The Distribution of Mammals and Birds in the South China Sea and West Sumatran Islands

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That part of the South China Sea between Malaya, Sumatra and Borneo is beset with islands, large and small, deep water and shoal.

The Riau Islands are sometimes large and high, in shallow water ten to fifteen fathoms deep, five to ten miles from Singapore. Batam Island covers 120 square miles, Bintang 325 square miles. Karimon Island is 1,500 feet and Durian 1,000 feet high. Other large high islands lie in ten to fifteen fathoms, within ten miles of Sumatra's east coast. Lingga covers 240 square miles and is nearly 4,000 feet high, Singkep 220 square miles and 1,500 feet high, Banka 2,800 square miles and 2,300 feet high. Billiton is half way between Sumatra and Borneo, still in ten to fifteen fathoms covering 1,600 square miles and 1,700 feet high. Bunguran Island in the North Natuna group, far out to sea between Malaya and Borneo, lies in thirty-five to forty fathoms, covers 100 square miles and rises to 3,000 feet. These are islands large enough for any animals. None have the highland fauna found above 3,000 feet on Malaysian mountain tops.

The Karimata, Tambelan and South Natuna island groups include many small islands, none of which cover more than ten square miles. All lie close to Borneo's west coast, in ten to fifteen fathoms and a few reach 1,000 feet in height. Many of the small Anamba islands, lying in twenty-five to thirty fathoms, far out to sea between Malaya and Borneo cover twenty-five to thirty square miles and rise to 1,800 feet.

These islands are the tops of submerged mountain chains, tectonically continuous with ranges in Malaya and Borneo. Billiton, Banka, Lingga and Karimon and Kunder Islands in the Riau group are continuations of Malaya's main range. Singkep and Batam Islands join the Gunong Tahan range and Bintang Island in the Riau group is a relic of the east coast range. Similarly the Anamba and Tambelan Islands join the Schwaner mountains in west Borneo, the North and South Natuna Islands join up with the Muller Mountains in Central Borneo.

Pleistocene glaciations have thrice dried out the shallow South China Sea, at the most to a depth of forty fathoms. The islands were then joined together and to Malaya, Sumatra and Borneo by Sundaland. This great plain was divided into two by the Great Sunda River, rising between Billiton and Borneo and running north east between the North and the South Natuna Islands. This now drowned river bed can still be traced on the charts. Inter-glacial floodings have separated the islands several times. Higher relative sea levels than at the present time have submerged low, shallow water islands and cut up some of the larger ones.

Off the west coast of Sumatra lie eight island groups. Simalur Island furthest north lies in about 200 fathoms, covers 500 square miles and is 1,800 feet high. The Banyak Islands are small, and lie in thirty-five fathoms, the largest covering only twenty square miles but rising to 1,000 feet high. Nias lies in 100 fathoms, more or less, covers 1,200 square miles and is 2,600 feet high. The small Batu Islands lie in thirty-five fathoms, the larger islands covering twenty square miles and rising to 800 feet. Siberut, Sipora

and Pagi, lying in just over 100 fathoms and known as the Mentawi Islands, cover 600 to 700 square miles each and rise to 1,000 feet. Engano lies alone in nearly 500 fathoms with an area of about 200 square miles.

The Banyak and the Batu Islands lie each on a different submarine bank connected with Sumatra's west coast. It may be that Nias is almost joined to the Banyak Islands and Siberut to the Batu Islands: it is not clear from the soundings.

Tectonically, these islands are the tops of a submerged mountain range, continuous with the Andaman and the Nicobar Islands to the north and with Sumba and Timor to the east.

The distribution of all but the peculiar species of mammals is given in TABLE A.

Let us suppose Banyak, Nias and Batu Islands were connected with Sumatra's west coast. Interglacial flooding impoverished the Banyak and Batu Islands: seven Sumatran species were relict on the deeper water Nias Island (Nos. 1 to 7). In the next glacial, the Batu Islands re-emerged and received seven species at first (Nos. 8 to 14). Later the Banyak Islands re-emerged and with the Batu Islands received another seventeen species, (Nos. 15 to 31) including three which already lived on Nias (Nos. 21, 22 and 31).

In the South China Sea Islands twelve species of mammals are found in the majority of the island groups from east to west (Nos. 9 and 19 to 29). With two exceptions they are not found in Nias but are present in the Banyak and Batu Islands. Thirteen mammals are found in the Riau, Banka and Billiton and in the Anamba and North Natuna groups (Nos. 5 to 18). They do not reach the shallow water South Natuna, Tambelan and Karimata groups, east of the Great Sunda River. Malayan *Ratufa bicolor* and *Sus cristatus* reach the North Natunas but not Borneo: Bornean *Tarsius* and *Ptilocercus* reach the South Natunas but not Malaya. Nine mammals have a uniform distribution in the majority of the shallow water islands east and west but are absent from the deeper water Anamba and North Natuna Islands (Nos. 30 to 38). With two exceptions they are absent from the Banyak and Batu Islands in the same depth of water.

When Sundaland dried out to its maximum in the severest glacial period, the mammals went to all the present South China Sea islands, unless stopped by the Great Sunda River. They seem to have gone to the Batu Islands and sometimes to the Banyak Islands but not to Nias. When Sundaland was less dried out in milder glacials, mammals went to the shallower water islands in the South China Sea but to the deeper water Anamba, North Natuna, Banyak and Batu Islands not at all.

If you collect lowland birds in the Malay Peninsula, forty-six are not found in Malacca or Johore. They are subhighland and their distribution ends with the main range in Selangor. If you collect lowland birds in Sumatra, twenty-six are absent from that part north of Padang Sidempuan in Lat. 1° 30′ N. Here in young Miocene times an arm of the sea is said to have separated north and south Sumatra. If you collect lowlands birds in Borneo, twenty-seven are not found north of the fourth parallel. North Borneo is almost separated from the rest by the tributaries of the Padas river to the west and the basin of the Sembakong river to the east. If you collect lowland birds in Java, forty-two are found in the west and centre but not in the east. The dividing line is the low lying plain between Semarang and Djokjarkata in 110° E. Another fifty-five species are found in Malaya, Sumatra and Borneo but are absent from Java.

These *Half-Siders* (half-Malayan or half-Sumatran or half-Bornean of half-Javan or non-Javan) are not as a rule found in the Philippines or in the Lesser Sunda islands. When found at all in the South China Sea islands or in the West Sumatran islands, they are found in one quarter or less of the sixteen possible island groups (TABLE B, Nos. 1

Table A

	Simalur	Banyak	Nias	Batu	Mentawi Is	Riau Is	Banka	Billiton	Anamba Is	North Natuna	South Natuna	Tambelan Is	Karimata Is
1. *Felis bengalensis*	.	.	X	.	.	R	.	.	.	.	.	.	.
2. *Arctictis binturong*	.	.	R	.	.	X	R	.	.	.	.	.	.
3. *Cervus unicolor*	.	.	R	.	.	.	X	X	.	.	.	.	.
4. *Muntiacus muntjac*	.	.	R	.	.	X	X	X	.	.	.	.	.
5. *Rattus concolor*	X	.	R	.	.	X	.	X	X	X	.	.	.
6. *Rattus cremoriventer*	.	.	R	.	.	.	[R]	[R]	R	.	.	.	.
7. *Manis javanica*	.	.	X	.	.	X	X	X	.	X	.	.	.
8. *Hylopetes sagitta*	.	.	.	.	R	R	R	.	.	R	.	.	.
9. *Sciurus lowii*	.	.	.	2R	R	R	.	.	.	[R]	[R]	.	.
10. *Petaurista petaurista*	.	.	.	R	.	R	.	.	.	R	.	.	.
11. *Tupia glis*	.	.	.	2R	R	4R	R	.	3R	R	.	.	.
12. *Arctogale trivirgata*	.	.	.	X	R	4R	R	.	3R	R	.	.	.
13. *Pithecus femoralis*	.	.	.	X	.	2R	.	.	.	R	.	.	.
14. *Lariscus insignis*	.	.	.	R	R	R	.	.	.	R	.	.	.
15. *Sciurus tenuis*	.	2R	.	R	.	X	.	.	R	R	.	.	.
16. *Sus cristatus*	X	R	.	R	.	2R	.	.	.	R	.	.	.
17. *Ratufa bicolor*	.	R	.	R	.	.	.	.	R	R	.	.	.
18. *Rattus sabanus*	.	2R	.	R	R	R	.	.	R	R	.	.	.
19. *Rhinosciurus laticaudatus*	.	R	.	.	R	R	.	.	R	[R]	[R]	.	.
20. *Ptilocercus lowii*	.	.	.	X	.	X	X	.	.	R	.	.	.
21. *Macacus irus*	.	.	X	R	X	X	X	X	[R]	[R]	[R]	[R]	X
22. *Tragulus javanicus*	.	.	R	R	R	9R	R	R	3R	3R	2R	.	.
23. *Galeopterus variegatus*	.	R	.	2R	.	R	X	.	[R]	[R]	R	.	R
24. *Sciurus notatus*	.	3R	.	R	.	4R	R	R	R	2R	2R	3R	R
25. *Rattus surifer*	.	3R	.	2R	R	R	.	.	R	R	R	.	R
26. *Tragulus kanchil*	.	2R	.	2R	.	2R	R	.	.	2R	.	.	R
27. *Macacus nemestrinus*	.	X	.	X	.	X	X	X	.	.	.	.	X
28. *Ratufa affinis*	.	2R	.	3R	.	7R	R	R	.	2R	R	R	.
29. *Rattus mülleri*	.	3R	.	2R	.	2R	R	.	R	R	R	.	.
30. *Tupia tana*	.	R	.	2R	.	R	.	.	.	.	R	R	.
31. *Rattus whiteheadi*	.	R	R	R	.	X	X	X	.	.	R	.	.
32. *Pithecus pyrrhus*	.	.	.	.	.	X	X	X	.	.	R	.	.
33. *Rattus rajah*	.	.	.	.	.	R	.	.	.	.	R	.	.
34. *Tarsius tarsier*	.	.	.	.	.	.	X	R	.	.	R	.	.
35. *Viverra tangalanga*	.	.	.	.	.	X	X	.	.	.	.	.	X
36. *Sciurus prevostii*	.	.	.	.	.	2R	R	R	.	R	R	2R	R
37. *Nannosciurus melanotis*	.	.	.	.	.	R	R	.	.	R	R	.	.
38. *Nycticebus coucang*	.	.	R	R	R	R	.	.	R	R	.	.	.
39. *Rattus canus*	.	R	.	.	.	.	.	.	.	.	.	.	.
40. *Hemigale derbyanus*	.	.	.	.	R	.	.	.	.	.	.	.	.
41. *Iomys horsfieldii*	.	.	.	.	R	.	.	.	.	.	.	.	.

Table B

	Simalur	Banyak	Nias	Batu	Siberut	Sipora	Pagi	Engano	Riau Is	Banka	Billiton	Anamba Is	North Natuna	South Natuna	Tambelan Is	Karimata Is
HALF-BORNEAN																
1. *Anthracoceros coronatus*	·	·	X	X	R	R	R	·	·	·	·	·	R	·	·	·
2. *Anaimos maculatus*	·	·	R	·	·	·	·	·	·	·	X	·	X	·	·	·
3. *Dicaeum concolor*	·	·	·	·	·	·	·	·	·	·	·	·	X	·	·	·
4. *Ichthyophaga nana*	·	·	·	·	·	·	·	·	·	·	·	·	X	·	·	·
5. *Batrachostomus auritus*	·	·	·	·	·	·	·	·	·	·	R	·	X	·	·	·
6. *Chotorea rafflesi*	·	·	·	·	·	·	·	·	·	X	R	·	·	·	·	·
7. *Euptilosus euptilosus*	·	·	·	·	·	·	·	·	·	X	·	·	·	·	·	·
8. *Eupetes macrocercus*	·	·	·	·	·	·	·	·	·	·	·	·	X	·	·	·
9. *Aethostoma rostratum*	·	·	·	·	·	·	·	·	X	·	X	·	·	·	·	·
10. *Anaimos thoracicus*	·	·	·	·	·	·	·	·	·	·	X	·	·	·	·	·
HALF-MALAYAN																
11. *Culicicapa ceylonensis*	R	·	R	·	X	X	X	X	X	·	·	·	X	·	·	·
12. *Accipiter trivirgatus*	·	·	X	·	·	·	·		·	·	·	·	X	·	·	·
13. *Strix leptogrammica*	·	R	R	·	·	·	·		·	·	·	·	X	·	·	·
14. *Ictinaetus malayensis*	·	·	X	·	·	·	·	·	·	·	X	·	·	·	·	·
15. *Phodilus badius*	·	·	X	·	·	·	·	·	·	·	X	·	X	·	·	·
16. *Anthreptes simplex*	·	·	X	·	·	·	·	·	·	·	·	·	X	·	·	·
17. *Rhinomyias umbratilis*	·	·	R	·	·	·	·	·	X	·	X	·	X	·	·	·
HALF-SUMATRAN																
18. *Pericrocotus igneus*	R	·	X	·	·	·	·	·	·	·	X	·	·	·	·	·
19. *Ceyx erithacus*	·	·	X	·	·	·	·	·	X	·	X	·	·	·	·	·
20. *Orthotomus sericeus*	·	·	X	·	·	·	·	·	·	·	·	·	·	·	·	·
HALF-JAVAN																
21. *Aethopyga siparaja*	R	R	R	·	R	R	R	·	X	·	·	X	X	·	·	·
22. *Irena puella*	·	X	X	X	X	X	·	·	·	·	·	·	·	·	·	·
23. *Sasia abnormis*	·	·	R	·	·	·	·	·	·	·	X	·	·	·	·	·
24. *Pitta sordida*	·	·	X	·	·	·	·	·	·	R	R	·	·	·	·	·
25. *Micropternus brachyurus*	·	·	R	·	·	·	·	·	·	·	X	X	X	·	·	·
26. *Meiglyptes tristis*	·	·	R	·	·	·	·	·	·	·	·	·	X	·	·	·
27. *Arachnothera chrysogenys*	·	·	R	·	X	X	·	·	X	·	·	·	·	·	·	·
28. *Spizaetus nipalensis*	X	X	X	·	·	·	·	·	·	·	·	X	·	·	·	·
29. *Prinia flaviventris*	·	·	R	·	·	·	·	·	·	·	·	·	·	·	·	·
ALL-MALAYSIAN																
30. *Treron vernans*	R	R	R	R	R	R	R	R	X	X	X	R	X	X	R	X
31. *Ceyx rufidorsis*	R	·	R	R	R	R	R	·	X	X	X	·	X	·	·	·
32. *Pycnonotus plumosus*	·	X	X	X	X	X	·	·	X	X	·	·	R	R	·	·
33. *Chalcosthetha chalcosthetha*	·	R	X	X	R	R	·	R	X	X	·	·	R	R	·	X
34. *Gracula javana*	R	R	R	R	R	R	·	R	X	X	X	R	X	X	R	X
35. *Copsychus malabarica*	R	R	R	R	R	R	·	·	X	R	R	R	R	·	·	X
36. *Hemiprocne longipennis*	R	·	R	R	·	R	R	R	X	X	X	X	X	·	·	X
37. *Ducula aenea*	R	R	R	R	R	R	·	R	X	X	X	X	X	X	X	X
38. *Leptocoma brasiliana*	R	·	R	X	X	X	·	·	X	X	X	R	R	·	·	·

to 29). Those birds found in the majority of the island groups (TABLE B, Nos. 30 to 39) belong to the ninety-two species found in all-Malaya, all Sumatra, all Borneo and all Java—the *Full-Timers*.

Among forty-six half-Malayan species, only *Culicicapa ceylonensis* (No. 1) is found in many islands. Ten others go to Nias and Billiton or North Natunas (Nos. 2 to 7), the rest to no islands at all. Of twenty-eight half Sumatran species, three are found in Nias and twelve in Billiton or the North Natunas (Nos. 8, 9, 10). Of twenty-seven half Bornean species, only five are found in Nias and thirteen in the South China Sea islands. In thirty-eight half Javan species, *Aethopyga* and *Irena* are found in many islands. Nine others are found in Nias and fourteen in two or three of the South China Sea islands (Nos. 21 to 29). Fifty-five non-Javan species (not shown in the table) have only *Aegithina viridissima* in many islands. Fifteen are found in Nias and fourteen in two or three of the South China Sea islands. Six are found only in Banka and seven only in the North Natuna group.

The *Half-Siders* do not turn up on many islands. If they do, it is on Nias or either Banka, Billiton or on Bunguran in the North Natuna group.

Here are ninety-two *Full-Time* all-Malaysian species. Fifty-four of these are found on the majority of the South China Sea and West Sumatran islands (TABLE B; Nos. 30 to 39, for example). Sixteen others are found freely in the South China Sea islands and ten on no islands at all. This leaves twelve all-Malaysian species in a minority of the islands —e.g. in Nias only are *Lalage, Trachycomus* and *Munia atricapilla*.

Most of the *Full-Time*, all-Malaysian species are found in the great majority of the islands.

For mammals, successive ice ages have determined their distribution across the Sundaland, joining the islands in the South China Sea to Malaya, Sumatra and Borneo. The same is true for the Banyak and Batu Islands with Sumatra's west coast.

For birds, glacial periods determined their distribution throughout the large islands of Malaysia and the majority of the small islands in the South China Sea and off the west coast of Sumatra. Geologists agree that in at least one interglacial period the sea level was about fifty feet higher than at present. This divided up Sumatra, Borneo and Java, limiting bird distribution to parts of these provinces. At the same time, dispersal during the interglacial period cut down bird distribution to a minority of the South China Sea and West Sumatran islands.

TABLES A and B show the distribution of mammals and of birds in the islands of the South China Sea and in the islands off the west coast of Sumatra. Their presence unaltered in the islands is indicated by an X, their presence as a peculiar subspecies by an R.

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