species is commonest on the extreme distal limit of its range, and then there is usually a gap in the distribution, occurring between it and its relatives living nearer to the supposed point of invasion. A somewhat similar condition is presented by some Malaysian birds which occur, mainly, as winter migrants from the north. These species have in a number of cases established breeding resident races on the southern periphery of the specific range.

I am inclined to think that the importance of ancient land connections in accounting for the present distribution of animals has been overstressed by some zoo-geographers of Malaysia. On the Sunda shelf the sea distances are never very great, and having seen the vegetation-covered floating islands, broken away from river banks by floods, going down river past Palembang on the east coast of Sumatra, I am prepared to believe that, on a basis of geological time, there are few things that we cannot assume to have happened in the way of dispersal by currents, wind and adventitious means. There are certainly signs that the relatively narrow seas have not prevented the mingling of the existing faunas where they face each other.

It is still too early to base any analysis of Malaysian faunas on the entire contents of published lists of any given area, for it is certain that these lists still do not fairly represent the facts. Only the well-known species can be used in a serious study, for our knowledge of the others is incomplete. It is only a few years ago that a big pig was added to the list of Malayan mammals; within a few years a curious murine genus described



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from a small island off the west coast of Sumatra was demonstrated to occur on all four Malaysian land masses; only last year I described a new bat from Java and had to refer it to a South Indian genus; it is not very long since *Rhinoceros sondaicus* was revealed in Sumatra; and recent collections from the mountains of North Sumatra contain a striking and entirely new species of rat as well as specimens extending the range of other Malaysian forms. Our knowledge of the bats, insectivores, and small rodents is, assuredly, still far from complete and the observations in the following pages exclude consideration of these groups.

It has always seemed to me that another factor of prime importance in distribution is the presence or absence of the urge to spread. Migratory birds will follow ancient but obliterated coast lines and even on continuous land surfaces Malaysia presents many instances of mammal species which will not pass a certain line although to human eyes the habitat on both sides seems ecologically quite similar. Sometimes the narrowest strip of water seems to inhibit the passage of even birds, more completely than apparently far more formidable boundaries in other cases.

\* \* \*

It is convenient to recognise four *Provinces* in Malaysia, and although this arrangement is largely natural, that is to say, in close agreement with both zoological and geographical facts, and provides a simple arrangement, it is not altogether satisfactory in that the four provinces are certainly not equal in value.

### THE MALAYAN PROVINCE.<sup>1</sup>

*The Malay Peninsula; the small islands close to both its coasts; the Anamba and Tambelan Islands in the South China Sea.*

The northern boundary of this province, and consequently that of the sub-region is here regarded as Lat. 10° N. which is at the narrowest part of the Isthmus of Kra. Any further extension embraces territory within the political limits of British India. The adopted dividing line is, furthermore, not unnatural,

<sup>1</sup>. Basic literature of the Malayan Province.—Kloss, Journ. F. M. S. Mus. II, 1908, p. 147 (a list); *id.* p. 151 (list of bats); *id.*, Journ. Strs. Br. R. A. Soc., No. 53, 1909, p. 1 (primates, carnivores and ungulates); and very many short papers, mostly by Robinson and Kloss, in Journ. F. M. S. Mus. I-X, 1905-22 wherein the mammal faunas of most of the Malayan coastal islands are discussed, the most important being III, 1908, p. 101 (Tioman group), IV, 1911, p. 175 (Trengganu Arch.), and V, 1915, p. 128 (islands in the Bandon Bight). For the Anamba Islands see Chas. and Kloss, Journ. Malay. Br. Roy. Asiat. Soc. pt. 3, 1928, p. 28.

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for although on the west coast along the region of the heavier rainfall and evergreen forests Malaysian species often extend through Tenasserim to about the latitude of Tavoy, the Pakchan Estuary seems to constitute a real faunal boundary for many birds and mammals, especially on the east coast. A herpetologist would draw the southern line of his Indo-Chinese fauna at about Lat. 12° N. for by raising it from 10° N. about a dozen Malaysian species of amphibians and reptiles are excluded.<sup>2</sup> A botanist suggests that the division should be at about the latitude of Singora in Peninsular Thailand, and that an intermediate area more Indo-Chinese than Malayan lies between Lat. 7° N. and 10° N.<sup>3</sup> Little is known of the mammals of the high mountain range between Tenasserim and Thailand.

The distinctness of the mountain faunas throughout Malaysia has already been mentioned above. In the Malay Peninsula, as elsewhere, the dividing line is at about 3,000 ft. A Himalayan element (*e.g.* *Rattus bowersi*, *Tamiops*, *Dremomys rufigenis*, *Sciurus erythraeus*) is the dominant feature of the high-levels in Perak, Pahang and Selangor, but it fades out in the south, and is absent in Negri Sembilan and on the Johore hills; it is also weak on the isolated summit of Kedah Peak in the north.

Occasionally the mountain species are differentiated into northern and southern forms (*e.g.* *Sciurus tenuis*).

In the lowlands some true Malaysian species (*e.g.* *Sciurus notatus*, *Sciurus hippurus* and *Rhinosciurus tupaiodes*), on the eastern side of the Peninsula, are very near their northern limit in the Thai province of Bandon, but on the west coast this fauna extends further to the north.

In the lowlands the fauna is not homogeneous for certain continental species occur in the north but not in the south (*e.g.* *Menetes berdmorei*, *Macaca speciosa*); on the other hand many Malaysian forms are found only in the southern two-thirds of the Peninsula.

Subspecific variation is basically latitudinal, which is interesting in view of the fact that the main physical feature of the Peninsula is a high range of mountains running north and south, like a backbone, down the Peninsula. Many species widely spread in the Peninsula can be separated into northern and southern races, and in some species more than two subspecies can be recognized. In these cases there is usually, but not

<sup>2</sup> See Malcolm Smith, Faun. Brit. Ind., Reptiles and Amphibia, I, 1931, p. 13.

<sup>3</sup> Ridley, Journ. Strs. Br. Roy. Asiat. Soc. 59, 1911, p. 55.

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always, a third form in the extreme south. This southern area is also marked by the absence of some otherwise common Malayan mammals (e.g. *Sciurus prevostii*, *Sciurus concolor*).

Most of the subspecies are solely Malayan, i.e. restricted to the Peninsula, but these are usually very like other forms found in East Sumatra and Borneo. No Malayan form could be called strikingly distinct from all its extralimital neighbours: *Pithecus obscurus* is, perhaps, the most distinct. Further, if the arrangement in the following pages is accepted, the Peninsula has no peculiar genus, or species.

It is true that I have regarded *Pithecus obscurus* as a species, but I am not very familiar with the Indian langurs, and I suspect that *obscurus* is merely the southern representative of the continental *barbei*.

In the Peninsula are found a number of species not found elsewhere in Malaysia. All are immigrants from the north (e.g. *Bos gaurus*, *Rattus bowersi*, *Rhizomys pruinosus*, *Dremomys rufigenis*, *Sciurus erythraeus*, *Sciurus caniceps*, *Viverra megaspila*, *Viverra zibetha*, *Macacus speciosa*). Two genera (*Menetes* and *Tamiops*) are in the same category. All the foregoing are unaltered or altered southern forms of more northern mammals. Their extreme southern limit is variable: *Viverra zibetha* occurs as far south as Singapore.

The faunal convergence at the extremities of the Ceylon-Burma-Malayan-arc is as well known as are the several theories put forward to account for the phenomenon.

The coastal islands of the Peninsula are usually inhabited by subspecies slightly differentiated from those of the opposite mainland. In most cases those found on the east coast islands are more distinct than those on the west. The finding of the rare, montane insectivore *Hylomys* on Tioman was unexpected, but otherwise the mammal faunas of all these small islands present no anomalous feature: the forms have obviously been derived from the nearest mainland, or neighbouring small islands. In the Tioman group an affinity with the nearer islands of the Rhio Archipelago is noticeable.

In the Anamba Islands the mammals are only rarely inseparable from those of the mainland; the faunal affinities are with the Malay Peninsula rather than with the neighbouring North Natuna Islands. The Tambelan Islands between Singapore and Borneo, and situated nearer to the latter, have an impoverished fauna of no special interest beyond the presence of insular races of *Sciurus prevosti* indicating affinity with some other small island groups in the South China Sea rather than with the Malay Peninsula.

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### THE SUMATRAN PROVINCE.<sup>1</sup>

Sumatra and the shallow water islands off its east coast with which the islands of the Rhio and Lingga Archipelagos are intimately related. The large islands of Banca and Billiton. The chain of islands off the west coast of Sumatra, the most important of which, from north to south are Simalur, the Banjak Islands, Nias, the Batu Islands, the Mentawi Islands (Siberut, Sipora, and the Pagi Islands), and Engano.

The mammal fauna of the main island of Sumatra is closely allied to that of the Malay Peninsula. Some of the continental forms are missing (e.g. *Bos gaurus*, *Rattus bowersi*, *Tamias*, *Sciurus caniceps*), but others, absent from Borneo and Java, are shared with the Peninsula (e.g. *Tapirus*, *Capricornis*, *Aetherus*, *Hylobates symphalangus*). On the other hand Sumatra and Borneo have in common a Sondaic element lacking on the continent (e.g. *Tupaia tana*, *Hystrix crassispinis*, *Sciurus albescens*, *Simia satyrus*, *Tarsius*). In this connection the islands of Banca and Billiton are demonstrable links between the two larger islands, although even on the former, so close to the coast of Sumatra, there is a Bornean species, *Tupaia gracilis*, not yet found in Sumatra. An isolated Java-Sumatran element is barely demonstrable although the murine genus *Mycteromys* as yet has been found on these two islands only.

There is, however, in Sumatra a peculiar hare, *Nesolagus netscheri*, not found elsewhere, and with its nearest allies in the foot-hills of the Himalayas (north-east).

A strong faunal boundary that cleaves the island from north to south is the Barisan Range, a depression in which, at Lat. 1° 30' N. (Padang Sidempuan), also seems to act as a faunal boundary. There is much specific variation among Sumatran mammals. A main racial division is north against south, but often the forms on the alluvial flats of the east coast differ from those inhabiting the older land west of the mountains. Northern forms may approximate to, or be inseparable from, Malayan races.

The low-lying islands on the east coast of Sumatra call for no special remark. The maze of small islands known as the Rhio-Lingga Archipelago has a mammal fauna poor in species, but extraordinarily rich in subspecies. The species are those

1. The basic literature for this province is, or is summarized in, the following papers.—Rob. and Kloss, Journ. F. M. S. Mus. VIII, pt. 2, 1918, p. 1 (Sumatra); Lyon, Proc. U. S. Nat. Mus. 52, 1916, p. 437, and Chas. and Kl., P. Z. S. 1928, p. 53 (West Sumatran Islands); Dammerman, Treubia, VII, 1924, p. 281 (Rhio-Lingga Arch.); and Sody, Temminckia, II, 1937, p. 221 (Banka).

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common to the south of the Malay Peninsula and the lowlands of Central-East Sumatra, but the Sumatran affinity is the stronger of the two.

The islands of the West Sumatran chain are of special interest, for they contain many well-marked forms. In their faunas these islands vary much among themselves, and sometimes from Sumatra. There is no proof that the island chain ever formed one land-mass, or that all the islands were ever joined to Sumatra. The archipelago cannot be treated as an entity, and there is reason for regarding the deeper water islands (Simalur, the Mentawi Islands and Engano), as forming a zoogeographical province, small in area, but equal in value to any of the four other provinces here adopted. The subspecies on the islands within the forty-fathom line, the Batu and Banjak Islands, are not so distinct as those on the deeper water islands; and neither are the forms on the medium-water island of Nias so well marked as in the Mentawi Islands. These latter islands have a most interesting mammal fauna which includes a curious genus of leaf-monkeys (*Simias*), a remarkably distinct gibbon, a very distinct langur (*Pithecus potenziani*), and other striking forms.

### THE BORNEAN PROVINCE.<sup>1</sup>

*Borneo and its coastal islands, the most important of which are Labuan, and Mantanani off the north-west coast; Maratua off the east coast; and Pulau Laut off the south-east corner. The North Bornean Islands of Banguey, Balambangan and Mallewallé; the North and South Natuna Islands; the Karimata Islands.*

The outstanding feature of the mammal fauna of Borneo is that it is far more specialised than that of any other Malaysian province. Neither in the mountains nor in the lowlands is the fauna even, and there are several obvious faunal boundaries in the island. One of these is formed by the high mountain ranges of the interior, the general strike of which is in a north-east and south-west direction. In some species a race found east and south of the mountains is separable from another found, broadly speaking, in Sarawak. In some other cases, races are

1. Basic literature for this province from the systematic view-point can be obtained by reference to Lyon, Proc. U. S. Nat. Mus. 40, 1911, p. 53 (South Borneo); Gyld., Kungl. Sv. Vet. Akad. Handl. 60, 1919, p. 1 (a list); Chas. and Kl., Bull. Mus. 6, 1931, p. 1 (North Borneo and islands); Banks, Journ. Mal. Br. Roy. Asiat. Soc. IX, 1931, p. 1 (Borneo, general); Chas., Bull. Raff. Mus. 10, 1935, p. 5 (Natunas); Chas., Treubia, XV, 1935, p. 1 (Karimata Islands).

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distributed approximately as above, but meet on the northern coast (north-western) in the neighbourhood of Baram where there is an important faunal boundary. Sometimes a purely northern race has a limited distribution extending only from the barrier last mentioned across the territory of British North Borneo and a short way down the east coast.

Within the major divisions given above, limited areas in the lowlands of south, and west Borneo also tend to produce subspecies. Sometimes certain rivers running west and east act as boundaries for subspecies. Turning to the mountains we find that the great massif of Kinabalu in the north has its own peculiar forms, and it shares others with certain other high peaks: among these latter there are signs of independent specialisation on Mt. Dulit in North Sarawak. A few montane forms occur also on the isolated peaks of Poi and Penrissen in the north-west corner of the island: the form is usually that found on the northern mountains but, rarely, distinctive subspecies have developed.

Noteworthy among the Bornean mammals are species of Indo-Chinese origin. These may (*Helictis*, *Bos sondaicus*), or may not (*Nasalis*, *Dremomys*, *Dendrogale*) reach Java.

Borneo has a large number of mammal forms not found elsewhere: it is my belief that a majority of these is of local origin. A small element is shared with the Philippines (e.g. *Nannosciurus exilis*). Species common to Borneo and Sumatra are relics (*Tarsier*, *Simia*), or purely Sondaic (*Sciurus albenscens*). A few forms are common to all three Sunda Islands (e.g. *Rattus infralutens*, *Mydaus*, *Pithecus aygula*).

The coastal islands of Borneo have their own subspecies in a number of cases, but these are never more than slightly differentiated from those of the mainland.

The mammal fauna of the Karimata islands seems to be Bornean in origin, but the local subspecies are sometimes very well marked.

Although closely associated in name the North and South Natuna Islands have little in common faunistically. The southern group is essentially Bornean in its affinities, a relationship primarily indicated by the presence of *Tarsius* and *Tupaia tana* on Sirhassen Island, and emphasised by the facies of the local forms of *Ratufa affinis* and the two *Tragulus*.

The northern islands are also linked to Borneo by *Mydaus* which occurs in both places, but in general the subspecies of Bunguran are dissimilar to those inhabiting the nearest Bornean mainland. In a number of cases they bear a strong resemblance to the races on Bintang Island in the Rhio Archipelago.

THE JAVAN PROVINCE.<sup>1</sup>

Java with Madura; Bali. Many small islands in the Java Sea, the most important of which are the Thousand Islands; the Watcher Islands off Batavia; the Karimon-Java Islands; Bawean; the Kangean Islands, including Raas and Sapudi; various small islands between Bali and Borneo, the most important of which are Arends, Solombo, Kalambau, and Mata Siri. Christmas Island in the Indian Ocean. The Cocos-Keeling Islands.

The mammal fauna of Java is poorer than that of the two other Sunda Islands, a circumstance perhaps due to the small area of the land. In almost all cases a Javan subspecies can be recognised; sometimes the local forms are not strikingly different from subspecies found in other parts of Malaysia, but in other cases they are widely divergent.

The broad basis of subspecific variation is longitudinal, and several of the species are represented by western and eastern races. Owing to lack of material I cannot venture an independent opinion on the validity of a number of forms recently described from Java. According to one estimation no less than six races of *Sciurus notatus* are found on the island, and a number of species are represented by three races. Mr. H. J. V. Sody has postulated an area of racial differentiation in the centre of the north coast where "sub-insular status" is suggested for Mt. Moeriah.

The majority of the Javan forms are representatives of more widely spread Malaysian species mostly occurring on all four land masses, but sometimes with a more restricted range. Some of these latter, not occurring in Borneo, are members of the western drift from the continent by way of Sumatra (e.g. *Sus cristatus*, *Felis tigris*, *Cuon javanicus*).

On the other hand, Java shares with Borneo *Bos sondaicus* and *Helictus*, genera not found in Sumatra or the Malay States: no doubt they reached Java from Indo-China by the eastern drift, another member of which, *Pithecus aygula*, went on to Sumatra. Of the purely Sondaic forms some are shared with the two other Sunda Islands (e.g. *Mydaus*, *Rattus infraluteus*, *Nannosciurus melanotis*); or with Sumatra alone (e.g. *Tupaia javanicus*). The Malaysian status of both the species (*Herpestes javanicus*, *Felis pardus*) common to the Malay Peninsula and Java, but not found in the other Sunda Islands, is doubtful. In the case of

<sup>1</sup> Basic literature for the Javan Province. Java.—A series of papers (incomplete, 1940) started by Dammerman in Treubia, XIII, 1931, p. 429; Dammerman, Treubia, XI, 1929, p. 1 (a list); Sody, Tectona, XXXI, 1938, p. 741 (a list). Bali.—Sody, Natuur. Tijdschr. Ned. Ind. XCIII, 1933, p. 56.

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the leopard I am still a little doubtful as to whether it is rightly omitted from the Sumatran list. Four striking forms are found in Java and not elsewhere in Malaysia. Of these, *Lepus nigricollis* is almost certainly an introduction; and the status of *Felis viverrina* is not above suspicion. *Sus verrucosus* and *Mustela lutreolina* are endemic Javan forms. The former I regard as a western outlier of a more eastern group; the latter is likely to be overlooked and it will probably turn up elsewhere in Malaysia. The mammal fauna of West Java is richer than that of the East.

Slightly marked subspecies of some common Malaysian forms are found on various small islands in the Java sea. Bali too has a few insular subspecies, and on Bawean Island lives the small deer *Cervus kuhlii*, a form of which my knowledge is very superficial.

The fauna of Christmas Island in the Indian Ocean is highly specialised. The indigenous birds are Austro-Oriental in their affinities, but the mammals also reflect a Malaysian influence. The mammal fauna of the Cocos-Keeling Islands consists of introduced, and adventitiously occurring Malaysian and Christmas Island forms.

## II. ARRANGEMENT, ETC.

This handlist is based primarily on an examination of specimens, and to a much lesser degree on literature. In addition to the collections in the Raffles Museum much of the relevant material in the museums of London, Leyden, Buitenzorg and Kuching has been examined, as well as important specimens in some other museums in Europe. Unfortunately I have not yet been able to visit the United States National Museum wherein are important Malaysian collections.

The synonymy is purely regional, and excludes extralimital synonyms. The majority of the references have been checked in the original publication, but the library in Singapore although fair is far from complete, and often I have had to obtain a reference from a secondary source, in which case I have tried to avoid the works of mere copiers. A number of *nomina nuda* have been excluded as they never seem to have crept into literature. Almost needless to say, Sherborn's "*Index Animalium*" has been of the greatest use.

I regret that the index is so brief. I should have liked to provide a full index as in my "Handlist of Birds", but towards the end of the work the need to economise arose.

In the method of spelling place names I have, at times, been inconsistent and in the case of small places in Netherlands India I have often followed the Dutch system. There would,



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for instance, have been little point in anglicising the numerous names I have mentioned in my excursus on *Pithecius*, for some of these localities are not marked on any English map known to me. The new Dutch "Atlas van Tropisch Nederland" (1938) is indispensable to a zoologist in Malaysia.

The references given in the footnotes are often merely suggestive. At times they may seem, at first glance, relatively unimportant, but it will be found that they usually quote the essential literature on the group, or region.

An asterisk in front of the name means that topotypes have not been examined. In the great majority of cases these forms have been accepted. They are mostly based on islands off the west coast of Sumatra (excluding the Mentawi Islands).

In this list a very broad view of a "species" is taken and there is an extensive linking of geographical races and representatives in the German fashion. *Species* is here used in the *formenkreise* sense. Many of the combinations adopted are novel. In the matter of genera I have been very conservative and have "lumped" extensively.

In any attempt at the reduction of genera the factor of colour-pattern should surely not be ignored, for it seems to be a deep-seated character; but if this factor is superimposed on the divisions already proposed, based on anatomical differences, the result among mammals and birds is almost invariably monotypic genera. In the few cases in which groups of species have emerged (but far more usually "pairs" emerge) from such detailed treatment, a good case can usually be made out for considering one to be a more recent arrival on the territory of another.

In Malaysia the mammals have been much more plastic than the birds, and in some cases the species are so broken up that a list of the subspecies is little more than a list of the small islands on which the species is found. In many cases small islands with an avifauna showing little or no differentiation from that of the nearest large land-mass, have developed a number of very distinctive mammal races. Among the maze of islands just south of Singapore known as the Rhio-Lingga Archipelago are scattered nine forms of *Tragulus javanicus*, some very distinctive in appearance. For instance, on Bulan Island is a pale rufous animal, brightest on the nape, and with a bold yellowish rufous colour-pattern on a white throat. Less than twenty-five miles away, Kundur Island is inhabited by a much darker form in which the neck is almost solidly black!

Throughout Malaysia the small islands show a relatively greater tendency to produce subspecies than do the large land-masses. On the former the biological discipline seems less severe and variation is perpetuated; on the latter it is absorbed.

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Some collectors still use alcohol or formalin as an initial preservative for mammal skins in the field, but material so preserved is useless for critical colour comparison. Often the colours are not changed, but sometimes they are, and then unfortunately in a subtle manner that produces a "natural" result. Monkey skins dried from such preservatives are not infrequently slighter paler than they should be, and squirrels and tree-shrews tend to become deeper brown on the back. Deep chestnut parts of the pelage are altered in the direction of maroon; but kindred colours paler than chestnut may be bleached. Some collectors have maintained that colour is not affected by alcohol, but when collections are submitted to me for examination I find that I can usually pick out the skins that have suffered immersion, and in consequence submit that a note recording such treatment should always be added to labels.

The descriptions of thirty-nine new forms appear in the following pages.—*Tupaia glis cognata* (p. 9), *Tupaia glis umbratilis* (p. 9), *Hylomys suillus tionis* (p. 12), *Talpa klossi malayana* (p. 13), *Megaderma spasma abditum* (p. 35), *Megaderma spasma kinabalu* (p. 35), *Rhinolophus philippinensis sanborni* (p. 39), *Hipposideros diadema natunensis* (p. 43), *Tylonycteris malayana* (p. 52), *Eptesicus verecundus* (p. 53), *Kerivoula papillosa malayana* (p. 55), *Pithecus femoralis paenulatus* (p. 75), *Pithecus femoralis fluviatilis* (p. 76), *Pithecus obscurus seimundi* (p. 80), *Nasalis larvatus orientalis* (p. 84), *Tarsius tarsier natunensis* (p. 86), *Petaurista petaurista stellaris* (p. 113), *Iomys horsfieldii penangensis* (p. 115), *Hylopetes sagitta sipora* (p. 117), *Sciurus prevostii baramensis* (p. 131), *Sciurus nigrovittatus venetus* (p. 139), *Rattus rattus robinsoni* (p. 154), *Rattus rattus perhentianus* (p. 155), *Rattus rattus pemanggis* (p. 156), *Rattus mülleri credulus* (p. 162), *Rattus sabanus dictatorius* (p. 165), *Rattus sabanus salanga* (p. 166), *Rattus surifer puket* (p. 169), *Rattus surifer telibon* (p. 170), *Rattus surifer muntia* (p. 170), *Rattus surifer pidonis* (p. 171), *Rattus surifer natunae* (p. 173), *Rattus rapit cameroni* (p. 176), *Rattus whiteheadi piratae* (p. 181), *Rattus whiteheadi subitus* (p. 182), *Tragulus javanicus hendersoni* (p. 196), *Tragulus kanchil insularis* (p. 198), *Tragulus kanchil pidonis* (p. 198), and *Tragulus kanchil pumilus* (p. 199).

### III. ACKNOWLEDGEMENTS.

\*I cannot conclude this introduction without acknowledging my indebtedness to my former chief and predecessor, Mr. C. Boden Kloss, who first introduced me to the study of systematic mammalogy. Together with the late H. C. Robinson he is

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responsible for the accumulation of a large part of the unrivalled collections now under my charge in the Raffles Museum.

Mr. E. Banks, Curator of the Sarawak Museum is always a most helpful colleague. He invariably places the State collections at my disposal in a most generous manner, and by doing so has brought us much nearer to an exact appreciation of Bornean mammals.

The officials in charge of the Zoological Museum at Buitenzorg in Java have been equally helpful, formerly Dr. K. W. Dammerman, and latterly the present custodian, Mr. M. A. Lieftinck. The close but quite unofficial relations existing between this group of three museums working under entirely distinct administrations is a pleasing feature of museum life in the East.

In London, Mr. F. C. Sawyer and Dr. C. D. Sherborn have kindly checked some references for me.

F. N. CHASEN.

SINGAPORE, April, 1940.

1. When he retired from service in the East in 1926 the late H. C. Robinson took to Europe part of the local collection of mammals with the intention of using it as a basis for a book on Malayan mammals, but he died soon after and the material passed to the British Museum. As workers in Europe are beginning to use this collection a few words about it will not be out of place.

The skins taken to London represent only a part, and by no means the largest or most important part, of the collections once housed in the museum at Kuala Lumpur, Federated Malay States. The bulk of those collections, together with the Raffles Museum material remains under my charge in Singapore. It is, therefore, incorrect to assume that any published opinion, or observation by Robinson, Boden Kloss, or myself is based solely on the skins now in London, for in most cases much more extensive material has been studied. For instance, in Mr. R. I. Pocock's 1934 review of *Pithecus pyrrhus* it is quite wrongly assumed that Kloss' published remarks are based entirely on the series now in London.

Unless the labels on the skins specifically quote the collectors the identity of the latter should never be assumed. In too many cases to mention in particular, Robinson and Kloss have now in published papers been given the responsibility of measurements never taken by them, and of collecting in localities they never visited.

While on the question of measurements it should be mentioned that the method of taking them was not identical over the long period of years during which the collections were formed, and the detail of the individual labels should always be observed. When I worked with Kloss he always took the total length and tail measurements in the field. In working out the collections later it was always easy to subtract the last named measurement to get the figure for the head and body. This method leaves less room for error than does Robinson's early practice of taking two separate measurements for head and body, and tail, in the field.

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Few collections could have been more carefully labelled than were the skins in question, but most unfortunately some of the later collected skins had only field labels and these labels, plus some of the others now greasy or faded, are giving a lot of trouble. The localities are being published often without reference to a map and some of the errors of transcription are so grievous that they are almost unrecognisable even to readers familiar with the ground.

A further point occurs in connection with the citation of localities. In a number of cases a recent author has been at pains to correct the cardinal points to which museum workers in the East have referred localities in Siam. This is quite unnecessary as the directions as originally given are in accordance with the zoo-geographical divisions described in detail, with a map, in Kloss' well-known paper (Journ. Nat. Hist. Soc. Siam, I, 1915, p. 250).

Family RHINOCEROTIDÆ.

Genus RHINOCEROS Linn. 1758

**Rhinoceros sondaicus** Desmar. Javan, or One-horned Rhinoceros.

*Rhinoceros sondaicus* A. G. Desmarest, Ency. Méth. (Mamm.), II, 1822, p. 399: Java.

*Rhinoceros javanicus* F. Cuv., Hist. Nat. Mamm. IV. livr. 45, 1824, pl. 309: Java (n.v.).

*Rhinoceros inermis* Less., N. Tab. Règne Anim. 1842, p. 159: (n. n. fide Sherb.).

*Rhinoceros nasalis* Gray, Proc. Zool. Soc. 1867, p. 1015: "Sumatra".  
*Distr.*—Malay States; Sumatra; Java.

**Rhinoceros sumatrensis**.<sup>1</sup> Sumatran, or Two-horned Rhinoceros.

*Rhinoceros sumatrensis sumatrensis* Fisch.

*Rhinoceros sumatrensis* G. Fischer, Zoogn. ed. 3, III, 1814, p. 301: Sumatra. Ref. fide Sherborn.

*Ceratorhinus niger* Gray, Ann. Mag. Nat. Hist. (4), XI, 1873, p. 357: Malay Peninsula (not *R. niger* Schinz, 1845).

*Distr.*—Malay Peninsula; Sumatra; Borneo.

Family TAPIRIDÆ.

Genus TAPIRUS Brisson, 1762.

**Tapirus indicus** Desmar.<sup>2</sup> Malay Tapir.

*Tapirus indicus* A. G. Desmarest, Ency. Méth. (Mamm.) II, 1822, p. 410: Malay Peninsula.

*Tapirus sumatranus* Gray, Med. Repository, 1821: Sumatra (n. v.).

*Tapirus malayanus* Raffles, Trans. Linn. Soc. XIII, 1821, p. 270: Malacca.

*Tapirus bicolor* Wagner, in Schreber, Säugth. VI, 1835, p. 400: Malacca.

*Distr.*—Malay Peninsula; Sumatra.

<sup>1</sup> *Rhinoceros sumatrensis* is the genotype of *Dicerorhinus* Gloger, 1841. A larger, northern race is certainly distinct (*lasiootis*), but on the limited material I have seen I cannot divide *sumatrensis* as defined above. If a Malayan form proves separable from a Sunda Island race, *R. blythi* Gray, 1873 (Tenasserim) is available. At one time a single rhinoceros of unknown species was well-known to be on the small island of Abang Besar in the Rhio Archipelago. Kloss gave me this information.

<sup>2</sup> *Tapirus indicus*. Genotype of *Acrocodia* Goldman, 1913.