

# SOME NOTES ABOUT THE NATURE RESERVE PULAU PANAITAN (PRINSENEILAND) IN STRAIT SUNDA,

with special reference to the avifauna <sup>1)</sup>

by

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From August the 30th till October the 5th 1951, Kebun Raya Indonesia (Botanical Gardens) at Bogor organized an expedition to the island mentioned above.

Up till then the island was nearly "terra incognita" from a scientific point of view, for no botanical or zoological investigation had ever been made, though some scientists (a.o. MOLLIER, DAMMERMAN, ENDERT) paid short visits to the area.

## I. Some details about the island, its topography and vegetation

### A. General

Pulau Panaitan lies in the Sunda Strait off Java's First Point, the most western promontory of Java, between  $105^{\circ}4'$  and  $105^{\circ}14'$  E. long., and between  $6^{\circ}32'$  and  $6^{\circ}40'$  S. lat. Its southernmost point (Tdj. Karangdjadjar) lies approximately 10 km north of Java's First Point. It is separated from it by the Prinsen-Strait or Behouden Passage. The distance from the island to the nearest point on Sumatra is about 85 km. Since the eruption of Krakatau in 1883 it is uninhabited.

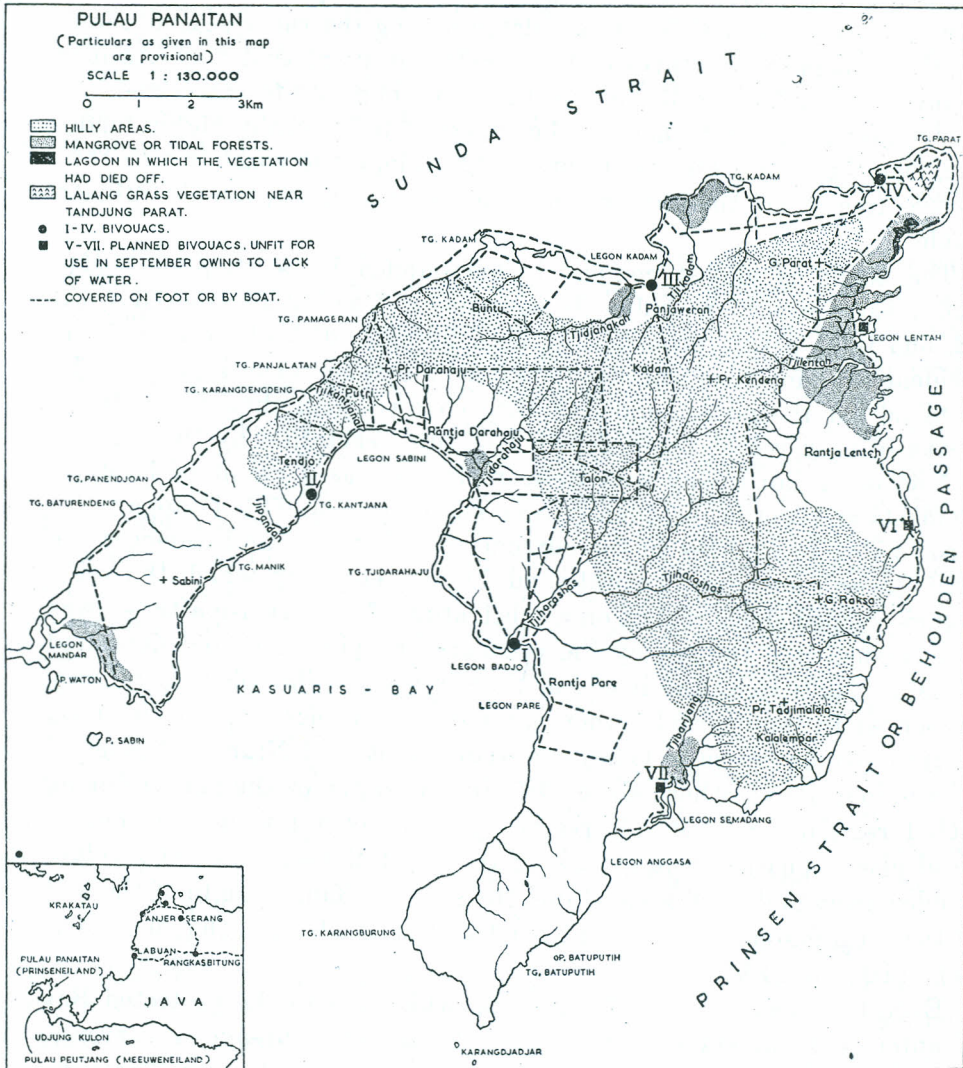
According to the data available in the archives of Kebun Raya Indonesia this volcanic island covers an area of 17,500 hectares <sup>2)</sup>. Its longest coast line, that between Tg. Parat and Tg. Karangdjadjar, is approximately 23 km long; that from Tg. Parat along the north and west coast to Legon Mandar may be assumed to be of about the same length. At its greatest width the Kasuarisbay is about 7 km wide. The highest point of the island lies at approximately 320 m above sea-level.

Many parts of the coast are highly inaccessible, particularly so in the Kasuarisbay and along the north-west side of the island. Not only are the surrounding waters notorious for their unreliable and strong

<sup>1)</sup> I have to thank Mr M. W. F. TWEEDIE, Director of the Raffles Museum at Singapore for reading the manuscript and for his valuable suggestions.

<sup>2)</sup> Ir T. W. G. DAMES, however, who carried out a survey of the island, reports its area to amount to only 12,000 hectares.

currents, but the island is for its greater part ringed in by treacherous reefs of coral or rocks and where these are absent the bottom of the sea rises so steeply up to the shore as to make anchoring practically impossible. Suitable anchorage-grounds are to be found here and there in



Map of Pulau Panaitan.

the Kasuarisbay, along the east coast near Legon Semadang and Legon Lendah and in places along the north coast, e.g. in Legon Kadam.

## B. Topography

If, after studying the map and comparing it to our own findings in the field, I venture the opinion that 50% of this volcanic island may be termed from moderately to heavily dissected and the other half slightly hilly to level, I believe this estimate not to be far of the mark. I further think that a considerable part of the level area may be assumed to be either very boggy or completely inundated during the rainy season. Many indications, including features of the vegetation, point that way. As it is in many parts of Udjung-Kulon, the peninsula opposite to our island, the drainage into the sea may here too be supposed to be locally highly inadequate, owing to the presence of coral-ridges along the coast, which shut off large areas from the sea, and often make only underground drainage possible.

The island is almost completely surrounded by a strip of beach, which greatly varies in width. It consists of fine, light-coloured coral sand, and is as a rule protected by both living and dead coral-reefs. It is evident that much of the dead reef at one time formed part of the "mainland" of the island, and was then covered with shrubs and trees, but was in very recent times denuded of this vegetation by the sea. By this I do not mean to say that these reefs sank as a result of isostatic movements and were subsequently covered by the sea. This is apparently not so; owing to changes in the currents or other marine influences the "fertile layer", made up of coral sand, humus, etc. — in which the vegetation mentioned above rooted, on a substratum of solid reef-matter — was either washed into the sea by the breakers or "piled up" and deposited as coastal ridges along the inside of these reefs. Similar phenomena may be observed in innumerable other parts of the tropics, as, for instance, in Udjung-Kulon between Tandjung Alang-alang and Niur, just west of Java's Second Point, where since 1937, in the course of the period during which I regularly visited this region, not merely a few metres, but at several places tens of metres of the vegetation-covered coral-ridges crumbled away and were washed into the sea ..... This in spite of the fact that the coral-plateau lies here at least 1½ metres above the normal high tide mark!

Even the coral-island of Pulau Dua, which lies in the protected Bay of Banten and suffers only very little from heavy breakers, currents, storms, etc., is steadily crumbling off along its north-east coast. The same phenomenon may be seen in other islands, e.g. in the Bay of Djakarta.

Extensive mangrove-complexes are found in Legon Lentah, in Legon Semadang and in Legon Mandar. Smaller areas lie in the estuaries of the

Tjidarahaju, the Tjidjankah and east of Legon Kadam and in a few other places, but these do as a rule not extend to the coast.

This mangrove is often rooted in a gritty or sandy soil. Worthy of note are the beautiful "submarine gardens" (living coral-reefs), which may occasionally be seen growing on the bottom of the sea in the immediate proximity of these mangrove areas, so that it would seem that the water on its long way from the interior through these forests acquired such a high salt content that it could no longer harm the reefs.

In areas where during the rainy season rivers carry large quantities of fresh water into the sea, the reefs do not thrive or are entirely absent, since water of too low a salt content does not favour the growth of coral-reefs.

As may also be seen from the map, the hill-ridges along the north-west coast between Tandjung Kadam (west of Legon Kadam) and Tandjung Baturendeng in many places jut out into the sea, forming wild headlands or falling apart into detached rocks made up of andesite, conglomerates, breccia and occasionally basalt.

The island is traversed by many rivulets of various sizes, which have often cut deep ravines and have rocky beds. Some of these water-courses end up in the lowlands which are marshy during the rainy season; others carry their water directly into the sea, but except in the places where we bivouaced (see map), there is probably nowhere along the coast any rivulet to be found which in a normal dry season still contains fresh water. On the other hand it may be assumed that no dry season is so severe as to cause all drinkingwater to disappear, so that there is bound to be fresh water left in many parts of the hills right up to the end of the dry season.

Apart from the coastal plains, the two southern peninsulas of Pulau Panaitan and the area north of Mt Parat, may be said to be extremely poor in fresh water. But also in these areas, as in many places near the coast, the groundwater level is locally high nearly throughout the dry season, so that here and there it is possible to dig wells.

As far as we could ascertain the Tjiharashas, the Tjidarahaju and the Tjidjankah may be reckoned among the biggest rivers of the island. They have all of them large catchment areas. The river along which our bivouac III was built (Legon Kadam) and which reaches the sea a few hundred metres east of the Tjidjankah is not shown on the map; it may have been Tjikadam finding a new way to the sea, or it may have been no more than a drainage-gully of the marshy plain further inland. This nameless river as well as the Tjiharashas and the Tjidarahaju, of

which three the last-mentioned is by far the biggest, are completely cut off from the sea by a strip of sandy beach during the dry season. When the rains set in, however, this strip of beach is washed away by the surplus water of the marshes in the interior finding a way to the sea. During our stay on the island the Tjidjankah, which disembogues into Legon Kadam, was the only river not cut off from the sea. It is kept open in the dry season not by rainwater from the interior but by seawater flowing inland at high tide and receding at low tide. In this way conditions are created which favour the growth of the mangrove-complexes. This river too has a very extensive catchment area and far inland has a wide bed, so that it may be supposed to carry large amounts of fresh water into the sea during the rainy season, as is also clear from the absence of coral-reefs and the presence of dead reefs in the bay into which it empties.

Among the numerous rivulets falling into the sea along the east coast of the island there was, as far as we could find out, not a single one still containing fresh water when we stayed there. Those north of the Rantja Lentah all lose themselves in mangrove-forests or, during the rainy season, feed the swamps lying between this mangrove-forest and the hills. At the time of our stay only the upper courses of some of these brooks still contained small quantities of fresh water.

### C. Vegetation

If I may make some very superficial remarks about the vegetation as we found it I think I may safely estimate that 65% of the island is covered with primary forest, under which the ground has, apart from the litter, only a scanty cover of anything but the natural regeneration of the trees growing there. Among those trees, many of which had shed their leaves during the dry season, I saw: tongtollok<sup>1)</sup> (*Pterocymbium javanicum*), kibonteng (*Urandra secundiflora*), kimokla (*Knema glauca*), bungur (*Lagerstroemia speciosa*), kedongdong (*Spondias pinnata*), gondang (*Ficus variegata*), pedali (*Radermachera gigantea*), bajur (*Pterospermum javanicum*), lame (*Alstonia* sp.), reungas (*Gluta renghas*), kisanpan (*Evodia aromatica*), tjereleng (*Pterospermum diversifolium*), hanja (*Anthocephalus cadamba*), gadok (*Bisschoffia javanica*), salam (*Eugenia* sp.), laban (*Vitex pubescens*), putat (*Planchonia valida*), kibi-jawak (*Eugenia* sp.), kendal (*Cordia subcordata*), teureup (*Artocarpus*

<sup>1)</sup> The greater part of the scientific names of trees I owe to the Forest Research Station at Bogor and to Dr F. H. ENDERT, Superintendent of the Forestry Service at Bogor.

elastica), tamaga (*Eugenia* sp.), kopeng (*Ficus pubinervis*) and kilaka (*Myristica iners*). The larger specimens of these trees, many of which are buttressed, had a diameter of from 70—90 cm, but the biggest of all — we often came across these forest giants on tops of low hills and in groups of several specimens together — were considerably larger still, being not rarely over one metre in diameter. The biggest trees I measured (in the hinterland of the Tjiharashas) were 200 and 150 cm in diameter, respectively, at a height of 2 m above the ground. These were *Spondias pinnata* and *Bisschoffia javanica*, both of them trees which at that height had little developed buttresses.

I was often surprised to see how shallowly many of these giants proved to root; not only along the shore, but also further inland I came across uprooted trees, of which the roots had not gone beyond 1 m in depth, often less than that. It is a complete mystery to me how such trees of about 80 cm in diameter, rooted in a soil of pure coral, manage to grow at an angle of approximately 30°, as did one enormous njamplung (*Calophyllum inophyllum*) along Legon Sabini.

Among the many other species we also observed gigantic kiaras (*Ficus* sp.), reaching towards the sky like huge pillars, or covering areas of many hundreds or even thousands of square metres, forming a forest of trunk-like aerial roots.

Mention should further be made of the large numbers of lianas of such great variety as to size and shape as I rarely saw elsewhere. There were flat and round ones, cork-screw-shaped specimens and others twisted like huge cables, some were smooth, others had thorns or a cork-like bark like a tree. Some were hanging down like heavy ropes from the tops of the tallest trees, whereas others had assumed the most fantastic contortions on their way up.

I believe I am not far wrong either by estimating that 15% of the area is covered by dense rattan-jungles, more or less horizontally growing waru (*Hibiscus tiliaceus*) and bamboo: the heavy awi haur (*Bambusa vulgaris*) and awi bulu (*Schizostachyum brachycladum*) as well as the thin tjangkeuteuk (*Schizostachyum zollingeri*) and, further, by langkap (*Arenga obtusifolia*), pinang (*Areca catechu*), nipa (*Nypa fruticans*), lamiding (*Acrostichum aureum*), rahashas (*Mapania*), alang-alang (alang grass = *Imperata cylindrica*) and other types of lower vegetation, such as ferns which covered entire fields. The bamboo we found on the island, especially the larger species, appeared on the whole depauperated: they were often dead or seemed to be so. Although this might partly be due to lack of light, this explanation would not hold for all cases, so that the

symptoms may have to be attributed to some disease like that which causes the njamplungs in Udjung-Kulon to die off, but which on this island fortunately was observed in only a few instances.

I further estimate that about 20% of the vegetation consists of Barringtonia, *Pes caprae* and *Casuarina* formations: ketapang (*Terminalia catappa*), njamplung (*Calophyllum inophyllum*), butun (*Barringtonia asiatica*), waru (*Hibiscus tiliaceus*), dadap (*Erythrina* sp.), kamps ( *Hermandia peltata*), *Sophora tomentosa*, *Vitex negundo*, kenjèrè laut (*Desmodium umbellatum*), tjantigi (*Pemphis acidula*), *Premna integrifolia*, *Ipomoea pes caprae*, *Wedelia biflora*, tjemara (*Casuarina equisetifolia*), pandan (*Pandanus tectorius*), gabus tsina (*Scaevola frutescens*), babakoan (*Tournefortia argentea*), etc. In these 20% I should like to include the tidal forests comprised of the various *Rhizophora*, *Lumnitzera*, *Avicennia* and *Bruguiera* species and of *Aegiceras corniculatum*.

Nearly everywhere along the shore lies a vegetation belt belonging to the *Barringtonia* type, sometimes practically impenetrable, but at other places fairly open, as, for instance, along the north-west coast, where via a sparse *Pandanus* and *Scaevola frutescens* vegetation, with an occasional magnificent *Tournefortia argentea*, one enters the tall njamplung forest with as undergrowth usually *leumpeni* (*Ardisia humilis*), of which — this may be remarked in passing — the crowns seemed dead, almost without exception, producing a curious effect. Many coconut- (*Cocos nucifera*) trees are to be seen here and there in the coastal area, e.g. along Legon Sabini and locally south-west of Tandjung Kadam (west of Legon Kadam). South-east of Legon Mandar and between Legon Kadam and Tandjung Parat, as well as in a few places along the east coast, complexes of tjemaras (*Casuarina equisetifolia*) are worth mentioning. They included enormous specimens (one of which was 1.60 m in diameter at a height of about 1.5 m above the ground).

Open areas covered with low herbs, grasses or a grass-like vegetation are extremely rare and in my opinion are nearly always to be looked upon as swamps which are flooded during the rainy season. This decidedly also applies to the *Nypa fruticans*, *Mapania* and *Acrostichum aureum* vegetation which is found here and there, sometimes at a great distance from the shore; during the rainy season the sea-water will undoubtedly also make its influence felt much further inland than it does during the dry season, as appears from many indications in the terrain. An exception in this respect forms a fairly extensive area of alang-alang (*Imperata cylindrica*) of about 5 hectares with some scattered kasso (*Saccharum spontaneum*), tjentè (*Lantana camara*), sembung (*Blumea balsamifera*)

and an occasional group of trees made up mainly of gempol (*Sarcocephalus cordatus*) and a few other species, such as reuheun (*Glochidion zeylanicum*) and leumpeni (*Ardisia humilis*). This lowland plain is situated just south-west of Tdj. Parat, not far from our bivouac IV. It may be supposed to remain for the greater part dry, even during the rainy season. It undoubtedly owes its existence to shifting cultivation, and is maintained by burning.

There are on the island no other alang-alang plains of this size, as far as we could ascertain ourselves and were told by inhabitants of the south-west coast of Banten.

On account of the primary forest in the interior which often has as little undergrowth as has an old beech forest in Europe, the island often reminds one of Meeuweneiland (Pulau Peutjang), which lies about 10 km south-east of Pulau Panaitan, at less than a kilometre's distance from the coast of Udjung-Kulon. But the practically impenetrable growths of rattan (*Calamus* spp.), etc., often covering the almost horizontally lying waru (*Hibiscus tiliaceus*), are more like in Udjung Kulon which abounds with this kind of tangled undergrowth. They form extensive jungles in which scarcely a single tall tree is to be seen. Also the mangrove-complexes and their edges, where crab-mounds, overgrown with *Acrostichum aureum*, *Hibiscus*, rattan, etc. and stinking mud-creeks make all progress next to impossible, resemble the notorious Handeuleum Bay of the above mentioned inaccessible Nature Reserve. A very favourable exception in this regard forms the mangrove-area near the estuary of the Tjidjankah, where *Rhizophora* and *Bruguiera* grow in a gritty soil, which is easy to walk on. The same may be said of the mangrove in the lagoon east of Legon Kadam, the soil of which is also fairly solid and easy on the feet, if the dense vegetation does not make walking impossible. Mangrove was found growing in pure sand south of the Rantja Lentah and near the lagoon south-west of Tdj. Parat.

Relatively little merbau (*Intsia bijuga*) was found on the island. I myself came across some merbau around the Tjiharashas- and Tjipan-dan-bivouacs (along the Kasuarisbay, exclusively in the coastal zone), but for the rest the species proved rare, so that the reputation this island has from of old, among many people living in south-west Banten, of being rich in merbau appears to be founded mainly on fiction. Whether or not it should be considered possible that the dead merbau trunks we found were uprooted by the flood which followed the eruption of the Krakatau in 1883 is not for me to decide, but I for one am convinced that the disaster they met with must have taken place quite a long time ago.



In several parts of the island, but mainly in its north-east corner, as far as north and north-east of Mt Parat, much shifting cultivation seemed to have been practised, later even than 1921, the year in which Pulau Panaitan became a Nature Reserve. As late as 1931 Dr ENDERT still found fairly positive signs of this type of cultivation along the slopes of the Raksa-Tadjimalela complex, and it may be assumed that elsewhere also the land has been cultivated clandestinely, as the vegetation in many places has more the character of secondary than that of primary forest. I am too little of an expert in this field, however, to venture a definite opinion on this subject. The flood which swept these regions after the eruption of the Krakatau has certainly not left Pulau Panaitan untouched, and the absence of old forest in the lowlands east and west of Legon Kadam in my opinion will have to be attributed mainly to this calamity. It may also account for the absence of large trees in the north-east part of the island, nearly up to the foot of the Mt Parat.

It may be safely assumed, that since in 1938 the supervision on Ujung-Kulon was intensified, no more clandestine agriculture was practised on Pulau Panaitan except perhaps in the area southwest of Tdj. Parat, which is still covered with alang-alang. In this lowland area which is surrounded by a tall coastal vegetation, cultivated fields may easily escape the attention of passing ships.

## II. The fauna, particularly the mammals and the birds

In the following are mentioned not only the animals which were caught, but also those species which were observed, or whose presence could in some other way be established.

### A. Mammals

60 mammals in all were collected, mainly squirrels and rats. The rats were caught exclusively by means of traps which were set every day, whereas other mammals, such as barking-deer, squirrels and bats, were shot. All mammals which came in our possession were measured and weighed.

Generally speaking it may be said that the stock of game on Pulau Panaitan is satisfactory, if not more than that. This is perhaps due more to the fact that the island does not lie within easy reach than to its having been set aside as a Nature Reserve, but I am quite positive that if the area had not become a Nature Reserve, people would have settled there, and that this would have had a very detrimental effect on the stock of game, as it has had everywhere else in Indonesia, is a thing I am equally sure of.

Boars, barking-deer and mouse-deer were seen almost every day, even when continuous shooting of birds, squirrels etc. disturbed the quiet. All boars seen belonged to the species *Sus vittatus*, the barking-deer to *Muntiacus muntjak* and the mouse-deer to *Tragulus kanchil*. Whether the two last-mentioned species belong to geographic subspecies other than those living in Java cannot be decided until after the specimens which were collected have been thoroughly studied by an expert. Of *Sus vittatus* no material was collected, owing to the religious objections of the Moham-medan taxidermists against the handling of these animals.

Although some areas seemed less rich in game than others, I do not think so short a stay on the island warrants any conclusions as to differences in game-density, the less so since these differences are probably not permanent, but linked up with the availability of water, mud-pools, the season for certain kinds of fruit, etc. During our visit the greatest number of barking-deer and mouse-deer were seen in the western peninsula. In this area I saw on one day 12 barking-deer and 15 mouse-deer as well as 7 boars. The barking-deer were found throughout the island mostly in pairs, but we also saw does accompanied by young fawns; many tracks were found along the beach where the species was also frequently seen. On the beach near the Tjikantjana (Legon Sabini) I saw a doe making jumps of from 3 to 3.20 m! Some of the barking-deer were tested for liver-fluke (*distomatosis*) but they had never been infected and had completely healthy livers.

The mouse-deer were as a rule seen singly, sometimes in pairs or in groups of three specimens.

Large herds of boars were not seen, but groups of from 5 to 10 specimens were by no means rare. Many juvenile specimens were observed, and on one occasion very young ones which were less than 2 months old and had not yet lost their stripes. During our stay at the Kasuarisbay in the last days of June piglings of about two months old were seen on three occasions, viz. once one and twice two or three specimens together, accompanied by more adult ones.

Unlike MOLLIER<sup>1)</sup> who found the game on this island just as shy as everywhere else in not-protected regions, I had the impression that the animals are less distrustful of man here than they are in areas where game-hunting takes place regularly.

The late Dr K. W. DAMMERMAN in his "Preservation of wild-life and Nature Reserves in the Neth. Indies" (1929) wrote: "Deer also occur

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1) A forester, who visited the island about 1860.

in great numbers on Prinsen Island", but he gave no facts on which he based this statement. Neither does Dr A. C. V. VAN BEMMEL when discussing a newly described race of *Rusa timorensis (laronesiotes)* from Meeuweneiland in his "Revision of the Rusine deer in the Indo-Australian Archipelago" (Treubia, 20, 1950, p. 237). He writes "Only known from Meeuweneiland. It is not known whether Prinseneiland, lodging a large stock of deer, presents the same race."

At my request Dr VAN BEMMEL informed me that he was told by Dr HARDENBERG that the big-game hunter PIETERS had shot two deer on Prinsensiland. But after my opinion such a piece of information may not justify the statement that the island lodges a large stock of deer. After making inquiries I was told by Mr PIETERS that he shot only one deer on the island, in 1924, in the neighbourhood of Legon Kadam, in the region, therefore, where we spent three weeks. In view of his own findings in this regard Mr PIETERS thought it quite well possible for deer to swim across the stretch of water which separates Pulau Panaitan from Java.

Moreover VAN BEMMEL's mentioning as "terra typica" of this new race "Meeuweneiland, Strait Sunda, between Java and Sumatra" may hardly be termed an accurate location. In fact the said island is separated from Ujung Kulon, where — according to the same author — is living the Java deer *Rusa timorensis russa* (MÜLLER & SCHLEGEL), by an extremely quiet bay of hardly half a kilometre's width.

Our own findings regarding the presence of deer on Pulau Panaitan may follow below.

Two game-hunters stayed with us for a week with the express purpose of assisting us in the search for deer. They pitched their tents in the most promising part of the island, viz., in the area where the only remaining plains, grown with alang<sup>2</sup> (*Imperata cylindrica*) were available and near a marshy meadow, which was covered with a grassy vegetation, and still contained fresh water. After the alang-alang plain had been burned the Banten game-hunters and I again looked for deer, doing so once more after from 7 to 10 days, when the entire plain was covered with young shoots, a delicacy for any deer in Java. Even then no tracks were seen, no droppings found. I promised the reward of one hundred rupiahs to the person who would bring me either a living or a dead deer, and ten-later on twenty-rupiahs for the finding of droppings or an unmistakable track, but although the Banten "shikaris" were very keen on earning this money, I had no occasion for paying a penny.

After my stay on the island I personally have come to the conclusion that this type of game does not occur here, but negative proofs are

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After my stay on the island I personally have come to the conclusion that this type of game does not occur here, but negative proofs are

obviously impossible to furnish, at least in this case, so that the legend of the "large stock of deer" of Pulau Panaitan will probably continue to exist in literature for a long time to come.

Grey monkeys, the so-called monjets (*Macaca irus*) are fairly common on the island and were observed almost every day and at the most widely different places. The species is found in mangrove-forests, along the beach, digging for something to its liking, walking across the reefs when the water has receded at low tide, but also in the interior, in the almost impenetrable rattan jungles, in waru, etc., and in the crowns of the tallest trees. In short, "monjets" are everywhere but nowhere numerous. I saw no large groups and as a rule encountered only a few specimens together, occasionally accompanied by small, but already "independent" young. Other species of monkeys were not observed, and I do not think there are any.

There is little to be said about the other mammals. "Luwaks" (*Paradoxurus hermaphroditus*) were a few times seen or smelled. One of the members of the expedition aimed at a big specimen near the Parat bivouac, but missed. I myself saw a specimen south of Pasir Kendeng, when we were on our way to the Mt Raksa, but on this trip I did not bring a gun. Tracks of what were probably ganggarangan (*Herpestes javanicus*) were found a few times on the shore. The wild cat (*Felis bengalensis*) was probably heard on one night only, from the Tjipandan bivouac. The highly characteristic excrements of this animal were, however, not found. The big squirrel (*Ratufa bicolor*), the djaralang, was heard by me and seen by another member of the expedition in the tops of tall njamplungs near the Tjiharashas bivouac. The species is evidently rare here, for in my experience this squirrel usually soon reveals its presence by its cry of alarm, by its size and its liveliness, in spite of the fact that it generally lives in the tops of tall trees.

Small squirrels (*Callosciurus notatus prinsulae*)<sup>1)</sup> may be called common; they were seen almost daily and more than twenty were collected. The species was found throughout the island, but does probably not occur in the mangrove-forest. As appears to be the case with many other mammals, this squirrel seems to be able to do without water for long periods on end, since we found specimens in areas where not a drop of water was to be found for miles around.

<sup>1)</sup> The subspecies *prinsulae* was described in 1949 by SODY from one specimen, collected by Dr K. W. DAMMERMAN on Pulau Panaitan in July 1929. Further particulars about DAMMERMAN's visit are not known to me.

Rats were not found to be very numerous, for although during the five weeks of our stay from 20 to 30 traps were set every day with different sorts of baits, only 7 rats were caught, viz., 1 near the Tjiharashas -, 2 near the Tjipandan -, 3 near the Legon Kadam - and 1 near the Parat-bivouac. Without exception they belonged to *Rattus rattus* subsp. Near a decaying trunk a small rat was caught, but after it had been put into a widemouthed bottle it managed to work itself up along its smooth walls and escaped.

During our stay there were a great many flying foxes on the island. Some of them used to rest hanging in the tall trees of the Tjidarahaju estuary (Kasuarishay). The excrements and vomits of these animals caused us a lot of trouble in the Tjipandan bivouac. When staying along the north-coast large numbers flew across Legon Kadam, coming from the south-west, may be also from the Tjidarahaju. Occasionally a few of them flew very low above the water as if they wanted to drink or take a bath. I did not succeed in seeing them doing so, although I watched them very closely on several occasions, because it is a rather rare phenomenon to see a flying fox drinking in nature. Judging by their size the specimens observed belonged to *Pteropus vampyrus*.

Bats were decidedly not rare, although the number we saw could not be called large. The numbers seen at twilight were never great and consisted mainly of the small *Tylonycteris pachypus* <sup>1)</sup>, a few specimens of which were caught by means of a butterfly-net. In this way also one *Pipistrellus macrotis* was collected. The bats we frequently started from their hiding-places belonged as a rule to the bigger *Cynopterus brachyotis javanicus*.

A few specimens we roused from a coco-nut tree on the north-west coast were accompanied by big young, differing greatly from the adult animals, which however still suckled these young, as was apparent from their lactiferous teats. In a cave north of the Tjiharashas bivouac a resting-place was found of the big-eared *Megaderma spasma*; from the roof of this cave about 15 animals were hanging; but the bottom made it seem probable that the number staying there was periodically much greater.

These were the mammals we saw on the island, but I wish by no means to create the impression that these were the only species living on Pulau Panaitan, for I am sure this is not the case. It is next to impossible within so short a period during which so many different subjects

1) The bats were determined provisionally by Dr J. K. DE JONG.

demand the attention, to acquire an adequate insight into the group of the smaller mammals, which moreover show their greatest activity under cover of night.

Former investigators report the finding of tracks of porcupines and of wild dogs. The track of a porcupine is difficult to mistake, but as to tracks of wild dogs I should like to suggest that they may have been confused with those of ordinary dogs from some prahu or other vessel which landed or was shipwrecked on the island. Another possibility is that these tracks were in fact made by the large "sea otters" (*Lutra perspicillata*) which animal might find a highly favourable habitat here. But no tracks of this mammal were found by us.

## B. Birds

Some 300 birds in all were shot. Notes were made on the contents of the stomach, the stage of development of the gonads etc.; ova and testes were measured accurately if they proved well-developed. Finally all birds were weighed, since in my opinion the weight may be of some value when classifying birds. It is impossible to give now in this first paper any but superficial details of the ornithological results and to make any decisive statements as to the subspecific relationship of this material. For the time being I consider the avifauna of this island very closely related to that of Java, since, except for *Falco peregrinus* (Peregrine Falcon), *Streptopelia bitorquata* (a Turtle-dove) and *Dicrurus hottentottus* (Crested Drongo), not a single bird was observed which is not found in Ujung-Kulon (most western part of Java), and of these three birds the second and the third are typical island-birds, whereas *Falco peregrinus* may easily escape attention and is to be looked upon as a straggler.

If we compare the species whose presence was established on Pulau Panaitan with those living in Sumatra we find that on the island there were six which are not found in Sumatra, viz., *Ptilinopus melanospila* (Blacknaped Fruit Dove), *Halcyon cyaniventris* (Kingfisher), *Coracina javensis* (Javan Cuckooshrike), *Muscicapa banyumas* (Fly-catcher), *Cisticola exilis* (Red-headed Fantail Warbler), and *Dicaeum trochileum* (Scarlet-breasted Flowerpecker), which might be an indication that Pulau Panaitan got its birds from Java and not from Sumatra, a theory which seems obvious if the map is studied, and which will undoubtedly be confirmed after the material has been subjected to a thorough examination and compared to that from Java and South Sumatra.

The high degree of uniformity as to scenery and vegetation of this island may be taken as the main reason why the number of bird species

permanently living here cannot be called large, although it does not compare at all unfavourably with the avifauna known from many other islands. If by way of comparison we look at some islands bigger than Pulau Panaitan we see that of the Batu Islands off the west coast of Sumatra 33 species are known, of Engano with its many habitats (beach, reefs, kampong-gardens, irrigated rice-fields, secondary forest of various ages, primary forest, etc.) only 31 species, and of the islands of Kangean and Bawean which are not less rich in habitats, 82 and 26 species, respectively, so that our island on which in the course of five weeks we established the presence of about 95 species does not make a bad figure. It should be borne in mind, however, that this number may be slightly larger than it might have been a few months earlier in view of the migratory birds visiting Indonesia from the north of Asia during the cold months of the temperate zone. To this category belong about 12 birds on our list. On the other hand the end of the dry season, which was very severe on this island is not the most favourable time of the year in which to make an ornithological inventory of an area. Only few birds hatch during this period and most species are very quiet and therefore little noticeable outside the mating season, thus easily escaping attention. This probably also accounts for the fact that, with the exception of *Eudynamis scolopacea* (Koel) not a single parasitic cuckoo of the ten species living in Java could be detected. The Koel is a bird which does become active in September/October, as it usually lays its eggs in the last months of the year and calls most frequently just before and during that period.

For the same reason perhaps not a single barbet was collected or observed except for the small *Megalaema australis*, which was probably heard once, whereas in Ujung-Kulon four species were found, of which two or three can be heard or seen almost daily!

But there are many birds which do not have to be noisy to draw the attention and we did not spot these either, in spite of the fact that the habitat for such species seemed present. We here refer to *Geokichla citrina*, further to *Pitta guajana*, to *Aegithina tiphia* and some Pycnonotidae, such as *Pycnonotus cafer*, *Pycnonotus zeylanicus* and *Criniger tephrogenys*. The black and grey king-crows *Dicrurus macrocercus* and *D. leucophaeus* seemed to be lacking too, whereas of the extensive subfamily of the Timaliinae not one representative could be detected. Many members of this group would — judging by human standards — find on Pulau Panaitan an ideal habitat. I looked in vain for *Pellorneum capistratum*, for *Malacocincla sepiaria* and the two *Macronus* species, all of them birds we know from many other places and also from



Udjung-Kulon. It seems difficult to assume that such typical resident birds might occur there in some other season.

The number of species I observed in one day was on very rare occasions as high as 30, varying as a rule between 20 and 25, including a few migrants from the coast. If we compare these figures to those of Udjung-Kulon or of the area along the Welkomstbay, where frequently between 60 and 70 and sometimes more than 70 species could be established in the course of one day, the numbers of Pulau Panaitan are very disappointing, although it is hardly fair to compare this island to such vast areas with so many different habitats.

If I were to divide Pulau Panaitan into habitats the principal ones for our purpose would be: (1) The shore and the reefs, (2) The Barringtonia, *Pes caprae* and *Casuarina* formations, (3) The areas covered with lower, secondary vegetation, including the alang-alang plain near Tandjung Parat, (4) The lagoon of the dead mangrove near Legon Lentah, and (5) The primary forest, to be subdivided into (5a) The crowns and (5b) The lower strata.

If I were subsequently to name the five birds characteristic of these respective habitats, they would be for habitat (1) *Ardea sumatrana* (Dusky-Grey Heron), *Egretta sacra* (Reef-Heron), *Esacus magnirostris* (Stone-Plover), *Haliaeetus leucogaster* (White-bellied Sea-Eagle) and *Halcyon chloris* (White-collared Kingfisher). This sea-eagle I might also have grouped with habitat (2) but I placed it under (1) because it gets its food here.

For habitat (2) this would be: *Halcyon chloris*, *Orthotomus sepium* (Ashy Tailor-Bird), *Gerygone sulphurea* (Fly-eater), *Pachycephala cinerea* (Mangrove Fly-catcher Shrike) and *Anthreptes malacensis* (Brown-throated Sunbird).

For habitat (3) *Artamus leucorhynchus* (Swallow Shrike), *Pycnonotus ggiavier* (Yellow-vented Bulbul), *Orthotomus sepium*, *Dicaeum trochileum* (Scarlet-backed Flowerpecker), and *Nectarinia jugularis* (Yellow-breasted Sunbird).

For habitat (4) *Ardeola speciosa* (Pond-Heron), *Halcyon cyanoventeris* (Javan Kingfisher), *Dendrocopos moluccensis* (Lesser Pigmy Woodpecker), *Rhipidura javanica* (Fantail Flycatcher) and *Aplonis panayensis* (Tree Starling).

For (5a) *Ptilinopus melanospila* (Black-naped Fruit Dove), *Ducula aenea* (Green Imperial Pigeon), *Aceros undulatus* (Malaysian Wreathed Hornbill), *Anthracoceros malabaricus* (Pied Hornbill) and *Gracula religiosa* (Grackle).

And finally for (5b) *Pycnonotus plumosus* (Large Olive Bulbul), *Copsychus malabaricus* (Shama), *Muscicapa banyumas* (Hill-Blue Flycatcher), *Pachycephala cinerea* and *Dicrurus hottentottus* (Crested Drongo).

One can walk for hours or even days on end in the interior of this island without seeing or hearing many other birds than those mentioned under 5a and 5b. It may be *Centropus sinensis* (a non-parasitic cuckoo) which one hears calling from a rattan jungle or some other dense brushwood or the fairly noisy *Pycnonotus atriceps* (Black-headed Bulbul), *Hypothymis azurea* (Black-naped Flycatcher), the ubiquitous *Orthotomus sepium* and *Dicaeum trigonostigma* (Orange-bellied Flowerpecker). With luck one may come across *Gallus gallus bankiva* (?) (Red Junglefowl) or *Dryocopus javensis* (Great Black Woodpecker), for these birds are seen rather rarely. During my stay on the island this beautiful woodpecker proved less rare than the Red Junglefowl, for I did not get any opportunity of watching the latter bird or of seeing it at so close a range as to have the slightest chance of shooting it. This was very unfortunate, since some members of the expedition who did manage to see it from a short distance, maintained that the cock was bigger than and "different" from those known from Java. This opinion was shared by some natives of Banten, who know the Bankiva fowl from the Mt Hondjé Reserve and from Udjung-Kulon as we do the ordinary domesticated fowl! I have repeatedly heard the cocks crowing, but failed to notice any difference from the sound produced by cocks from the mainland of Java. On September 25th one of the members of the expedition found a nest of this species in the middle of rank fern-growths under tall Casuarinas, not far from the coast near our Parat bivouac. He aimed at the bird when it flew away, but missed. The fowl returned to the nest, a very unusual thing to do for junglefowl under those circumstances. When snares were laid around the nest, however, it was so wise as not to return, so that I did not have a chance of seeing this bird either. The eggs, five in number, four of which I measured, were 41.4 — 43.4 mm long and 32 — 33 mm wide, measurements which may be called normal for eggs of the Red Junglefowl from Java. If I were to go once more to Pulau Panaitan for a longer stay, it would be partly in order to try and get to know some more about this fowl.

The author who, years ago, reported the presence of the Red Junglefowl on this island, also records *Pavo muticus* (Peacock), but this bird may be assumed not to occur here.

Of the hornbills, mainly living in the tall forest, *Anthracoceros malabaricus* was the most common one but fairly frequently was also heard

*Aceros undulatus*. The presence of *Buceros rhinoceros* (Rhinoceros Hornbill) the third species from the mainland of Java, was not established by us, but in my opinion this does not imply that the birds may not be present here from time to time, as for these excellent fliers, which often cover great distances if the destination is a fruit-bearing tree, the Behouden Passage would seem easy to cross. However, one should be careful in applying human standards in cases like this.

In the stomach of *Aceros undulatus* I found no less than 20 fruits of kòkòsan monjet <sup>1)</sup>, which were from 3 to 4 cm in diameter. In the stomach of a grackle I also discovered such a fruit, which shows that this relatively small bird may play quite an important part in the distribution of such trees and of, e.g. palm-trees as *Corypha utan*. The grackle, living here in the same habitat may be termed common, a thing which can at present be said of only very few places in and near Java. It was mainly by their well-known call that these birds attracted the attention, but they were very rarely seen and practically impossible to shoot.

Nearly everywhere in the lower strata of the tall forest one daily hears or sees *Copsychus malabaricus*, *Muscicapa banyumas*, *Pachycephala cinerea* and *Dicrurus hottentottus*, whereas *Orthotomus sepium* and *Hypothymis azurea* are also fairly common.

*Copsychus malabaricus*, evidently finds here an ideal habitat and there probably are very few places in or near Java where this species is so common and where this inhabitant of dense secondary vegetation is so frequently seen, although here too it hardly ever leaves the shadow of the forest. Its beautiful song was, together with the piercing call of *Pachycephala cinerea*, in many places the first sound heard at dawn.

*Muscicapa banyumas*, was found up to quite near the coast, also in the immediate neighbourhood of the mangrove where we would expect the very similar *Muscicapa rufigaster*, the presence of which was, however, not established for this island. The remarkable fact is that the island of Krakatau which lies about 40 km north of Pulau Panaitan, is inhabited nearly to the top by *Muscicapa rufigaster*, whereas there *M. banyumas* does not occur.

Although *Dicrurus hottentottus*, which is very common in habitat 5b, is also known from various places on the mainland of Java, the species is never collected on the mainland of the western part of this island but is only known from some islands in the Bay of Djakarta and the Thousand Islands. The bird was never seen in Udjung-Kulon; here its place is taken

<sup>1)</sup> According to Mr VAN WOERDEN, Curator of the Botanic Gardens at Bogor, probably *Dysoxylum excelsum*.

by *Dissemurus paradiseus*, which like all other drongos does not occur on Pulau Panaitan.

Several birds collected in the habitat 5b proved to have well developed gonads in spite of the fact that September and October are the driest months of the year in this part of Java, a season in which birds seem little inclined to make breeding plans (see also Limosa, 22, 1949, pp. 1-279).

Most of the specimens of *Muscicapa banyumas* shot on the island were in the mating or hatching stage. On one occasion the oviduct was found to contain an egg ready for laying and one nest was discovered with one-day old young. The gonads of nearly all *Pachycephala cinerea* and *Dicrurus hottentottus* were also strongly developed.

Although there were a few other species with well-developed gonads, e.g. *Pericrocotus cinnamomeus*, *Pycnonotus atriceps*, *Gerygone sulphurea*, *Orthotomus sepium* and *Hypothymis azurea*, only a small percentage of the birds examined was in this stage. To the list of birds with well-developed gonads may be added *Esacus magnirostris*, but this bird is known to breed in this season. On two occasions a clutch of this species was found.

The heron- and stork-like birds were fairly well represented. *Egretta sacra* was seen on the reefs along the shore regularly; the dark "variety" seemed to be in the majority. *Ardea sumatrana* was noticed in the same milieu, and was often roused from the leafy trees in the Barringtonia formation. Along the north-west coast was discovered what was probably the first nest of this species ever known from Java. It was found in a njamplung (*Calophyllum inophyllum*) in the forest behind a headland, less than one hundred metres from the coast at an altitude of about 10 m. It was a big, though airy, construction which had probably contained young only a short time before, as was clear from the excrements around and under the nest. A big feather was found on the ground under the nest, a fairly positive proof that it belonged to this heron. After my opinion a nest like this in such a milieu is bound to be of this heron, so that it may be considered certain that the species breeds here. It is possible that the young of which, along the beach of Ujung-Kulon, I observed specimens which were still being fed by their parents, had come from Pulau Panaitan, although it is equally well possible that the birds also nest in that part of Java.

Apart from *Ardea sumatrana* and *Egretta sacra*, together with *Ardeola speciosa* and *Butorides striatus* (Little Green Heron), all other heron- and stork-like birds were seen in the lagoon of the dead mangroves south-west of Tdj. Parat. They were the ordinary *Ardea cinerea* (Gray Heron), *Ardea purpurea* (Purple Heron), *Egretta alba* and *Egretta inter-*

*media* (Larger and Smaller Egret), *Ciconia episcopus* (White-headed Stork) and *Leptoptilus javanicus* (Lesser Adjutant Bird). Here too the only specimen of *Anhinga rufa* (Darter) was seen. They all of them preyed on the fish left in stinking pools, the water level of which fell every day. There also preyed the kingfishers *Halcyon cyanoventris*, *Pelargopsis capensis* and of course the "Jack of all trades", *Halcyon chloris*. Feeding there on smaller organisms were *Tringa totanus* (Redshank), *Actitis hypoleucos* (Common Sandpiper) and other migrants from the north which might shortly before have flown across the tundras of northern Asia. They might recently have seen below them the war in Corea or the firing-squads of suffering China . . . Here too were the rails *Amaurornis phoenicurus* and *Porzana fusca*, but of them little more than a glimpse was seen.

For the sake of completeness I here mention the other migrants from the north, which were found on the reefs or elsewhere along the coast. But on account of their cosmopolitic character, which they have in common with so many sea- and reef-inhabitants of lower order on which they prey, they are only of small importance when speaking about the fauna of Pulau Panaitan. The number of these migrants steadily increased, but remained far below my expectations. We saw at least two species of Curlews (*Numenius phaeopus* and *N. madagascariensis*), *Arenaria interpres* (Turnstone), *Charadrius dominicus* (Golden Plover), *Squatarola squatarola* (Grey Plover) as well as the smaller *Charadrius leschenaultii* or *Ch. mongolus*, which alighted on the reefs and feasted upon the "loaded table". Outside this habitat of the *Limicoles* we saw the following migratory birds: *Hirundo rustica gutturalis* (Common Swallow), to be distinguished from the swallow which breeds here by its lighter underparts and longer tail, *Motacilla flava* (Blue-headed Wagtail), and, finally, *Merops superciliosus* (Brown-breasted Bee-eater). The last-mentioned bird does not come from such a great distance, as it nests in India and in Ceylon.

• It became evident, that, apart from *Actitis hypoleucos*, which may also be frequently observed in Java during the dry season, there are also other migrants which stay on here during that season, or arrive early or return late to their winter quarters, for in the last days of June I saw 2 *Squatarola squatarola*, 5 *Tringa nebularia* (Greenshank) and 2 *Numenius phaeopus* (Small Curlew) on and near the reefs.

Ranging the coast of the island we saw flying above the sea the terns: *Sterna sumatrana*, *Sterna anaetheta* and probably *Anous stolidus*, *Sterna dougalli* and *Sterna bergii*. Further, the stormy petrel (*Oceanitus oceanicus*) and, on earlier occasions, the gannets *Sula leucogaster* and the rare *Sula sula*. *Sterna sumatrana* was in June found breeding along the coast

of Pulau Panaitan. At that time *Sterna anaetheta* and *Sula leucogaster* were again observed together looking for food (see also Limosa, 20, 1947, pag. 199).

Of the birds of prey not only *Haliaeetus leucogaster*, *Icthyophaga ichthyocetus* (Larger Fishing Eagle) and *Pandion haliaetus* (Osprey) could be seen fairly frequently, but also *Falco peregrinus* (judging by the dark underside I thought it to belong to the subspecies *ernesti*), *Haliastur indus* (Brahminy Kite) and *Spilornis cheela* (Serpent Eagle) were seen. *Haliastur*, so common in many places in and near Java, especially along the coast, was probably represented here merely by one adult and one juvenile specimen, which seems to confirm what I said on an earlier occasion (Trebibia, 19, 1948, p. 93), viz., that this common bird of prey appears to be rare in and around Strait Sunda.

*Icthyophaga* seemed to live on the reefs and the coastal-zone more than in the estuaries of fresh or brackish water rivers, as the species was observed exclusively in the coastal-vegetation and on or above the reefs. This behaviour may be partly due to the time of year, and the species may here too feel more strongly attracted by the estuaries and swamps when the rainy season sets in.

The night birds of prey, the owls, were hardly noticed at all. Only *Otus bakkamoena* (Collared Scops Owl) was heard and that only in the Mt Raksa area when we camped out there for a few nights. In the field owls are as a rule little noticeable, so that from this poor result few or no conclusions can be drawn as to the stock of owls on this island.

Apart from *Ducula aenea*, and the smaller *Ptilinopus melanospila*, which we heard almost daily in many parts of the island, few pigeons were noticed, *Macropygia phasianella* (Sunda Island Cuckoo-Dove), being perhaps the least rare one. *Chalcophaps indica* (Emerald Dove) was also not infrequently seen, but always in dark places, whereas the Sunda Island Cuckoo-Dove was seen mainly in the Casuarina areas. *Treron vernax* (Pink-necked Green Pigeon), I frequently met in the secondary vegetation and also near the Casuarinas surrounding our Parat bivouac mainly near the alang-alang plain. This species is here decidedly less common than it is beyond the Behouden Passage in Ujung-Kulon. I had the idea I heard *Treron griseicauda* (Pompadour Green Pigeon) calling a few times, but after all I am not quite sure of that. One of the members of the expedition heard *Geopelia striata* (Barred Ground-Dove), along the coast near the Parat bivouac, but I have not been able to establish the presence of this pigeon myself. Its call is so characteristic, however, and the bird everywhere so well-known, that I do not doubt this piece of information. The

presence of *Streptopelia bitorquata* (Island Turtle-Dove) was established in a peculiar way, by the finding of a dead specimen on the beach near Legon Kadam. This turtle-dove is a bird which seems very fond of coral-islands. I did not come across it either in Ujung-Kulon or elsewhere along the coast of south-west Banten, but it is very common on the small coral-island of Pulau Dua in the Bay of Banten, and occurs also on some of the islands in the Bay of Djakarta.

About the smaller Apodidae (swiftlets) I am unfortunately unable to give much information, as none of the few specimens which came within shooting range were obtained. Not rarely, near our Legon Kadam bivouac, for instance, many swiftlets were seen, which seemed to form large flocks while looking for food and suddenly disappeared shortly before dark. During the day-time too groups of these birds were seen here and there, mostly flying around the tops of high trees, where they perhaps caught small insects, which in their turn fed on the flowers or fruits of these trees. These swiftlets probably belonged to *Collocalia inexpectata*, but I may have mistaken them, for instance, for *C. fuciphaga*. When crossing the Behouden Passage by ship we saw many swiftlets, which certainly were on their way to Ujung-Kulon; they may have been bound for the swift-caves of Sangijan Sirah in the Mt Pajung complex, south-east of Java's First Point, a place well-known for its great quantities of edible birds' nests.

Nests of *Apus affinis* (House-Swift), were found on the bluff cliffs along the north-west coast of the island, but the young had already flown out. As seems to be the common practice of this species, the adult as well as the juvenile birds had left the environs of the breeding-place, so that the species was not seen any more on the island! The nests, which were still in good condition, and surrounded by a large quantity of excrements, furnished proof that the species had hatched there during the past season.

Cemented against the leaf of a palm-tree was found the nest of *Cypsiurus parvus* (Palm-Swift).

*Hemiprocne longipennis* (Crested Tree-Swift), we saw and collected as far as is shown by my notes, only near the Legon Kadam and the Parat bivouac.

In this part of the island we also regularly heard *Caprimulgus macrurus* (Long-tailed Nightjar), but I myself saw the species only once in the secondary vegetation near the alang-alang plains close to Tdj. Parat. They were also occasionally to be found in the forest. An albino could be collected.

Near Legon Kadam were also shot the only specimens of the two red kingfishers *Halcyon coromanda* and *Ceyx rufidorsus*, bringing the total number of kingfishers we found on Pulau Panaitan up to 6 species, for, in addition to the species referred to in the preceding (*Halcyon chloris*, *H. cyanoventris* and *Pelargopsis capensis*), *Alcedo meninting* (Deep Blue Kingfisher), was seen several times. The two last-mentioned species appeared far from common and *Pelargopsis* could not even be collected.

The island is probably poor in woodpeckers, but two species were observed which elsewhere are not seen or heard "every day", viz., the biggest representatives of the family living in Java, the Great Slaty Woodpecker, *Mülleripicus pulverulentus*, and *Dryocopus javensis*, of which the latter seemed less rare than the former; both were found exclusively in the "old forest", the black one generally in small flocks, may be a family, together. The third Woodpecker was the Lesser Pigmy Woodpecker, *Dendrocopos moluccensis*, which here too seemed very fond of the coastal zone, and was not rare in and near the mangrove-areas.

Of the extensive family of the Bulbuls only three species were found to be present, viz., the secondary vegetation-loving *Pycnonotus atriceps*, *P. goiavier* and *P. plumosus* of which the first and last mentioned species also seemed to feel at home in the primary forest, where they were often seen together, feeding on small forest fruits.

*Copsychus saularis* (Magpie Robin) was the only thrush besides *Copsychus malabaricus*, we found on the island. The bird was not at all common and it was weeks before we collected our first specimen. Together with those other "birds of cultivated areas" *Pericrocotus cinnamomeus*, *Artamus leucorhynchus*, *Rhipidura javanica*, *Aplonis panayensis* and *Oriolus chinensis* (Black-naped Oriole), etc., this robin was met with in areas where tall tjemaras towered above the low coastal vegetation or where the dense brushwood had been replaced by a low or sparse one.

The Sylviid *Orthotomus sepium* we met practically everywhere. There is probably not one acre on this island where this small busybody is not found, and apart from *Pachycephala cinerea*, this is probably the only species so little particular as regards habitat.

In the only alang-alang patch we found in the north-west point of the island, *Cisticola exilis* (Small Fantail Warbler) was noticed once. After the lalang grass had been burned, I surprised *Turnix suscitator* (Bustard Quail), once and *Motacilla flava*, a few times. *Corvus enca* (Slender-billed Crow), in Udjung-Kulon often to be found on and near lalang grass fields as well as in the crowns of fruitbearing forest giants, was rare on Pulau Panaitan and was seen only sporadically.



The parasitic Loranthaceae, forming rank growths, even in the tjemaras, also pointed to the presence of Dicaeidae, of which we detected *Dicaeum trochileum* and *D. trigonostigma*, the latter more often than *trochileum*, also — perhaps mainly — in the tall forest.

Of the Nectariniidae, were observed: *Nectarinia jugularis*, *Aethopyga siparaja*, (Yellow-backed Sunbird), *Anthreptes malacensis* and *Arachnothera longirostris*; *Nectarinia* and *Anthreptes* were fairly common, particularly so in the coastal-zone and in areas which were covered with secondary forest; *Arachnothera longirostris* (Little Spiderhunter) was only once heard for certain and seen later on, so that the species is obviously rare here.

The only representative of the Ploceidae (munias) found on this island, was *Erythrura prasina* (Long-tailed Munia), a small group of which was noticed in a depauperated, fruit-bearing bamboo-stool in the middle of the forest. None of the *Lonchura* species, which are often so common elsewhere, was seen, although particularly *L. leucogaster* is generally known not to be at all particular as to his habitat, and also *L. punctulata* (Spotted Munia) and the "bondols" might find something to their liking on this island.

The above notes may suffice for the time being. In a paper to be followed I hope to give more particulars about the birds which were collected.

#### C. Other animals observed by me on the island

On this subject I can be brief, as what I saw in this respect I came across accidentally.

Many *Clarias batrachus* were observed and also large numbers of *Ophiocephalus striatus* (fishes) were seen, both in brackish water along the shore and in fresh water further inland. The big "eel", *Anguilla mauritiana*, was frequently seen, also along the coast as well as further inland, and so was the "bonteng".

Shrimps were common, mainly a big species, below the waterfall near our Tjipandan bivouac, and in the rivulet which supplied us with fresh water near Mt Raksa. We saw at least two species of freshwater shrimps.

Many thornbacks were seen in the lagune of Legon Mandar; in the latter part of June many were caught by the crew of our ship near Legon Semadang, they were accompanied by young which had pale-blue spots on their upper sides.

Specimens of the frog *Rana macrodon* were seen in the Tjiharashas bivouac in the dead leaves along the rivulet as well as in the water. Some

of them were collected. Young frogs were observed in and near the wells in the Parat bivouac, but these were not caught.

*Mabouya multifasciata* ? (lizard), as well as some species of tree-lizards, what I thought to be *Draco volans*, were seen.

*Gecko verticillatus* ? (gecko) and *Cosymbotus platyurus* ? (house-lizard) were heard regularly, but of these reptiles no specimens were collected. Of the bigger reptiles may be mentioned the snakes *Python reticulatus* and *Dryophis prasinus*, of which three and one specimens, respectively, were seen and partly collected. *Chelonia* sp. (turtle) is decidedly not rare near the island, for tracks of egg-laying turtles and eggs which had been emptied by Javan monitors were frequently seen. One small specimen of that turtle was caught, but set free later on. A few times these animals were found swimming in the sea, at one occasion two of them were seen together. A freshwater turtle caught in the rivulet near the Tjiharashas bivouac probably belonged to the common species *Cyclemys amboinensis*.

*Varanus salvator* (Javan monitors) were seen every day and in nearly all surroundings. They were often found along the beach, but also in the extremely dry forest in the central part of the island, as well as in our store-tent, from which they stole eggs and other things which seemed palatable.

Less numerous, but not at all rare, were crocodiles, and I do not think I ever saw so many crocodiles within five weeks in any other place. They varied in length from 1½ to about 3½ metres, but really big, and particularly very heavy animals were not seen. The tracks which were found were also not made by old specimens. More than once crocodiles were discovered in heavy breakers, whereas sometimes I watched small ones running along the beach, like Javan monitors, with their bodies raised high and their tails lifted clear from the ground.

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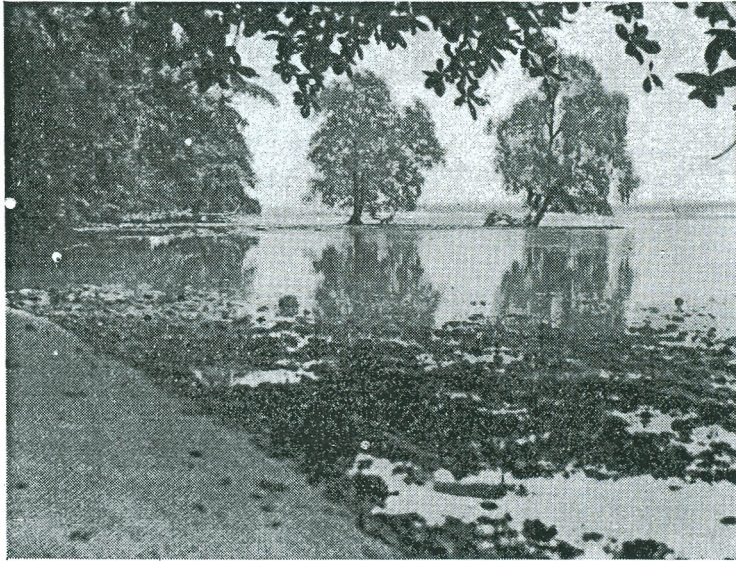


Fig. 1. Coral-reefs north of Tandjung Tjidarahaju, Kasuarisbay.



Fig. 2. The rare *Pandanus bidur* in the western peninsula, south of Tandjung Manik.

A. HOOGERWERF: *The Nature Reserve Pulau Panaitan.*



Fig. 3. Around Legon Mandar, the locality where most of the "birds of cultivated areas" could be observed.

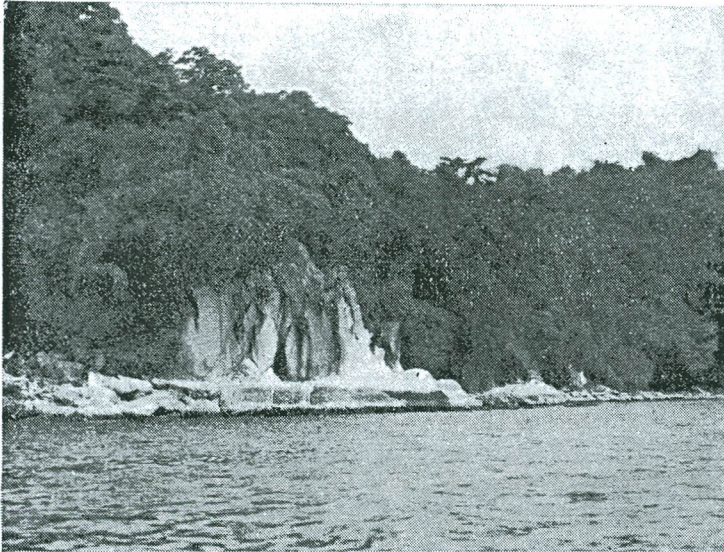


Fig. 4. A hill ridge along the north-west coast, jut out into the sea, forming a wild headland.

- A. HOOGERWERF: *The Nature Reserve Pulau Panaitan.*

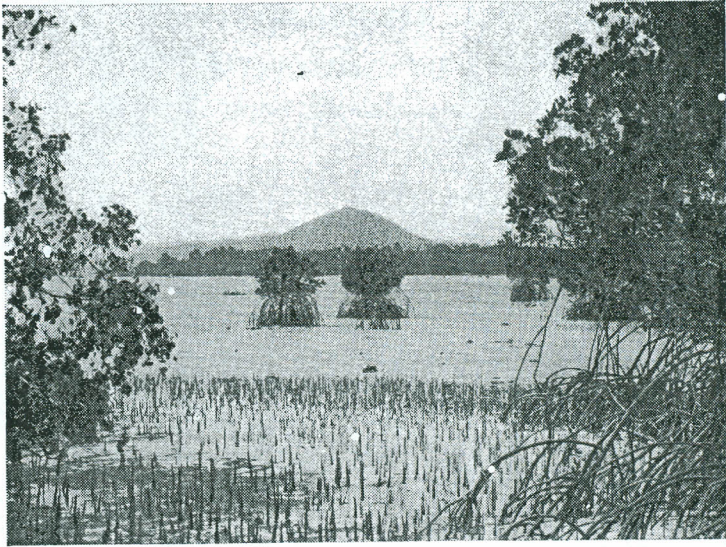


Fig. 5. Mt Raksa seen from Legon Lentah, east coast.

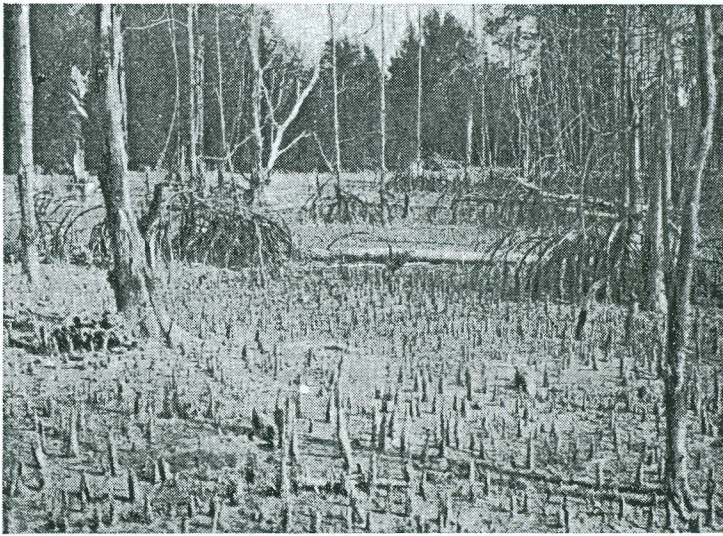


Fig. 6. The lagoon in which the greater part of the vegetation had died off.

A. HOOGERWERF: *The Nature Reserve Pulau Panaitan.*

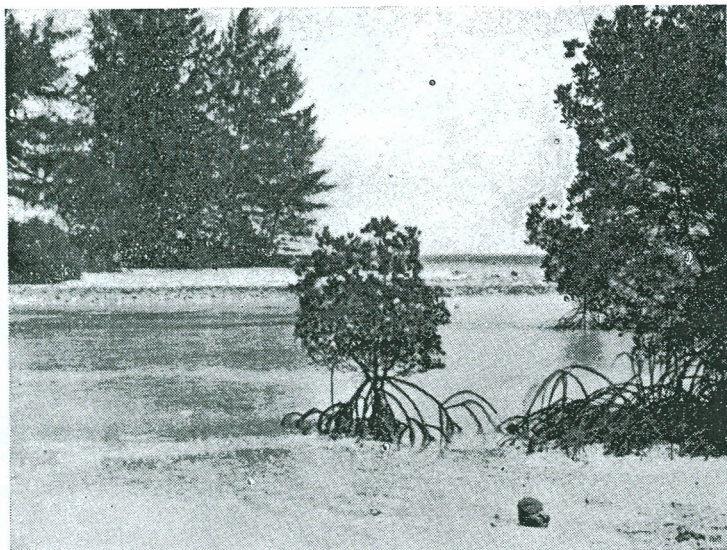


Fig. 7. Mangrove and *Casuarina equisetifolia* on coral-reefs along the north coast.



Fig. 8. Part of the area covered with lalang grass near Tandjung Parat.

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