ON THE ORNITHOLOGY OF THE RHINO SANCTUARY UDJUNG KULON IN WEST JAVA (INDONESIA)

by

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Some particulars on the History, Geomorphology, Topography and Vegetation

Udjong Kulon, which means West point, is the most western peninsula of Java; it was set aside as a Nature Reserve as far back as 1921 and obtained the status of Game Reserve in 1937. The area has been reported to cover approximately 37.500 ha (375 sq. kilometres), but its real dimensions are considerably smaller, as the 1921 Decree (by which the peninsula was declared a Nature Reserve) agrees mentioning 28.600 ha.

In the beginning of the 19th century the area was already thinly populated but the disastrous tidal waves caused by the volcanic eruption of nearby Krakatau in 1883 swept away almost all human habitation, except along the south coast. Most probably tiger and malarial mosquitoes formed the main reasons for reluctance to settle in this region. Also since the country east of the isthmus of Karang Randjang, close to Udjung Kulon's eastern boundary was scarcely inhabited and a wealth of suitable agricultural land was available there, opening up this inhospitable peninsula was not necessary. The lack of human interest in these isolated wastelands was a main reason why Udjung Kulon became a natural refuge for all big game species living in Java, making it one of the most attractive hunting grounds around the beginning of the present century.

In 1912 a small group of Dutch scientists and conservationists founded the Netherlands Indies Association for Nature Protection with one of its first objects the creation of a number of Nature Reserves among which Udjung Kulon ranked first. Soon afterwards some restrictive regulations came into force and in 1921 the entire peninsula was declared a "Natuurmonument", putting a ban on all actions that

could change the existing situation. Much later it became evident that a too strictly protected Nature Reserve is not in favour of the well-being of certain big mammals and the original status was changed in 1937 into that of Game Reserve.

Udjung Kulon is clearly divided into three different parts, viz. the high, sharply intersected mountains west of the Tjibunar and Tjidjungkulon; the much lower, rolling hills east of these two rivers till the tidal forests east of the line Tjigenter-Tjibandowo and these mangrove swamps in the most southerly part of Handeuleum or Tamandjaja Bay, where the isthmus is only about 1800 m. wide. The mountains in the extreme west, which are not volcanic as some authors suppose, but consist amost entirely of sedimentary rock, are known as the Mt. Pajung range, named after the highest peak (480 m). From this range steep narrow ridges fall away to the east, merging into the hills of the central part of the peninsula. In the south-east, south and south-west these ridges drop steeply into the sea, and towards the north-west they gradually become lower, reaching the sea as two capes, Java's First Point or Tdj. Lajar and Java Head or Tdj. Gede, with respective heights of about 30 m. and 50 m. Along the west coast lie a number of rocky islands, often very steep and high, usually with perpendicular walls bare of any vegetation and the tops covered with grass and grasslike plants and some low brushwood.

The larger eastern part of the peninsula displays an entirely different picture. It consists of rolling hills, without pronounced peaks, and which nowhere extend to the coast; it is formed mainly by an intersected marl plateau, which is said to be considerably younger than the Mt. Pajung range. The usual height is about 35-50 m, but in the west there is a much higher ridge which forms the link with the Mt. Pajung range. Along the north coast, just north-east of the alluvial plain which has been built up by the Tjidjungkulon and Tjidaon rivers along Muara Tjikuja, the marl plateau lying a few metres above the beach is clearly visible.

Somewhat southwest of the Njewaän region the marl ridge merges gradually into a rather broad uplifted coral reef, that continues to Java's Second Point or Tdj. Alang-alang and assumes a great width in the northernmost part of the reserve. Behind this coral reef, which

at places is 200-300 m. wide, lies lower terrain which has extremely poor drainage through this highly impermeable ridge. The few outlets worn in this reef, known by the names of Njewaän, Niur and Djaman, are not large enough to prevent the formation of extensive south-west monsoon swamps. By the geomorphologist VERSTAPPEN this coral reef is called a raised pseudo barrier reef and the shallows behind it a lagoon.

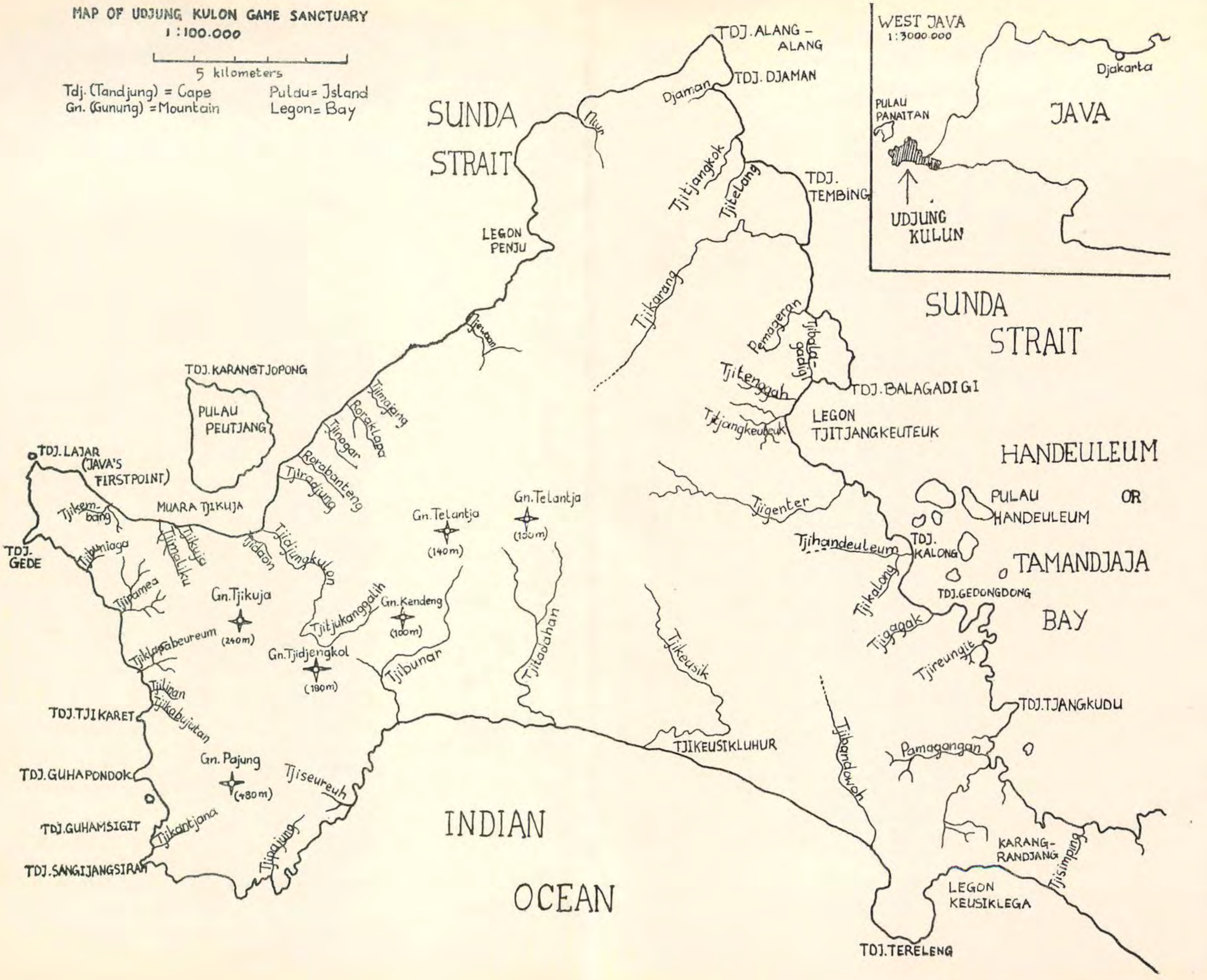
This reef continues, though much narrower, from Tdj. Alang-alang to the south, but becomes less obvious between the Tjikarang and Pemageran. Around the mouth of the latter tidal river it gradually merges into the mangrove swamps near Tdj. Balagedigi. Along this whole eastern coastal area too, the drainage of the terrain between the coast and the higher hills of the interior is often poor, which promotes the formation of south-west monsoon swamps there as well. With the exception of a number of somewhat higher sandy shore terraces which remain dry all the year round and are located at the mouths of the Tjikarang and the Pemageran and between the Tjitjang-keuteuk and the Tjihandeuleum, and in the coastal area along Tamandjaja or Handeuleum Bay south of Pemageran to near the eastern boundary of the reserve is covered with mangrove swamps. These extend south of the Tjihandeuleum far inland and, in the Tjisimping area, they are separated from the Indian Ocean only by a strip of higher ground no more than a few dozen metres wide. The Tjikalong, Tjigagak, Tjireungit and Pamagangan emptying into Handeuleum Bay are tidal rivers which form enormous mudbanks around their estuaries. Locally, however, there are also extensive coral reefs in them which are often so high that they are difficult to pass at low tide, even in a little dugout *proa*. These reefs too are parts of the pseudo barrier reef mentioned above, like the Handeuleum Islands and a number of small capes in Handeuleum Bay along the tidal forests. This extensive area of mangroves developed at the deepest point of the lagoon behind the pseudo barrier reef.

The west and south coasts present a less varied picture. Immediately west of the Tjibunar lies the very rugged Mt. Pajung range, with hillsides often dropping away steeply into the Indian Ocean or separated from the sea by narrow shingle beaches, joining

on to Tdj. Sangijangsirah, the extreme south-west corner of Java. The rocks which appear there contain an enormous cave which has long been known as a nesting place for *salanganes* (swifts producing edible nests). Going northward from somewhat south of the Tjiklapa-beureum, which flows into the sea on the west coast of Udjung Kulon, the terrain loses its desolate and impassable nature, since there the rocks fall back and are separated from the sea by an extensive well-wooded plain and the beautiful beach is interrupted only by a number of rocky capes before the high rock known as Java's First Point is reached.

Immediately east of the Tjibunar, which forms the boundary of the Mt. Pajung range along the south coast, there are small dunes which are covered mainly with *Pandanus* and separated from the sea by a zone of thick sandstone beds a few score metres wide. This sandstone is soft, lies practically horizontal and rises to about 5 m. above sea level. The top layers contain banks of gravel and pebbles. These deposits, which extend to a few hundred metres west of the Tjitadahan, are exposed to the highly abrasive action of the surf and thrust into the sea in slabs. East of this area of sandstone beds which is about 2000 m. long, a wide and very beautiful beach begins. This is separated from the interior by narrow dune ridges, which in most cases do not exceed a height of 10-12 m., but which form a considerably higher crest along the eastern bank of the Tjikeusik, which is called Tjikeusik luhur. Along the foot of these dunes shallow pools may often be found. Between the Tjibandowo and Tdj. Tereleng, which is built up from coral, there are no dunes, but east of this cape the picture does not differ much, until Karang Randjang, from that between the Tjitadahan and the Tjibandowo, for in that area too there are low dunes. East of the mouth of this last river lie fairly deep and extensive, poorly drained swamps which, towards the north belong to the Pamagangan basin. These continue in an easterly direction and beyond Karang Randjang are separated from the Indian Ocean only by the narrow strip mentioned earlier which consists mainly of coral.

As mentioned above it is thought that both the Handeuleum Islands are part of the pseudo barrier reef, but the third island, Pulau


MAP OF UDJUNG KULON GAME SANCTUARY
1 : 100.000
5 kilometers
Tdj. (Tandjung) = Cape
Gn. (Gunung) = Mountain
Pulau = Island
Legon = Bay
WEST JAVA
1:3000.000
Djakarta
JAVA
PULAU PANAITAN
UDJUNG KULUN
SUNDA STRAIT
TDJ. ALANG - ALANG
TDJ. DJAMAN
Djaman
Niur
Tjitjangkok
Tjitelang
TDJ. TEMBING
LEGON PENJU
Tjikarang
SUNDA STRAIT
Pemageran
Tjibalagadigi
TDJ. BALAGADIGI
Tjitenggah
LEGON TJITJANGKEUTEUK
Tjitjangkeuteuk
HANDEULEUM
PULAU HANDEULEUM
OR
TAMANDJAJA
BAY
TDJ. KARANGTJOPONG
PULAU PEUTJANG
TDJ. LAJAR (JAVA'S FIRSTPOINT)
TDJ. GEDE
Tjikembang
MUARA TJIKUJA
Tjikuja
Tjimaliku
Tjibuniaga
Tjidaon
Tjidjungkulon
Tjiramea
Gn. Tjikuja
(240m)
Tjiklapabeureum
Tjilintan
Tjikabujutan
TDJ. TJIKARET
TDJ. GUHAPONDOK
Gn. Pajung
(480m)
TDJ. GUHAMSIGIT
Tjikantjana
TDJ. SANGIJANGSIRAH
Tjipajung
Tjiseureuh
Tjimajang
Rorakklapa
Tjinogar
Rorabanteng
Tjiradjung
Gn. Telantja
(140m)
Gn. Telantja
(100m)
Gn. Kendeng
(100m)
Tjitjukanggalih
Gn. Tjidjengkol
(180m)
Tjibunar
Tjitadahan
Tjigenter
Tjihandeuleum
TDJ. KALONG
Tjikalong
TDJ. GEDONGDONG
Tjiggak
Tjireungit
Tjikeusik
TJIKEUSIKLUHUR
Tjibandawoh
TDJ. TJANGKUDU
Pamagangan
INDIAN
OCEAN
KARANG-RANDJANG
Tjisimping
LEGON KEUSIKLEGA
TDJ. TERELENG

Peutjang, also in the Udjung Kulon territory, is considered to belong to the same formation as the eastern part of the reserve i.e. the marl plateau although the greater part is covered with sand and coral shingle giving the impression of a coral island. The island is entirely covered with forest largely composed of tall trees with no thick undergrowth, whilst the Handeuleum Islands are covered mainly with brushwood and some tidal forests without many large trees. In addition there are a number of small mangrove islands in Handeuleum Bay which, almost without exception, are inundated at high tide and are still very unstable in their structure.

As emerges from the details already given, beyond the Mt. Pajung range (where for the greater part the hills extend to the coast in steep slopes) the whole peninsula is surrounded by a flat zone varying in width from a few hundred metres to half a kilometre. This strip is largely covered with what is obviously secondary vegetation, except along the Mt. Pajung area in the region between the Tjidjungkulon and the Tjimajang and along the south coast between the mouth of the Tjibandowo and the north-east corner of Tdj Tereleng. This zone is least visible behind the dunes along the south coast since the vegetation there is much denser, almost inaccessible, concealing the character of the terrain. It is likely that this extensive zone along the north coast of the reserve, covered with a secondary vegetation, largely owes its origin, as far as the vegetation is concerned, to the Krakatau eruption of 1883 and is not in the first place the result of agricultural reclamation. It is well known that as a consequence of the tidal waves caused by the eruption, which took place only about 55 km away from Udjung Kulon, enormous areas in and around the Sunda Strait were inundated. A large area of Pulau Peutjang was flooded and there the tidal wave was 15 m above the overall level. It is therefore likely that in that catastrophic year practically the whole lowlands of the reserve's north coast, including the Handeuleum Islands, were inundated. As a result of the funnel shape of Handeuleum Bay the tidal wave assumed a very great height there and reached the Indian Ocean across the isthmus of Karang Randjang, now covered with tidal forests, in the southern part of this bay. The large blocks of coral ("negroheads") in many

places along the coast, particularly in Handeuleum Bay, and here and there inland as well, must have been deposited during that disaster. Furthermore it is the author's firm conviction that the heavy trunks of *merbau* (*Intsia amboinensis*) which may be encountered even today in or near the seasonal swamps behind the uplifted reef along the shore, were deposited there in that year by the masses of water sweeping over this area. Probably the whole region north of a line connecting Legon Penju and the Tjitelang was inundated by Krakatau's tidal waves, but the area lying in the shelter of Pulau Peutjang between the Tjimajang and the Tjidjungkulon–where the heavy forest still extends to the coast today–was spared. Perhaps tall and apparently very old trees, such as *njamplung* (*Calophyllum inophyllum*), escaped destruction at a number of other places along the coast.

It is possible that this belt along the coast was in whole or in part subjected to agricultural reclamation before 1883. Indeed, this may be taken for granted as regards the alluvial plain opposite Pulau Peutjang, where there were some villages long before the eruption of Mt. Krakatau. However, it is the author's opinion that no such clearing took place in the subsequent period, since the Krakatau disaster drove away almost all the scattered inhabitants in the north of this area, and the scanty population of the immediate vicinity had much better agricultural land available. Later, this northern side of the reserve was perhaps only of importance as a hunting-ground for the nearby population and for European hunters; it is almost certain that after the Krakatau disaster it was the measures taken on behalf of game hunting that prevented the restoration of the original vegetation. At least it is known that around the turn of the century, and at regular intervals thereafter, Europeans hunted there who, shortly before their arrival, had enormous areas burnt off for the purpose of hunting the ruminant game grazing on young lalang-grass and other herbage which covered the freshly burnt ground. It is possible that it was not until after the eruption that Udjung Kulon assumed its greatest importance as a habitat for ruminant game and the animals preying on them.

As the Krakatau disaster can hardly have exerted any influence on the vegetation growing along Java's south coast bordering the

Indian Ocean, it is probable that the absence of an obviously primary vegetation along large stretches of that part of the reserve is due exclusively to anthropogenic influences of ancient date.

If we exclude mangrove, primary forest (or secondary forest giving the impression of being primary) occurs within only part of the Mt. Pajung range and on Pulau Peutjang. Even in the central part of the sanctuary east of the footpath between Muara Tjikuja and the Tjibunar, one seldom has the impression of walking through primary forest, at least if the thickness of the trees is taken as the criterion; trees with a diameter over 80 cm are definitely rare. Heavier vegetation rarely reaches the beach outside the Mt. Pajung range. Here however, and between the Tjimajang and the Tjidjungkulon and in isolated areas along the south coast, especially near Tdj. Tereleng and the Tjibandowo, it extends almost unbroken to the coast.

Most of the waterways marked on the map are tidal creeks, outlets of monsoon marshes or small brooks. Rivers with extensive drainage areas are those which empty into the Indian Ocean, and the Tjigenter, Tjikarang and Tjidjungkulon.

With the exception of the Tjigenter, the Tjidjungkulon and the Tjibunar, all these rivers are, however, cut off from the sea by a broad sandy beach during a normally dry north-east monsoon. Although one might be inclined to assume that good drinking water must be available almost everywhere all year round, this is not so. During a normal dry season there is no good drinking water available in the coastal area of almost the whole sanctuary, since all rivers still containing water are then brackish, often far inland. Even the Tjigenter, one of the largest rivers of Udjung Kulon, has at that season to be followed a kilometre or more upstream to find good drinking water. A favourable exception to this is the area between the Njewaän and Java's First Point, the Tjiklapabeureum and the Tjibunar.

There is a pronounced difference in rainfall between the damp Mt. Pajung region and the remaining much drier part of the reserve. The annual average over a period of 40 years for Java's First Point, which is part of the Mt. Pajung range, amounts to 3249 mm with a

monthly average varying from 130 mm (July) to 474 mm (December) and no month without rain. There are no reliable figures available for the remaining parts of the sanctuary. However, the author knows from experience that within the area east of Mt. Pajung, rainless months in the period June to October inclusive, are not rare, although a marked dry season is not an annual occurrence. Whilst many years have pronounced dry seasons, in others this season barely differs from the wet south-west monsoon season and in June-September exceptionally heavy rains fall almost daily.

Vegetation.

The major part of the reserve is covered with forest; most of the heavy forest is found in the mountainous and hilly interior. Although it is not possible to establish with certainty the status of this forest, it is most probably very old secondary. There are also extensive areas with a continuous canopy and little or no undergrowth and parts where the forest canopy is interrupted by enclaves chiefly covered with monotypic stands of bamboo or rattan, *langkap*, *salak* and other palm species. These alternate with large stretches of Zingiberaceae, wild bananas etc.,. Most of these wildernesses are found in the valleys. One of the most remarkable features in the botanical field is the abundance of many species of palms, often occurring in monotypic stands and covering extensive areas. About 40 years ago a well known, experienced tropical botanist wrote about this forest: "We then entered the primary forest, a forest of such a strange composition as I have neither seen in the Netherlands Indies nor have found described for this country. This forest was dominated by palms, with a sprinkling of trees or bamboo, and it continued up to close to the watershed with the Tjibunar, the number of palms gradually decreasing, though even near the watershed they continued to play a major role in the vegetation. This type of vegetation can hardly be ascribed to the low-lying ground, for the clay type soil is only swampy in a few places and the streamlets carry clear water through fairly deep-cut beds." (ENDERT 1931)

Among the tall trees as the most conspicuous species may be mentioned: *Bischofia javanica*, *Artocarpus elastica*, *Pterospermum*

Fig. 1. Rocks near Java's First Point.

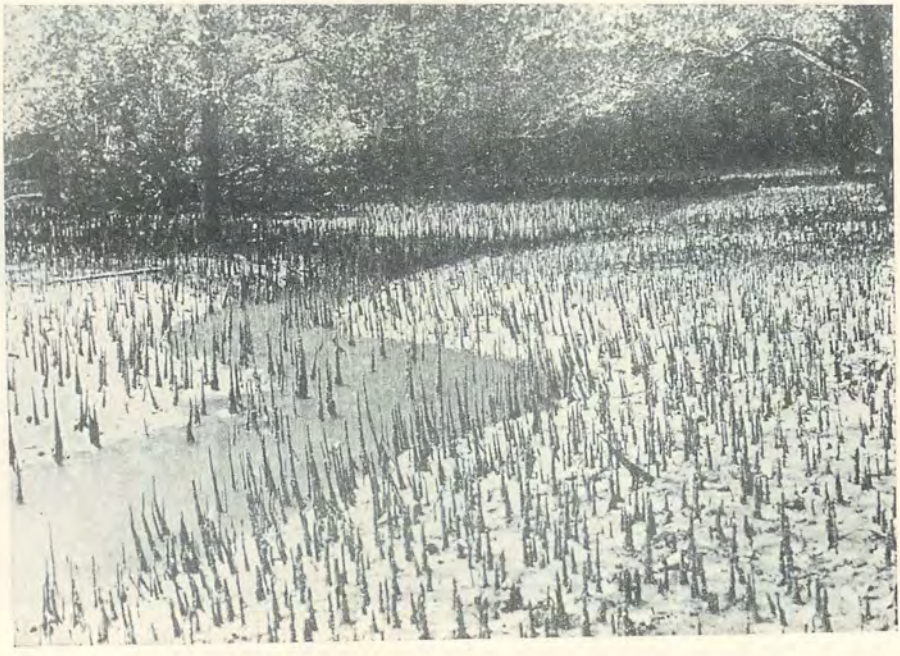


Fig. 2. Tidal Forest at Tdj. Balagedigi.

Fig. 1. Mouth of the Niur outlet.

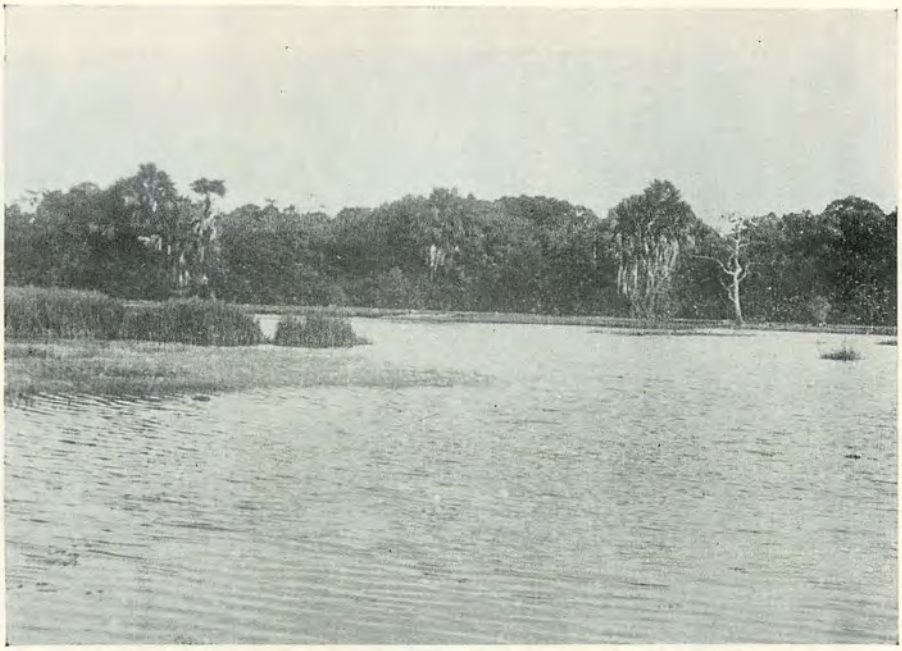


Fig. 2. Drying-up monsoon swamp in the Niur area with gebang palms *Corypha utan* in the background.

Fig. 1. Scenery that is characteristic of the north-east coast of the reserve.

Fig. 2. Part of the south coast just east of the Tjibunar which is exposed to the highly abrasive action of the surf.

Fig. 1. Beach bordering the pseudo-barrier reef near Tdj. Alang-alang.

Fig. 2. Lalang covered Tjidjungkulon pasture.

Fig. 1. Djaman, in the rainy season. The only place in the reserve with an extensive stand of tjemara, *Casuarina equisetifolia*.

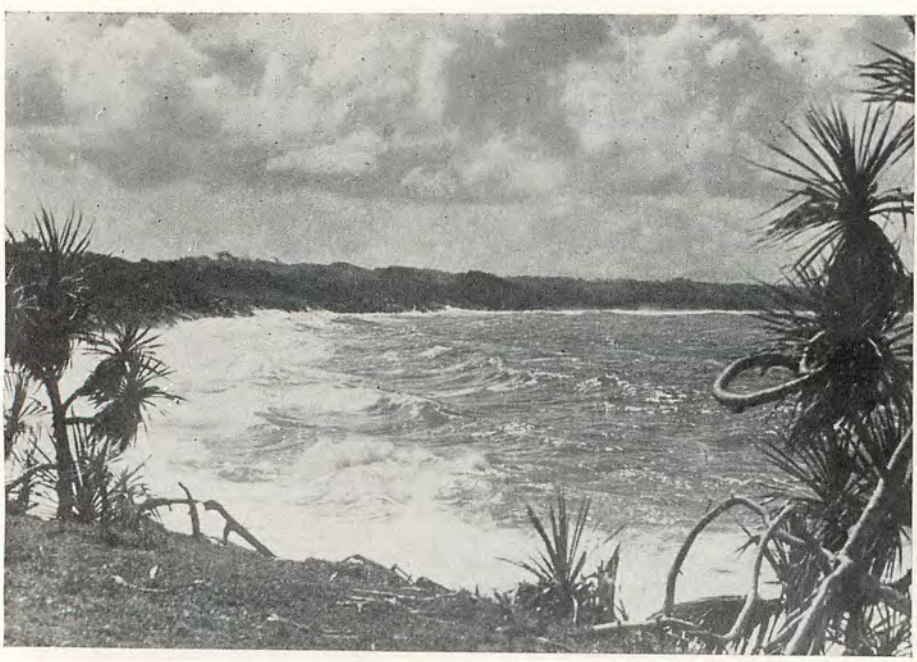


Fig. 2. Part of the beautiful south coast, east of the Tjibunar.

Fig. 1. The west coast : most desolate part of the reserve.

Fig. 2. The wilderness surrounding Java's First Point-rarely visited.

javanicum, Anthocephalus cadamba, Alstonia scholaris, Spondias pinnata, Pterospermum diversifolium, Radermachera gigantea, Pterocymbium javanicum, Pentace polyantha, Canangium odoratum, Wormia excelsa, Pometia pinnata, Dillenia indica, various *Eugenia* and *Ficus* species, etc.

In the regions of young secondary growth between the hilly interior and the north, northeast and northwest coasts, which often have a parklike character and where fairly open forest country alternates with open game pastures and monsoon marshes, the most frequent trees are: *Nauclea orientalis, Glochidion zeylanicum, Lagerstroemia flos-reginae, Dillenia indica, Dillenia obovata, Vitex negundo, Desmodium umbellatum, Hibiscus tilliaceus, Cordia subcordata, Morinda citrifolia, Ardisia humilis, Mallotus paniculatus, Calophyllum inophyllum,* various *Eugenia* and *Ficus* species, etc.

Undergrowth is composed of: *Calotropis gigantea, Melastoma polyanthum, Lantana camara, Blumea balsimifera, Commelina benghalensis, Euphorbia* spp., *Hibiscus sabdariffa, Eupatorium odoratum, Hyptis capitata, Stachytarpheta jamaicensis, Imperata cylindrica* and many Cyperaceae and Gramineae among which many *Fimbristylis* and *Cyperus* species and in boggy environment, including monsoon marshes: *Typha domingensis* var. *javanica, Phyla nodiflora, Eclipta prostrata, Leea sambucina, Polygonum longisetum* and, above all, various *Cyperus* species.

One of the most conspicuous features of the coastal lowlands is the *gebang* palm (*Corypha utan*) and in the Djaman area an extensive stand of high *tjemara* (*Casuarina equisetifolia*). In many localities the coast is bordered by a narrow strip of plants of the *Ipomoea pes-caprae* formation in which besides the latter species and *Spinifex littoreus* the following species are important: *Pemphis acidula, Vitex negundo, Tournefortia argentea, Sophora tomentosa, Wedelia biflora, Hibiscus tilliaceus, Premna corymbosa, Allophyllus cobbe,* etc. But the most striking trees in this zone are the *njamplung* (*Calophyllum inophyllum*), which are often enormous.

The lowlands bordering the south coast have quite a different vegetation; in addition to *Pandanus tectoreus* and *P. bidur,* it is the abundance of palms that catches the eye, especially the almost impenetrable thickets of rattan. Among taller trees, *Barringtonia*

asiatica, Hibiscus tilliaceus, Erythrina variegata, Terminalia catappa etc. may be called common.

In the mangrove swamps one encounters the usual trees and shrubs characteristic of this habitat, such as *Lumnitzera racemosa, Sonneratia alba, Avicennia* spp., *Rhizophora* spp., *Bruguiera* spp. and as ground cover in many places, *Acrostichum aureum* and *Acanthus ilicifolius*. Many tidal forests are along the northeast coast, but small ones are also found along the other coasts, being rarest on the south coast and absent from the west coast. The mouths of almost all rivers are bordered by monotypic stands of *Nypa fruticans*, often penetrating far inland.

Worthy of note is the fairly frequent occurrence of the rare *Pandanus bidur* of which beautiful stands are found along the west coast between Tdj. Lajar and Tdj. Gede, close to the mouths of the Tjibunar, Tjitadahan and Tjikeusik and along the south coast of Tdj. Tereleng.

Annotated List

With the exception of the period of the Japanese occupation of Java and its aftermath, the author visited this Nature Reserve very regularly between 1937 and 1958, camping there approximately 450 days and nights. Although during almost all these trips other work predominated, much attention was paid to ornithological subjects and an ornithological diary was kept of all birdspecies recorded, including field notes from which this synopsis is an abstract. All species listed below were encountered by the author except No. 70 (*Cairina scutulata*).

To enable the reader to compare the status of the birds occurring in this area with their status in the rest of Java some general remarks on the distribution, frequency of occurrence, habitat preference, song and reproduction in Jave have been added. So far very little has been published on these subjects and most papers were written in Dutch and are therefore inaccessible to those not familiar with the language. This information is taken from the author's unpublished typescript on the birds of Java. A thorough knowledge of a bird's vocal expressions is of paramount importance in identifying the

species in the field so much attention is given to this subject, but the author is fully aware of shortcomings in his efforts to satisfactorily reproduce these sounds.

References in brackets refer to papers listed at the end of this article. The reader may also refer to some general papers on the birds of Java and the surrounding islands, almost without exception published in Dutch or in little-known periodicals (Hoogerwerf and Rengers Hora Siccama 1938, 1939; Hoogerwerf 1948, 1949, 1949a, 1949b, 1953, 1953a, 1953b; Hellebrekers and Hoogerwerf 1967). The latter paper mentions all birds known to breed in Java and its satellite islands, and gives all particulars available on breeding dates, clutch size, egg measurements and weights, and descriptions; details which, therefore, are omitted from this paper. It is the author's intention to prepare a separate paper on the taxonomy of the birds of the Sunda Strait area of which this Nature Reserve is a part.

In the synopsis below the sequence of species is that of Chasen's Handlist (1935) as are almost all the English names. The scientific nomenclature is in accord with more modern views as far as acceptable in the author's opinion. For species breeding in Java (marked B in the list) and migrants (N = northern migrants; S = southern migrant) the author has almost exactly followed Bartels & Stresemann (1929) stragglers or species of which the status is not exactly known remain unmarked.

Family PHASIANIDAE

B I COTURNIX CHINENSIS PALMERI (Riley)
Blue-breasted Button-Quail

Not common; the small stock still present may be a remnant of a considerably denser population in the old days when suitable habitat (open plains covered with lalang grass and herbage of various kinds) was still abundant. Before the war the species was only observed within the Tjidaon-Tjidjungkulon area (the only lalang grass covered game pasture) where in October 1942 five specimens were

found. After the war the creation of new pasturage in the Niur region was most probably responsible for extension of its range to there.

General remarks. In many parts of the cultivated lowlands of Java up to at least 800 m this may be considered a common species. Its habitat includes harvested rice-fields, meadows, open fallow land etc. amid well populated areas, grassy plains, open or sparsely wooded wastelands in the remotest parts of the island. However, it is a bird of local occurrence, apparently absent from many suitable places, and it is perhaps more nocturnal than diurnal. Most diurnal records relate to flushed solitary individuals, quickly vanishing in thick cover after a short, low flight.

It is a silent bird, occasionally uttering a soft "tir-tir-tir-tir" when startled. The male bird is said to produce a whistle like "fi-yoo . . . fi-yoo".

The nest is a slight depression well concealed and with little or no lining. (Hoogerwerf 1951)

B 2 GALLUS GALLUS BANKIVA Temminck Red Jungle-Fowl

Rather common in and around almost all game pastures or remnants thereof, but also found along the west and south coasts where open places are rare, and even in primary forest in the interior, though thin scrub jungle and open forest country is preferred.

General remarks. This is one of the few species found in Java from the borders of the ocean to the edges of lava fields near the summits of the highest volcanoes (over 3000 m), but it is rather sparsely distributed and mainly restricted to really wild country including the primary forests of which, however, it prefers the fringes. It is much less an inhabitant of extensive open plains than the following species. Although cultivated areas are not avoided the remotest parts are selected with sufficient protective cover at hand, because it is an extremely shy and wary species.

Solitary individuals are encountered most frequently but occasionally a cock with some hens, for the species is polygamous and also flocking hens or a hen with a few chicks are a not uncommon

sight. When disturbed it runs with ease, only using its wings when the disturber approaches too close. The flight is heavy and usually short but occasionally flushed birds seek shelter in tall trees.

The cock's crowing sounds like "peukikoh" or "beukika", also as "kokkikohoh". Occasionally individuals of either sex cackle like domestic hens.

The nest is a depression scratched in the ground, lined with some dried leaves and other plant material. Real nests are also made in the axillaries of palms, on epiphytic ferns, bamboo clumps etc., sometimes at great height. (Bartels 1926, Hoogerwerf 1948a, 1949, Sody 1941, 1941a).

B 3 GALLUS VARIUS (Shaw & Nodder)

Green Jungle-Fowl

A more pronounced preference for open places with low ground cover and their surroundings is presumably the first reason for its less frequent occurrence than the preceding species. However, at the edges of the grazing grounds and in their park-like surroundings both species may find a mutual habitat, though they have not been seen together. The author never encountered *Gallus varius* in real forest but protective, often dense, cover appears essential. Solitary birds were seen most commonly in the reserve, but flocking hens—a cock accompanied by some hens or a hen with chicks - were not exactly rare. As with *Gallus g. bankiva* the cock's crowing is one of the most striking evidences of the presence of this Junglefowl.

General remarks. The Green Jungle Fowl is not uncommon within a suitable habitat; up to at least 1500 m above sea level, in humid West Java and in the eastern parts of the island up to the summits of the highest mountains. This species too has a rather local distribution. The difference in the vertical distribution of this and many other birds must be attributed to the fact that many mountains are deprived of heavy forest as a consequence of regular burning in the arid eastern regions of Java, and this is often replaced by enormous grass-covered areas forming an excellent habitat. Extensive stretches of woods are insuperable barriers to expansion in such species.

Although nowhere abundant, the species is resident in many localities where clearings border primary forest or in deserted agricultural plots and similar wastelands, covered with lalang grass or herbage of various kinds and dotted with bushes or thickets. Broadly speaking, this Junglefowl often inhabits the same areas as the preceding species, as in Udjung Kulon, but its habitat differs because of the pronounced preference for open plains, mainly those of the lowlands with sufficient cover at hand, avoiding heavy jungle where all sunlight is shut out by the forest canopy.

Its behaviour is rather similar to that of the Red Jungle Fowl but when flushed it rarely flies into trees.

Its call is an unmelodious "tjang-ègar" or a harsh "keukreuh" with the stress on the last syllable, often repeated at intervals of approximately 10 seconds.

The nest resembles that of the preceding species but the author is aware of no nests above ground level. (Hoogerwerf 1951, 1967, Sody 1941, 1941a).

B 4 PAVO MUTICUS MUTICUS Linnaeus Javanese Peafowl

One of the most conspicuous birds almost everywhere in the reserve, except in the heavy forest and the monotypic impenetrable thickets of *rotan*, bamboo, etc. It occupies the same habitat as both *Gallus* species mentioned above which it also resembles in habits. Although it does not penetrate far into forests with a continuous canopy, good cover is essential, both to roost and to hide. The flight looks rather strenuous but Peafowl are strong flyers as shown by roosting individuals regularly found on *Corypha utan, gebang* palms, often 25-30 m high and by the crossing of Tjikuja Bay to visit Pulau Peutjang, a distance of approximately 800 metres.

Usually solitary, or a few together, but 5-10 or more scattered individuals may graze the same area or use the same roost. Once 15 roosting Peafowl were found on the same *gebang* palm. Although polygamous, a cock associating for some considerable time with a few hens is not common in the reserve, but hens may assemble in small flocks and also hens with chicks are of rather common appearance.

General remarks. Its range in Java agrees with that of the preceding species, for Peafowl too take advantage of man's devastation of mountain forests in eastern Java, whereas in West Java they rarely visit regions above 1500 m. Almost everywhere they share the habitat of both *Gallus* species known in Java, but their behaviour seems closer related to that of *Gallus* g. *bankiva* because of the less pronounced aversion to shady localities. Like it, Peafowl frequent tea-and coffee gardens bordered by jungle, or a similar habitat, in thinly populated areas and they are also resident in many of the extensive teak forests in Central and East Java. However, Peafowl are considerably less common in Java today than either *Gallus* species and also more local in occurrence.

The most striking call is a far-carrying, penetrating "kie-auw", most often heard in the early morning and late afternoon, especially during the mating season. In addition, softer sounds are uttered like "auwooooooh-auwood-. . . kokokokokoko" or "eeeeeehè . . . eeeeeehè-woh" etc. During the rainy season the birds are extremely silent, occasionally for months.

In the reserve most breeding takes place from July to October and most cocks with a train are seen in August and September. The nest is a shallow depression in the ground among lalang grass or other not too high herbaceous or graminaceous plants, lined with some dried grassblades or similar material. (Bartels 1937a, Hoogerwerf 1947c).

Family TURNICIDAE

B 5 TURNIX SUSCITATOR SUSCITATOR (Gmelin)

Bustard Quail

In habitat and habits not much different from the Blue-breasted Button-Quail. In this area perhaps not so rare though not recorded outside the Djaman-Niur-Njewaän complex except once on the Tjidaon pasture. Usually one or two birds together, occasionally some more scattered over an area covering a few acres.

General remarks. Widely distributed in Java up to at least 1500 m above sea level, but restricted to open country, by preference covered with lalang grass or other graminaceous plants with little or no higher vegetation, prefering perhaps places where the ground cover is lower than that frequented by *Coturnix chinensis*. This species is also more often found on harvested ricefields, in vegetable gardens etc. where often some weeds form the only cover and the presence of human habitation seems not to bother the birds. Thus the Bustard-Quail is considerably more widespread than the Blue-breasted—with which it does not associate though both species may inhabit the same locality.

A very silent bird. The female produces a buzzing sound, or gloomy "boom-boom", most often heard at night.

The nest resembles that of *Coturnix chinensis* but is often less well concealed; often a real nest is made composed of dried leaves, grassblades and occasionally small twigs, stalks, etc. (Hoogerwerf 1962).

Family COLUMBIDAE

B 6 TRERON GRISEICAUDA PULVERULENTA[1] Wallace

Gray-cheeked Green Pigeon

Not common though periodically abundant, usually associating in small, but sometimes in large, flocks, rarely in pairs. Most often found on medium-sized trees in open secondary forest around the Niur-and Tjigenter pastures and in forest fringes, also penetrating primary forest. In many cases the melodious call betrays the presence of this beautiful pigeon.

General remarks. The range resembles that of the preceding species for this bird too reaches the highest elevations in East Java when suitable habitat is available, though it is erratic in its occurrence and numbers. It may be found almost anywhere with suitable feeding conditions. It occurs in densely populated areas including towns, when sufficient high trees are available; it then often associates with other fructivorous pigeons.

1. The race *pulverulenta* is often assigned to *T. pompadora*. Ed.

General silent but when roosting during the hottest hours of the day and also in the late afternoon the characteristic melodious "aoo-aoo" alternating with a less harmonious "hauw-hauw-hauw" usually uttered from dense foliage, is proof of its presence.

It nests in shrubs or trees, often not far above the ground and not very well concealed. The nest is a typical pigeon's nest, a small platform of twigs etc. without lining.

B 7 TRERON VERNANS GRISEICAPILLA Schlegel

Pink-necked Green Pigeon

Rather common but of irregular occurence and found in about the same habitat as the preceding species, though not frequenting the heavy forest. Often seen in mangrove and other coastal vegetation. This pigeon too is a sociable bird, often found in large flocks and when feeding associating with the preceding and other pigeons; in the reserve flocks of up to about 100 birds may be recorded at the same period as breeding birds.

General remarks. Not known in Java at altitudes above 1500 m and certainly more a pigeon of the lowlands than the preceding species, although in habitat and behaviour it resembles it. It is less elusive than the Gray-cheeked Green Pigeon and rather fearless of man and his habitations, even frequenting low shrubs if sufficient food, mainly berries, is available. It is often found in tidal forests, most frequently in pairs or small flocks. When feeding in high, fruit-bearing trees they may appear in huge flocks of a hundred or more often congregating with other fruit-eating birds. They also gather in extensive flocks at their nightly roosts. As with the preceding species they stay in dense foliage and often only their typical call attracts attention.

The call is a sweet, melodious "troo-troo-troo ... troo-wel-lot" or a single "troowel-lot", most often uttered in the late afternoon.

Nestsite and nest resemble those of the preceding species. In the reserve nests were found in almost every month; they were placed in light secondary forest or on open plains with many scattered groves of shrubs and small trees, generally only a few metres above the ground and not well concealed (Hoogerwerf 1948b, 1962).

B 8 PTILINOPUS MELANOSPILA MELANAUCHEN (Salvadori)
Black-naped Fruit Pigeon

More commonly recorded after the war than in prewar years but never numerous. Of local occurrence, displaying a preference for well wooded locations in the neighbourhood of the pastures. Also found in forests with a continuous canopy and in mangrove. Owing to its shyness sight records are rare; usually solitary or in pairs, never flocks of any size.

General remarks. Widely distributed up to 1500 m but considerably less evident than the two preceding species; more an inhabitant of tall trees and dense foliage, never associating in large flocks. Although this small pigeon may be found in sufficiently forested coral islands and in tidal forests and in primary forest at greater altitudes, it prefers the lower zones of its range. There it inhabits a diversity of habitats, including densely populated districts, villages and towns. Tall trees are a favourite residence, but low shrubs are not avoided. Lone birds or pairs are perhaps most common, but small flocks are not unusual. When feeding in fruiting trees they may associate with other pigeons, etc. The characteristic call betrays its presence but even then it is difficult to see.

It utters a gloomy and monotonous "oowook-wook . . . oowook-wook", "woo-woo-woo", "eu-oowoo . . . eu-oowoo" or "oowoo-woo", almost invariably from dense foliage.

The nest, a very small and light structure is most frequently in low or medium sized shrubs or trees, and is often poorly concealed.

B 9 DUCULA AENEA POLIA (Oberholser)
Green Imperial Pigeon

A rather common resident in almost the same habitat as the preceding species but almost invariably selecting tall trees and palms to feed, or perch, on. Most often found singly or in pairs, occasionally in small flocks of 5 to 10 individuals. Less shy than the preceding species but nevertheless most observations in the reserve are based on its loud call.

General remarks. Rather common in wild country below 800 m, but extremely rare or completely absent in the densely populated, cultivated regions—although it may frequent remote, quiet corners of such areas, especially within newly cleared agricultural plots. Tall trees however are essential. It also penetrates the primary forest, particularly its edges. Solitary birds are rather uncommon and most often small flocks are encountered. They most often feed amid the dense foliage of tall trees but roosting individuals are regularly found in thinly leafed or bare crowns.

Its typical call usually attracts attention : this is a far-carrying, monotonous booming "doo-doorrr", a repeated "koorrrr-hoo" most often heard in the late afternoon.

The few nests seen by the author were in medium-sized trees in open secondary forest and also in mangrove, 8-10 metres above the ground and not very well concealed (Bartels 1939, Hoogerwerf 1950a, 1963).

B 10 DUCULA BICOLOR (Scopoli)

Pied Imperial Pigeon

Of erratic occurrence in the reserve. Periodically found in extensive flocks, most often on fruiting *gebang* palms (*Corypha utan*), and never far inland. Since the fruiting of this palm lasts many months and there are always many of them of all possible ages, the appearances of this pigeon with apparent peaks in May, September and December cannot be linked to the cycle of these fruits. The typical call was extremely rarely recorded in the reserve.

General remarks. This pied pigeon is only known from coastal areas from which it apparently does not stray far; here mangrove, and fruiting trees and palms on dry ground are frequented. It seems to be erratic throughout its range, although it regularly returns to the same favourable feeding places. Non-breeding individuals are never seen singly, but in flocks which vary in numbers but are often extensive. When attracted by tall fruiting palms or trees they do not avoid populous areas but remain wary and shy. Outside the mating and breeding season the species is very silent.

Its call, a far carrying, booming "oo-oo-oo" or "oo-roo", "koo-koorrr", "woo-oo" or "dooroo" resembles somewhat that of most other *Ducula* species.

Not much is known of the breeding habits of this "sea pigeon". On a small coral island near Bawean (Java Sea) a single breeding bird was found in a tall tree in open forest, and on a well-wooded coral island a few miles south of West Java some scattered nests were found on the heavy branches of *Terminalia catappa* growing some metres above the beach (Bartels 1939, Hoogerwerf 1967).

B 11 MACROPYGIA PHASIANELLA EMILIANA Bonaparte
Sunda Island Cuckoo-Dove

Most observations are from the edges of the pastures, from the forest fringes and from the banks of brooks and rivers in primary forest. The apparent frequency of occurrence does not correspond with the extremely suitable habitat present in the reserve. However it is a shy and silent bird and the typical call is the most striking proof of the bird's presence.

General remarks. This is again a pigeon with an extensive range. It is known from sea level to at least 2000 m prefering, however, the lower altitudes. The favourite habitat is well wooded, including primary forest, although it may prefer the forest edge; it also frequents isolated groves of heavy secondary forest in the wild corners of cultivated districts. It is elusive; rarely observed outside the dense foliage, even after it has been located by its characteristic voice. If people approach it keeps completely still until suddenly leaving its refuge with extremely rapid flight. Single birds or pairs are most frequent. Not gregarious. Low and medium-sized trees attract more than forest giants.

Its call is a melodious not very loud "koo-wauw"....koo-koo-koo-wauw" or a loose "woo" or "woohoo".

Nestsite and nest resemble those of *Ptilinopus melanospila* but the nest is more often found in shady places and frequently on palm-leaves, in *rotan*, among tangled vines etc. (Hoogerwerf 1965c).

B 12 MACROPYGIA RUFICEPS RUFICEPS (Temminck)
Small Cuckoo-Dove

Habitat and behaviour in the reserve do not differ profoundly from the preceding species, but this smaller Cuckoo-Dove must be very rare in the sanctuary for there are only a few sight records from before the war, when it was also rarely heard.

General remarks. Unlike the preceding species this is more an inhabitant of the mountains where it occurs up to at least 2500 m. This preference for high elevations may be the reason for its rare occurrence in Udjung Kulon. In habitat and behaviour it resembles the preceding species, though perhaps it sticks more to primary forest or similar environments where all sunlight is shut out by the forest canopy. Very elusive; usually found singly or in pairs. Usually extremely difficult to discover, even after its call has betrayed its whereabouts.

Its call, a sweet "koo-reuw....koo-reuw", an often repeated "keuroo-keuroo" or "roo-roo-roo-roo-roo" is strikingly different from that of the preceding species, and is often the best evidence of the bird's presence.

Nestsite and nest resemble those of the preceding species; and again the nest is often placed in *rotan*, bamboo or on palmleaves, generally not far above the ground.

B 13 STREPTOPELIA CHINENSIS TIGRINA (Temminck)
Spotted Dove

Despite an abundance of suitable habitat this conspicuous dove is considerably less common in the reserve than in so many other places in Java where it occasionally becomes a real pest. In Udjung Kulon it was only found on or around the open game pastures or in a similar habitat along the coast. Generally alone or in pairs.

General remarks. Widely distributed from sea level to at least 1500 m, and in eastern Java to the highest altitudes. Broadly speaking this is the most common representative of the family, and one of the most familiar birds of the cultivated regions, comparable with such species

as *Halcyon chloris*, *Pycnonotus goiavier* and *Pycnonotus aurigaster*. It also frequents the same habitat as these species, differing however by its more pronounced terrestrial habits and its erratic occurrence, strongly influenced by fluctuations in food availability. Small flocks or pairs are most frequent but occasionally in rather extensive flocks on harvested ricefields or similar favourable locations. It is one of the most favoured game birds, so that one may wonder at its continuing abundance.

Although not exactly noisy its well-known call is heard regularly. It is a melodious "teu-koo-koorrr" or "teu-koo-koorrr.... koo-koo".

Most frequently the nest is a thin platform, but solid structures are also built, 3 to 8 metres above the ground, sometimes considerably higher, i.a. on coconut palms (Hoogerwerf 1967).

B 14 GEOPELIA STRIATA STRIATA (Linnaeus)

Barred Ground-Dove

In the reserve the habitat and behaviour of this lovely little dove resemble those of the preceding species but it is more commonly found in small flocks of 4 to 6 individuals. Its occurrence seems rather erratic, sometimes it was recorded almost daily in a suitable habitat where it was apparently absent for long periods.

General remarks. The range is almost exactly the same as the preceding species, but it is not known to occur over 1500 m. above sea level. This little ground-dove never assembles in such extensive flocks as the preceding species and pairs are more common than small parties, which may have led to, or may result from, more sedentary habits.

Though it is not such a favourite target as the much larger Spotted Dove many are captured, of which suitable ones are sold as cage birds and the remainder eaten. It is one of the most prized cage birds in Indonesia, and unbelievably high prices are paid for really perfectly calling individuals.

It produces a sweet and melodious call; a soft "purr-koo-toot", "purr-koo-too-toot" or "urrr-teu-kookook". But this will certainly be considered a very poor attempt to reproduce its voice if judged by a connoisseur of its vocal expressions.

Nestsite and nest resemble those of the preceding dove, but in size the nest is more like that of *Ptilinopus melanospila* (Hoogerwerf 1967).

B 15 CHALCOPHAPS INDICA INDICA (Linnaeus)

Emerald Dove

As everywhere it was very difficult to determine the real status of this dove in the sanctuary because of its silence and unobtrusive habits. Judging from the frequence of its occurrence, including the records exclusively based on the bird's calling, it seems justifiable to consider it not too common. However, in October 1942 five different individuals were observed on and along a jungle path approximately 6 kilometres long through one of the most densely wooded areas of the reserve.

General remarks. Like the *Macropygia* species this is a pigeon with a very extensive range. It is found from sea level to the summits of the highest mountains of Java when suitable habitat is available, prefering however the lower zones. The favourite habitat is rather similar to that of *Macropygia ruficeps* but its unobtrusive habits and preference for low thickets, in addition to its terrestrial behaviour, enable the bird to penetrate further into the cultivated parts of Java than the latter. It is a terrestrial bird *par excellence*, living almost exclusively in heavy forest or dense scrub jungle where sunshine rarely touches the ground, making observation extremely difficult. Its tendency to feed on jungle paths helps, because otherwise not much more than a glimpse of a low-flying bird or the characteristic call points to the bird's presence. Most frequently single birds are found, occasionally two. It only rarely ascends higher than a few metres above the ground.

It is certainly not a noisy bird; its call corresponds to its gloomy habitat, it is a melancholic "woo" or "hoo-oo" carrying far in the still surroundings.

Nestsite and nest resemble those of *Macropygia ruficeps;* the nest is often placed on the ribs of low, horizontal palmleaves (Hoogerwerf 1967).

Family RALLIDAE

B 16 RALLUS STRIATUS GULARIS Horsfield

Blue-breasted Banded Rail

The only specimen ever found in the reserve was seen (on September 15, 1941) on a freshly burnt game pasture bordering a dried-up monsoon marsh in the Djaman area. Its call was never heard. Because the many monsoon marshes and similar tracts in this area do not retain any fresh water during extremely dry north-east monsoons, this rail is probably rare, although a small breeding stock may be resident.

General remarks. Up to a least 1500 m but when conditions are favourable perhaps considerably higher. Common. Found in tidal forests and on dry coral islands (where no fresh water is available during long periods) and in small swampy plots near villages, and especially in the muddy ricefields, which are almost everywhere in Java. Between 1000 and 1500 m a very common species in West Java in extensive areas of wet ricefields, so that it certainly may be considered a resident of mountainous areas too. Despite regular occurrence in cultivated, and often densely inhabited areas, it is a shy bird, though more frequently seen than any other rail living here. When disturbed it most often escapes by running fast to cover which is never far away, only using its wings, and then briefly, when it is taken by surprise. Most frequently seen singly but occasionally several scattered over a small plot.

Perhaps on account of its nocturnal habits the call is rarely heard in daytime; it is an often (10 to 15 times repeated) buzzing note

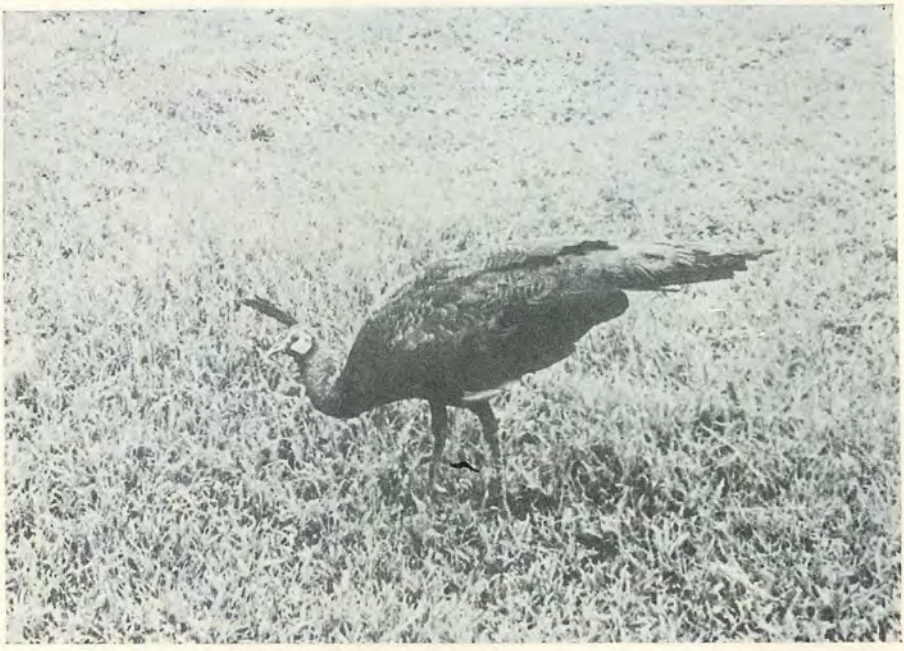


Fig. 1. Peafowl on the Tjigenter pasture.

Fig. 2. *Sterna albifrons sinensis* breeding in the coastal plain along the north coast of Java.

Fig. 1. *Esacus magnirostris* along a sandy beach in Djakarta Bay.

Fig. 2. Clutch of *Esacus magnirostris*.

Fig. 1. *Leptoptilus javanicus* in tidal forest near Djakarta.

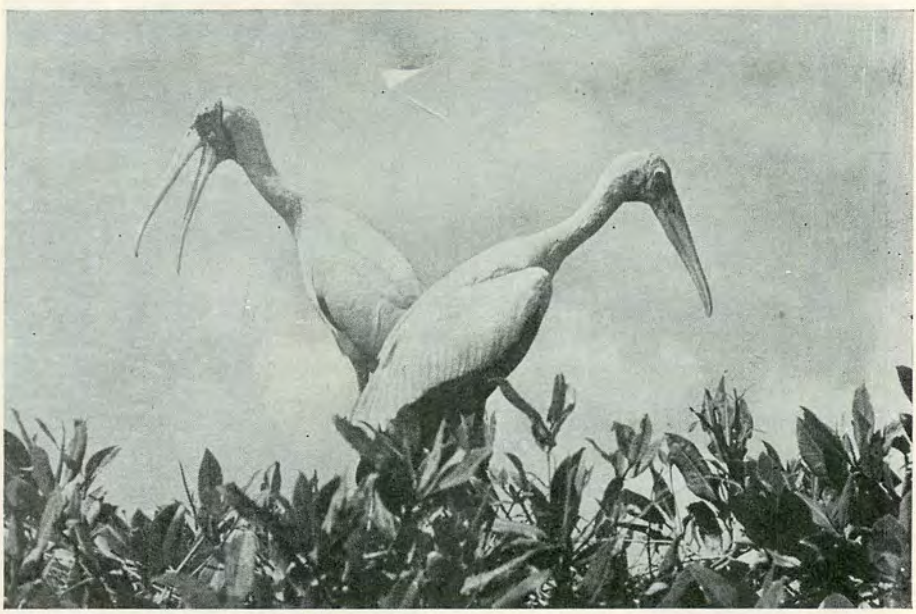


Fig. 2. *Ibis cinereus* on a coral island along the north coast of Java.

Fig. 1. *Egretta i. intermedia* in tidal forest in East Java.

Fig. 2. *Ardeola speciosa* on a coral island along the north coast of Java.

like "kch-kch-kch....mmmmmm"; not very impressive and not carrying far; starting weakly, growing louder and finally dying away again.

Nestsite and nest resemble those of the European *Rallus aquaticus*. The nest is a rather bulky, untidy structure of coarse plants with a shallow depression and placed close to the ground or water; usually well concealed among marshy vegetation; often in flooded ricefields.

B 17 PORZANA FUSCA RUBIGINOSA (Temminck)
Ruddy Crake

Remarkably enough the only specimen ever recorded in the sanctuary was encountered on the same day and in almost the same locality as the preceding species; a single bird was feeding along an open waterhole still containing some fresh water. In the reserve both species might frequent the same locations so perhaps this small, shy and very silent crake is permanently present too.

General remarks: Although this small rail is known to occur up to at least 1500 m it is almost certain that it prefers to reside below 800 m. It has, perhaps, a still more pronounced preference for the lowlands, because it is a permanent, rather common resident of salt-and brackish-water swamps bordering the coast. Habitat and behaviour resemble those of the preceding species. This crake too is an elusive, nocturnal bird never venturing far away from good cover in daytime and when disturbed using its legs more than its wings.

The call is not known to the present author, but it is said to be a high-pitched "kiek-kiek-kiek" mainly produced around sunrise and sunset.

The nestsite resembles that of the preceding species as does its nest which, however, is much smaller.

B 18 AMAURORNIS PHOENICURUS JAVANICUS (Horsfield)
White-breasted Waterhen

Perhaps mainly because of its being considerably less dependant on water and swampy localities and its less shy habits, this waterhen

was observed more frequently in the reserve than either of the preceding species. It was most frequently found in the many fresh-water swamps, especially those of the Niur-Djaman region but also in the edges of tidal forests and along brooks and rivers in light jungle.

General remarks. Occupying the same range as *Rallus striatus* it is perhaps most common in the lower parts of it where almost the same habitat is frequented. Unlike most members of its family it is at ease in arid localities, in places where no fresh water is to be found for long periods and in areas where only salt or brackish water is available. It is less shy than *Rallus striatus* and is perhaps less nocturnal. It differs from a true waterhen by its aversion to swimming. Lone birds or pairs are more common than small flocks and large flocks are rare.

It is rather noisy; its call, almost invariably uttered from dense cover, is a loud "turrrrr-koowak", "pĕ-rĕ-wok-wok" or "keureoh", often heard at night and apparently produced by several individuals at a time.

The nest resembles that of the rail mentioned above, but it averages larger. It is most frequently placed in about the same position, but nests in shrubs or in clumps of bamboo are not rare.

B 19 GALLINULA CHLOROPUS ORIENTALIS Horsfield

Moorhen

Unlike the preceding species this was rarely found in the reserve at localities where no fresh or brackish water was available, This apparent dependence on water and its preference for fresh water marshes may be the reason that records are restricted to the Djaman-Niur area where five specimens feeding together were once seen; which was more than the total number of records up till then, proving the scarcity of its appearance. Once one was seen very close to a crocodile, of which the bird seemed quite unafraid.

General remarks. This is more a lowland bird than the preceding species though found up to at least 800 m above sea level. It frequents the same habitat as the White-breasted Waterhen but it is more tied

to open water, perhaps prefering fresh water to brackish or salt water without however avoiding territories where fresh water is scare or absent. As with the preceding three species it is probably erratic in occurrence for local populations may vary considerably in areas with unchanged conditions. This may be due to an influx of birds from areas with worsening feeding conditions as often happens during dry periods. This was suggested by the presence in September 1935 of more than 150 scattered individuals, swimming in parties of 5 to 10, counted within a rather small area of fishponds quite close to the coast where usually only a small resident population was recorded. Habitat and behaviour similar to the European sub-species as is the call, position of the nest and the nest itself. The author is not aware of nests outside the bird's typical habitat.

Family JACANIDAE

N 20 HYDROPHASIANUS CHIRURGUS (Scopoli)

Pheasant-tailed Jaçana

On March 6, 1951, the only specimen of this migratory Jaçana ever seen in the reserve was flushed from the scrub-covered edge of a fresh water marsh for the greater part covered with floating aquatic plants. This was in the Niur region when there was an abundance of fresh water. This marsh-loving bird must be a rare straggler to the reserve only to be expected in the rainy season.

General remarks. Not common in Java and unknown from localities over 800 m above sea level, but erratic in occurrence and numbers which makes it difficult to determine the bird's real preferences during its visits to Java. In the author's experience it frequents the habitat of the preceding species but is considerably more particular, selecting low cover bordering open freshwater swamps grown with a wealth of floating aquatic plants from which it feeds. It is almost invariably seen moving with remarkable agility on these plants, quickly running to protective cover when disturbed and only flying if it ventured too

far away from the margins. Only single birds were recorded by the present author, but occasionally they congregate in flocks or many scattered individuals are found in the same environment.

It is a very silent bird but when alarmed it utters a mewing note like "miēēēh-iēēēēēh" or "kiēēēēēh-kiēēēēh".

B 21 METOPIDIUS INDICUS (Latham)

Bronze-winged Jaçana

This beautiful but smaller jaçana was encountered twice within four days in October 1941, not far from the spot where, ten years later, the preceding species was observed and under almost identical circumstances. On both occasions a single bird, most likely the same, was involved, feeding while moving upon some floating *Nymphaea* leaves. This too is probably an accidental visitor to the reserve.

General remarks. This jaçana, which is resident in Java, occupies the same range as the preceding species and shares its habitat, but is perhaps even more particular in the selection of its favourite residences because there are many suitable swamps, marshes and similar places where the species is completely absent. This jaçana is uncommon but there may be some swamps and marshes, especially in Central and East Java, where it is more numerous.

The present author does not know its call but it is said to be a loud, piercing note.

The nest us a hotch-potch of vegetable material deposited on floating leaves of aquatic plants, often far from the bank and its protective cover (Kooiman 1940).

Family BURHINIDAE

B 22 ESACUS MAGNIROSTRIS (Vieillot)

Stone Plover

Because of the rapidly growing human population of Java with a consequent increase in the number of people visiting the beaches, it is fortunate that the reserve shelters a resident population of this remarkable and vulnerable bird.

Although certainly not common, one or two, occasionally three, Stone Plovers may be regularly encountered in this area where sandy beaches, the favourite habitat of the species, are available; most frequently perhaps along the south coast. When there are three it is usually a family party. On two occasions a small pullus was found and nests, always one egg to a clutch, were recorded in September (2) and October (3). As elsewhere in Java most breeding take place in August to October inclusive. Undoubtedly many eggs are taken by monitor-lizards (*Varanus salvator*) which are regular visitors to the same beaches looking for sea-turtle eggs.

General remarks. This again is a rare bird, although the great many sandy, shingle and coral beaches bordering Java's lowlands may harbour a denser population than the author (who, as late as 1935, recorded the first breeding) was able to establish. It is almost exclusively nocturnal, inactive or sheltering during the day. Birds met by day are most often flushed from the highest parts of the beach where they seek the shelter of the undergrowth. Most frequently two, occasionally one or three, are found and when disturbed they run with great rapidity, only flying when approached too close or when the boundary of their territory is reached; then they return to their home flying in a wide curve over the sea, skimming the surf.

Most feeding takes place at night and it is at that time that the bird's call is heard most frequently; it is a far-carrying, piercing whistle "tlie-tlie", "tlie-lielie" or "wie-lie" often uttered in flight.

The nest is a shallow depression scratched in the sand of open beaches, often amid wreckage and without any lining (Hoogerwerf 1936d, 1937a, 1948a).

Family CHARADRIIDAE

N 23 CHARADRIUS DOMINICUS FULVUS Gmelin

Golden Plover

One of the most common migrants in the reserve during the rainy southwest monsoon, frequenting arid game pastures, dried-up marshes and similar environments. Also encountered on coral and

mudflats along the coast; less commonly on sand or shingle beaches. Most records are from the Djaman-Niur area where once, in November, approximately 100 were seen together, the maximum ever noted here, though flocks of 25 to 50 were not uncommon. On rare occasions a few were found along the sandy south coast congregating with the smaller *Charadrius leschenaultii* and *Ch. mongolus*. Once a single bird was seen in the Djaman region at the time of the northeast monsoon (June); this is the only summer record for this area.

General remarks. A common winter visitor to Java from sea level to at least 800 m but most frequently in the lowlands in the habitats described for Udjung Kulon; newly ploughed or damp, fallow ricefields are favourite locations. In behaviour it resembles the European subspecies (Hoogerwerf 1967).

N 24 CHARADRIUS LESCHENAULTII Lesson

Large Sand-Plover

Unlike the preceding species this smaller plover was only seen on the beaches. Although it prefers sandy shores or coral reefs it was also occasionally found on mudflats. If most frequently visits the wide sandy beaches of the south coast, invariable in flocks, sometimes associating with the smaller *Charadrius mongolus* or other migrating Scolopacidae. The earliest record from this area is August 12th.

General remarks. Although less common than the Golden Plover, this is a regular migrant from the Northern Hemisphere along the north coast and the south. Unlike the Golden Plover, this species is, in Java, almost restricted to the shore, prefering sand- and coral beaches to mud. Like almost all migratory Scolopacidae it is gregarious, associating in small, or occasionally very extensive, flocks often mixed with other migrants (Hoogerwerf 1967).

N 25 CHARADRIUS MONGOLUS subsp.

Small Sand-Plover

When visiting the reserve, naturally only during the rainy season, this small plover frequents the same habitat as the preceding species, with which it often associates. It too was most frequently

encountered along the extensive south coast beaches. There are two records during the northeast monsoon, July 11, 1955 near Tdj. Alang-alang and July 24, 1955 from the south coast beach.

The subspecific identity (*C.m. mongolus* or *C.m. atrifrons*) of the birds seen in Udjung Kulon could not be determined.

General remarks. In winter it is often very difficult to distinguish this species from the preceding one, but when the two are together, as often happens, the size difference is conspicuous. Habitat and behaviour do not differ.

The records of birds belonging to the subspecies *mongolus* evidence rare and erratic status. *C.m. atrifrons* is a regular migrant.

N 26 CHARADRIUS VEREDUS Gould

Eastern Dotterel

The records from the reserve of this winter visitor are worthy of note because it is considered one of the rarest migrants visiting Java. There are eight certain records from the reserve (3 in September, 4 in October and one in November), relating to single individuals and to small flocks, often associating with *Charadrius dominicus.* All records are from the dry, sparsely grown game pastures of the Djaman-Niur region.

Although the birds resemble somewhat the latter species when in non-breeding plumage, they differ by their smaller size and rather uniformly olive-brownish upper parts, whilst an often dull brownish breast band on the rather strikingly light underparts, is often present; in some birds the feet are ochrous, an uncommon feature in *Charadrius dominicus.* In plumage and general appearance in the field the species more resembles *Glareola maldivarum.*

General remarks. Up to 1938 only three specimens of this rare migrant were known from Java. The third bird of January 1938 was found about 20 km from East Java's north-coast, associating with a large flock of Golden Plover of which some were obtained with the same shot. Another bird was recorded by the present author in July 1934 along the north coast of West Java quite close to Djakarta. Although the Udjung Kulon records point to a more frequent occurrence in Java than the few specimens suggest, it is certainly still a rare visitor to the island (Bartels 1938).

N 27 CHARADRIUS DUBIUS CURONICUS Gmelin

Little Ringed Plover

The species is perhaps more common than the few records indicate; the few occasions on which it was observed in this area may reflect its being overlooked. It was only recorded on freshly dried-up swamps and along muddy waterholes, and remnants of freshwater swamps in the Djaman-Niur area.

General remarks. The range of this small plover, a regular winter visitor to Java, is very similar to that of the Golden Plover for it is found along the coast and up to at least 800 m, though it has a decided preference for the lower zones. The favourite habitat is muddy places, like damp, fallow ricefields, the edges of waterholes, monsoon marshes coastal mudflats, lagoons and fishponds. Single birds or small groups, often associating with other migrants are most common but large flocks do occur. In non-breeding plumage it is often not easy to distinguish between this plover and the following species, especially first year birds. The yellow eye-ring, yellowish instead of blackish feet and the lack of a light bar on the upper wing in flight are the most striking differences in the field (Hoogerwerf 1946a, 1966d.).

N 28 CHARADRIUS ALEXANDRINUS subsp.

Kentish Plover

This may really be a rare visitor to the reserve. There are only two certain observations from October 1942 and January 1943, both from the sandy southcoast beach where some were found with *Charadrius leschenaultii* and *Ch. mongolus*. The subspecific identity of these birds could not be ascertained.

General remarks. Birds belonging to the migratory subspecies *ruficapillus* are extremely rare in Java, but representatives of *javanicus*—of which breeding was first recorded by the author in 1936—are rather common along the beaches of the north coast and immediate environments, particularly during the rainy season. In winter this small plover behaves like the preceding species, but it prefers sandy beaches, dry meadows and other bare and grassy plains bordering the coast.

Its call is a soft "wit-wit-wit" or a not very far carrying "poo-iet" often uttered by flying birds.

Nestsite and nest of the subspecies *javanicus* resemble those of the European race; the nests found by the author in Java were made on an open sandy plain only partly grown with some low weeds etc. bordering the beach of the north coast. The nest is a slight depression scratched in the ground, lined with some small pieces of shell (Hoogerwerf 1946a, 1966d.).

29 CHARADRIUS PERONII Schlegel

Malay Sand Plover

Together with *Charadrius veredus* this small plover must be considered one of the rarest birds known to occur in Java, not found again since O. Bryant obtained two specimens along Java's north coast quite close to the reserve in 1909. On September 20, 1940 a single bird was seen in the company of some *Charadrius mongolus* on the sandy beach along the mouth of the Tjidaon opposite Pulau Peutjang. The bird conspicuously differed by its small dimensions and the very light upper parts, rufous occiput and the large amount of black on head and neck. These plumage differences also separate it from *Charadrius dubius* and *Ch. alexandrinus*. The bird recorded in Udjung Kulon must be considered a rare straggler.

General remarks. This is the only one ever seen in Java by the present author and no other recent records are known. On the Kangean Islands, where newly hatched pulli were found, and in Padar, a small island between Sumbawa and Flores (Lesser Sunda Islands) its habitat was coral sand beaches. It may be assumed that habitat and behaviour including nestsite and nest do not differ much from those of *Charadrius alexandrinus* (Hoogerwerf 1946a, 1966d.).

Family SCOLOPACIDAE

N 30 NUMENIUS ARQUATA ORIENTALIS Brehm

Curlew

It seems probable that confusion in the field with the smaller Whimbrel, or too little attention, first led to the assumption that this curlew was scarce in the reserve. Although the species is known as

a very common winter visitor to Java it was recorded only twice in Udjung Kulon, viz. in January 1943 and March 1952. In the first case there were 4 or 5 along the sandy beach opposite Pulau Peutjang associating with some Whimbrel, with a single individual of the rarer Australian Curlew at some distance. The second record relates to 10 birds on a small mud flat near the mouth of a mangrove creek in Handeuleum Bay. The observation in Java of three species of curlew together is worthy of note because it is highly exceptional.

General remarks. Both large curlews winter in Java; this one is the most common, though it is considerably scarcer than the Whimbrel with which it often associates. Such concentrations are most conspicuous at places where the birds assemble to roost or to wait for low tide, occasionally on trees. The common Curlew is rarely seen far away from the coast and its favourite habitat is the shore, feeding on sand- and mudbanks or coral reefs uncovered by the tide.

Compared with *Numenius madagascariensis*, this species averages smaller, noticeable especially in the shorter bill and legs, and has lighter plumage, particularly the underparts. Finally it has a very light back, rather similar to the Whimbrel, which however averages much smaller. In flight this light back is a striking feature (Hoogerwerf 1951, 1967).

N 31 NUMENIUS MADAGASCARIENSIS (Linnaeus)
Australian Curlew

On the occasion mentioned above, the only Australian Curlew ever encountered in the reserve was recorded.

General remarks. This is a rare migrant in Java; the few certain records of the present author concern a few birds congregating with the preceding species or with Whimbrels, always along the coast. This species and the common Curlew are among the shyest migrating Scolopacidae visiting the Javan beaches (Hoogerwerf 1951).

N 32 NUMENIUS PHAEOPUS VARIEGATUS (Scopoli)
Whimbrel

The author has surprisingly few records of Whimbrels and Curlews, and perhaps they belie the real status of these migrants in the reserve. The Whimbrel was recorded only four times of which

two on the south coast. Several were seen together once flocking with *Charadrius leschenaultii* and *Ch. mongolus*; on another occasion (as late as May 7), a solitary bird was involved.

General remarks. This Whimbrel is the most common 'curlew' in Java during the rainy southwest monsoon, frequenting the same habitat as both the preceding species. Whimbrels are also found rather regularly in the tidal forests and in suitable localities bordering the coast, but rarely far inland. Single birds or groups alone are not rare but more often they mix with other migrants. As with *Actitis hypoleucos* Whimbrels were rather commonly recorded in Java during the dry northeast monsoon (Hoogerwerf 1967)

N 33 CAPELLA STENURA (Bonaparte)

Pintail Snipe

Records are fairly restricted but the Pintail Snipe may be considered certain to occur regularly in this area during the southwest monsoon. This inconspicuous migrant is found in the edges of marshes, shallowly flooded game pastures and similar boggy areas. Once, from a shelter, in December 1939 nine were seen feeding together on the inundated Tjikarang pasture, but usually one does not see much more than a glimpse of a bird flushed from its favourite haunt.

General remarks. A very common migrant but very erratic in occurrence and numbers. Unlike most other migrating Scolopacidae the Pintail Snipe is widely distributed in its winter quarters occurring in Java from sea level to the highest mountains. Habitat and behaviour much resemble those of the European *Capella gallinago* with a pronounced preference in Java for flooded freshly planted paddy fields or damp fallow ricefields, making it a favourite target for sportsmen.

N 34 ARENARIA INTERPRES INTERPRES (Linnaeus)

Turnstone

Presumably an uncommon migrant in the reserve. Five records; which may reflect its real status as it is difficult to overlook. Almost all records are from the coast between the Tjigenter and Tdj. Alang-alang and there were never more than 5 together. Once a single bird was seen on a dried-up swamp some distance from the

coast, apparently an uncommon habitat for the Turnstone which, in Java, seems to be restricted to the shore.

General remarks. Uncommon in Java and without exception found along the shore, perhaps more frequently along the south coast because it prefers sand- or shingle beaches and coral reefs to mudbanks. A few, rarely more than 10 together, usually not associating with other species, are most frequent.

N 35 CROCETHIA ALBA (Pallas)

Sanderling

This extremely rare migrant was found with certainty only once in the reserve, a single bird on October 22, 1941 along the south coast not far from a large flock of migrating Scolopacidae. The small size, extremely light plumage and lively habits differ from most other migrants visiting Java's beaches during the southwest monsoon.

General remarks. This is a rare winter visitor to Java, till 1930 only known from three doubtful specimens. Since then there are a few definite records but the Sanderling is still rare. Although also known from Java's north coast it prefers the south coast from where in the late Thirties several records were reported and once, in September 1938, a flock of about 100 was observed. Nothing is known of the bird's behaviour in Java. The few seen by the author were along the shore (Kooiman 1940).

N 36 CALIDRIS SUBMINUTA (Middendorf)

Long-toed Stint

Only seven records of this common migrant, almost without exception of flocks found in the Djaman-Niur region on dried-up swamps or near the few mud pools still present. Once a solitary bird was seen on a small mudbank along the shore.

There is no certain record here of *Calidris ruficollis*, a second small stint known as a winter visitor in Java.

General remarks. This is a common species often congregating with other migratory Scolopacidae which may be found day after day in exactly the same places beside, or very close to, the sea. It is also found in the interior up to at least 500 m above sea level and single birds are not uncommon. It prefers open muddy places; in the rainy season frequenting the ricegrowing regions which occupy a very important part of the Javan lowlands and submontane districts. When along the coast it also frequents mudbanks.

N 37 CALIDRIS TESTACEA (Pallas)

Curlew Sandpiper

This sandpiper, fairly common in many localities along Java's north coast, was only recorded once in the sanctuary flocking with some stints, feeding on a freshly dried-up marsh. Because of its slender curlew-like bill and its characteristic way of feeding the species is not difficult to identify. In winter plumage it shows some resemblance to the Sanderling, which does not however have a striking white rump.

General remarks. A common migrant in Java occupying the same habitat as the preceding species with a pronounced preference for muddy areas. Although it may occur at fishponds, wet ricefields and similar spots, it does not go far inland. Usually found with mixed flocks of migrant waders.

N 38 TRINGA TOTANUS EURHINA (Oberholser)

Redshank

This again is a migrant which is apparently less common here than in many similar regions along the Javan coast. The Redshank was observed both on flat mudbanks and on a sandy beach along the north coast, and on dried-up swamps in the Djaman area. In the latter locality several were together with a few Wood Sandpipers.

General remarks. Redshanks are common during the rainy season in the same habitat as other waders; usually small parties associate with other migrants. Favourite feeding places are mudbanks, dried-up fishponds, wet ricefields, etc. along and close to the shore but occasionally they occur far inland.

N 39 HETEROSCELUS INCANUS BREVIPES (Vieillot)
Grey-rumped Tattler

There is only one certain record from the reserve: a single bird seen on a coral sand beach along the north coast, in September 1937.

General remarks. In the author's experience this wader, which in size and general appearance somewhat resembles a Redshank with strikingly shorter legs and bill, is a less common winter visitor to Java than the Redshank, and is more frequently to be found along the south than the north coast. In winter quarters it prefers coral banks and sand or shingle beaches to muddy areas. Usually solitary or in small groups; in habits more resembling the following than the preceding species (Hoogerwerf 1967).

N 40 ACTITIS HYPOLEUCOS (Linnaeus)
Common Sandpiper

A regular, often frequent winter visitor to the sanctuary, perhaps more cosmopolitan in habitat than most other waders visiting tropical Asia. Birds of this species—usually alone or in scattered groups, but rarely associating with other Scolopacidae—may be encountered on coral, sand- and mudbanks, along the coast as well as along creeks, rivers and marshes at some distance from the sea. In this area the earliest record is July 29, but from other localities in Java summer records are not uncommon.

General remarks. One of the most common migrant waders in Java. It frequents the habitats indicated above for Udjung Kulon, but it occupies a more extensive range than almost any other migrant wader, because it is known at altitudes up to at least 1500 m. feeding in wet ricefields but also frequenting bars of sand and shingle along large rivers and brooks in mountainous regions.

N 41 TRINGA NEBULARIA (Gunnerus)
Greenshank

There is only one certain record from the reserve although the Greenshank is by no means a rare winter visitor in Java. The bird was alone along the sandy beach of the south coast.

General remarks. A rather common winter visitor to Java, more or less restricted to the coast, but occasionally penetrating far inland. In habitat and behaviour it does not differ conspicuously from the Redshank.

N 42 TRINGA GLAREOLA Linnaeus

Wood Sandpiper

A rather common winter visitor to this area but less frequently observed than the Common Sandpiper and more often in small flocks, usually mixed with other migrant waders. Most individuals were found in the same places as *Calidris subminuta* but fairly uncommon along the shore.

General remarks. Common in Java during the rainy season but, as with the Common Sandpiper very rarely found with extensive flocks. In winter quarters it prefers a muddy habitat, the edges of fresh water marshes, flooded ricefields when the rice is short or already harvested, and similar boggy localities, often far from the sea, though it also occurs on sandy beaches, coral banks, etc.

Family GLAREOLIDAE

N 43 GLAREOLA MALDIVARUM Forster

Collared Pratincole

Erratic. A good number, though never more than about thirty, were seen exclusively in October and November 1940 and 1941. They visited freshly burnt game pastures in the Djaman-Niur region, often associating with Golden Plover. They did much of their feeding on the wing. Their tameness was so noticeable that they were assumed to be newly-arrived individuals.

General remarks. The visits to Java of this migrant seem very erratic, at least as far as numbers are concerned. In many years no birds, or only a very few are encountered, but in others the species occurs in huge numbers. They frequent harvested, dried-up ricefields, grassy or sparsely grown meadows etc. up to at least 800 m above sea level.

They apparently dislike beaches. Generally they occur in flocks. When on the ground their habits resemble those of a wag-tail more than those of most plovers and when feeding on the wing, as they often do, their behaviour is rather similar to that of the swallow-shrike. The feeding habits clearly demonstrate that they do not compete with the Golden Plover for food (Sody 1926a).

Family LARIDAE

N 44 CHLIDONIAS LEUCOPTERUS (Temminck)

White-winged Black Tern

Only two records, both in August; once two were seen above the Tjikuja Bay; the other time along the coast of Tdj. Alang-alang several were congregating with some other terns. On both these occasions the birds involved showed clear traces of their summer dress.

General remarks. This tern is a migrant, although individuals in almost complete summer plumage occur in Java, occasionally even during summer. It frequents coastal areas, especially close to the mouths or estuaries of large rivers. It is also found in small flocks further inland over flooded ricefields, swamps, etc.

B 45 STERNA DOUGALLII BANGSI Mathews

Roseate Tern

Uncommon. Observed only five times along the coasts of the reserve. Three times on some negro-heads (old coral blocks) off Tdj. Alang-alang where other terns also assemble, once on a similar coral block near the Tjitelang and fifthly along the rocks of the inhospitable west coast. In each case several together, mixed with other terns. In July birds in nuptial plumage were recorded, but breeding here could not be proved.

General remarks. Although locally not uncommon, apparently very particular in selection of habitat, making it one of the least common terns along the coasts of Java. Its favourite haunts are coral forma-

tions, coral islands and sandy beaches, and it is perhaps more frequent along the south coast than the north. During winter it often associates with other terns and then it is not easy to distinguish from the migratory *Sterna hirundo.*

It breeds in small colonies; the nest is a slight depression in the sand with little or no lining, or the eggs are deposited on bare coral ridges.

N 46 STERNA BENGALENSIS BENGALENSIS Lesson
Lesser Crested Tern

Perhaps more frequent a visitor to the reserve than the preceding species, but the number of records does not differ much. Found along the north coast at the same places as *Sterna dougallii* but also along the sandy south coast. Usually associating with other terns; once, in January, many were seen, part of a flock of about 200 terns of at least three species.

General remarks. This is a common migrant along the coasts of Java, differing from the following species with which it often associates, by its somewhat smaller size, a yellowish instead of green bill and in having the crest less pronounced. Gregarious; flocks often mixed, especially with *Sterna bergii.* In Java it is only found along the coast, both on mudbanks and on coral reefs, sandy beaches, etc. and often when feeding far away from land.

B 47 STERNA BERGII CRISTATA Stephens
Large Crested Tern

Together with *Sterna sumatrana,* this is the most common tern of the reserve. It prefers the coast between Tjigenter and Tdj. Alang-alang where many coral blocks are scattered off the beach and at low tide many sand-flats occur. The species was also not uncommon near Pulau Peutjang and along the south coast. Almost invariably found in small flocks, often mixed with other terns, especially the preceding one. Although semi-adults were noted in such flocks, breeding was not recorded in the reserve.

General remarks. One of the most common terns in Java in all months. Invariably in flocks, which are often extensive and mixed with other terns. In habitat and behaviour resembles the preceding species.

No breeding colonies are known on Java's mainland, but it breeds on one of the islands of the Karimundjawa Archipelago north of Central Java. Nestsite and nest resemble those of *Sterna dougallii* (Hoogerwerf 1967)

B 48 STERNA ANAETHETUS ANAETHETUS Scopoli

Bridled Tern

On fairly rare occasions (June, July, September) single birds were observed from boats sailing some miles off the coast of the reserve. Regularly (September, October) many appear on the rocky islands off the inhospitable west coast where they may breed, but this could not be confirmed because of the rough sea. They were often found there associating with the Brown Booby.

General remarks. This is a pelagic tern rarely encountered close to land so as far as Java is concerned, little can be added. It usually occurs in small flocks, often mixed with other terns or with the Booby mentioned above.

Breeding is known from Bawean Island and from the Karimundjawa Archipelago; there they nest in colonies both on coral sand and on bare coral formations or rocks, occasionally together with *Sterna sumatrana* (Hoogerwerf 1939, 1947b, 1967).

49 STERNA ALBIFRONS subsp.

Little Tern

The Little Tern is a fairly regular visitor to the reserve and perhaps both the breeding race (*sinensis*) and the migrant race (*pusilla*) occur. On the few occasions this bird was met it was in the company of other terns, usually congregating on the negro-heads off Tdj. Alang-alang and always during the southwest monsoon.

General remarks. The small resident population in Java of the subspecies *sinensis* may be swelled during the rainy season by many migrants of the race *pusilla*. That the two races mix was proven

when individuals of both races were shot from the same flock. Such flocks are often mixed with other terns wintering in Java.

In 1934 the author found the first proof of breeding in Java; the nests of a few scattered pairs were found along the north coast on a sandy soil, lined with some small shells and parts thereof (Hoogerwerf 1934).

B 50 STERNA SUMATRANA SUMATRANA Raffles

Black-naped Tern

Recorded almost every month, and the only tern for which breeding in the reserve was regularly confirmed. It frequents the same localities as *Sterna bergii* and during the southwest monsoon it often associates with it.

Eggs were found on bars or sparsely grown negro-heads off the coast, chiefly between Tdj. Alang-alang and the Tjikarang area, often several clutches close together but the colonies involved were of only 3 to 6 pairs.

General remarks. One of the most common terns in Java. A gregarious bird, generally found, especially outside the breeding season, in flocks with other terns, apparently prefering sandy and coral beaches to muddy environments but never found far inland.

Outside Udjung Kulon breeding has been proved also on sandy beaches of small islands, sometimes together with *Sterna anaethetus* (Hoogerwerf 1947b., 1967).

Family PODICIPEDIDAE

B 51 PODICEPS RUFICOLLIS VULCANORUM (Rensch)

Little Grebe

There is only one record. On January 7, 1943 a single bird was seen swimming in a shallow monsoon swamp in the Niur region. It was semi-adult with the sides of head and neck still streaked whitish; between dives a high-pitched note was emitted. Certainly a very rare straggler.

General remarks. The Little Grebe is rather particular in choice of habitat although it is found in Java from sea level to the highest mountains. It inhabits swamps, marshes, deeply flooded fallow ricefields, mountain-and craterlakes, etc., preferably those containing clear, fresh water and grown with floating aquatic plants and with a wealth of protective cover of reed, sedges etc. at their edge. It is less concerned by the depth of the water. It is also found in fairly densely populated areas where human visitors are common. Nevertheless there are many apparently suitable spots where it is absent. Usually alone or in pairs, but occasionally in large scattered flocks. In a craterlake in East Java more than 100 were once seen and it is probable that migrants swell the local population. The nest is a floating mass of aquatic plants attached to the surrounding vegetation (Kooiman 1940).

Family PROCELLARIIDAE

N 52 OCEANODROMA MONORHIS MONORHIS (Swinhoe)
Swinhoe's Petrel

On November 15, 1952 two specimens flew aboard a large *proa* used by the author and almost a year later at about the same spot a third was seen in the company of some Frigatebirds. Both these observations were in Handeuleum Bay and during extremely bad weather conditions.

General remarks. Pelagic; rarely approaching large land masses. Only a few stragglers are known from the neighbourhood of Java, making the Udjung Kulon records rather important.

Family CICONIIDAE

B 53 IBIS CINEREUS (Raffles)
Milky Stork

Apparently an occasional visitor to the reserve; the only five records are all prewar, one in January, the others in September and October. All records are from the Niur area where one or more were feeding along the river or in the shallow monsoon marshes.

General remarks. A rather common bird in Java along the coast and near it, rarely far inland. It may be found on mudbanks along the shore as well as in flooded ricefields and all kinds of swamps or marshes close to the coast, whether they contain fresh, brackish or seawater. It feeds almost exclusively in a slightly flooded muddy *milieu* and keeps away from densely populated areas. Away from the breeding ground single birds or a scattered flock are most common and large flocks rare. They also associate with Adjutants and herons. Sometimes with Adjutants and large birds of prey they soar high in the air.

They are silent birds but at the nest the clapping of their mandibles can be heard from quite a distance.

Sociable; breeding in colonies, occasionally mixed with cormorants, herons etc., usually on high, but also very low, trees. The nest varies in size and is composed of sticks, twigs etc. often with the leaves still attached (Hoogerwerf 1936c.).

B 54 CICONIA EPISCOPUS NEGLECTA (Finsch)

White-headed Stork

The frequent occurrence in the reserve of this uncommon species is worthy of note; observations cover almost every month with a peak in the driest period of the year, August, September and October. It was seen on arid, often freshly burnt or slightly inundated game pastures, avoiding deeper water and the seashore. The Djaman-Niur region and the Tjikarang pasturage were the most frequented places. Almost invariably small flocks were involved with maxima of 20 (October), 22 (August), 40 (August) and 50 (September) some at least staying quite long. Roosting birds were often found on very tall, bare or fruiting *Corypha utan* palms, occasionally associating with Peafowl, Milky Storks and Adjutants.

Although there were semi-adults among those birds proof of breeding in the sanctuary was never found, nor is it known whence these individuals came, but they may have been stragglers from Sumatra.

General remarks. This bird is little known in Java and outside the reserve the author has only a few records, almost invariably of birds seen far from the sea in habitats like those used in Udjung Kulon. Most records are from flooded ricefields in the well forested corners of the cultivated areas up to at least 800 m above sea level, and on freshly burnt lalang grass on the plains in the lowlands of southern Java. The species is perhaps commoner in the more arid parts of Central and East Java than in the damp western areas.

It is a very silent bird of which the author never heard the voice.

Little is known of its breeding in Java, but tall trees in well wooded regions seem to be favourite nesting places. Lone nests or clusters may be encountered; they average smaller than the nests of the preceding species (Hoogerwerf 1948a.).

B 55 LEPTOPTILOS JAVANICUS (Horsfield)

Lesser Adjutant

More common than the Milky Stork but less often seen than the preceding species though records cover almost every month with again a peak in August to October. Single birds were most often seen but occasionally as many as 4 to 10 and once even 30 (August) were recorded. The sight of as many as 30 is certainly uncommon in Java outside the breeding season. Solitary birds were often seen perching on high leafless *gebang* palms where they roosted sometimes together with Peafowl and the preceding species. Most observations are from the Niur area where they usually visited the same spots as the preceding two species, but they were also regularly found on mud-flats along the coast. Once a bird that was apparently very old was seen feeding quite close to a monitor lizard (*Varanus salvator*) taking some fish disturbed by the reptile's tail.

In August and October, and twice in September, young fledglings hardly able to fly were encountered, but the nests were never found in the reserve.

General remarks. More common in Java than either of the preceding ones. Most frequently found in the habitat of the Milky Stork, but also sharing the haunts of the preceding species, feeding as happily in

slightly inundated locations as in dried-up swamps and freshly burnt plains, etc. up to at least 800 m above sea level. However, the favourite habitat is the coastal mudbanks. They are often seen sailing high in the air in the company of one of the preceding species or together with large birds of prey.

This stork too is a silent bird but their wing-beat can be heard from far away and at the breeding site they produce a buzzing sound and the clapping of their mandibles can regularly be heard.

They breed in colonies on medium or tall trees in coastal swamps, but solitary nests may be found further inland on tall trees or palms in well-forested areas; the nest resembles that of the Milky Stork but is much larger (Hoogerwerf 1948c., 1951).

Family ARDEIDAE

B 56 ARDEA PURPUREA MANILENSIS Meyen

Purple Heron

Although breeding in the reserve was confirmed, perhaps not resident. It was almost exclusively recorded in the Djaman-Niur area; usually single birds which were very shy. The only record along the south coast was of a semi-adult feeding at the mouth of a river; this was the only time the species was seen along the coast. Periodically, in January, March and April, some nests were found both in a small heronry on a low tree in one of the Niur swamps, and, single nests, in another swamp in the same area, overgrown with high bulrushes, sedges and similar plants. Birds breeding in the reserve went out to feed on the opposite coast of Bantam, about 20 miles across the sea.

General remarks. Although common and occupying an extensive range in Java, though rarely over 800 m above sea level, Purple Herons are rather rarely seen because they are elusive and most active at night. Generally they do not visit the shore, but frequent swamps, marshes, flooded or damp ricefields and similar environments, near the coast and far inland. Unlike the Common Heron they remain

well hidden in the vegetation, keeping however a clear view of their surroundings.

When disturbed they utter a hoarse cry, and breeding birds also produce unmelodious screams. As part of their nuptial ceremonies they make snatching movements with the bill, like the Common Heron and audible at some distance.

Generally they breed in colonies, often in mixed heronries, but lone nests are not unusual. Nestsite and nest resemble those of the European race; in Java nests were found both on low trees and shrubs and close to the water or the ground in swamps amongst bulrushes, tall sedges etc., and often in the mangrove or close to the shore (Hoogerwerf 1967).

B 57 ARDEA SUMATRANA Raffles

Dusky-gray Heron

Regularly recorded, but never many at the same time. Single birds were the most common, though sometimes two or three. Always seen on the coast and rarest along the south coast. Once (August) three were found together along the beach of Tjikuja Bay and one produced a buzzing call which was probably part of courtship; this was the only time a call was heard. In the same spot a very young bird was seen in October 1941, and in January 1943 one of approximately the same age was approached to within 6 metres, along the south coast, which is exceptional for it is a very shy species. From these finds it was evident that it breeds here, but nests are not known from the reserve, though a nest found in nearby Pulau Panaitan was possibly of this species.

General remarks. Generally distributed along the coast of Java but nowhere numerous and usually confined to river mouths and estuaries, marginal areas of tidal forest and desolate beaches, feeding on mudflats, on sand- and coral beaches, and on coral reefs. In Java not known inland, not even visiting swamps and marshes bordering the coast, but in Sumatra the author shot one along a big river in mountainous country far from the sea. Roosts on shrubs or trees, but dislikes tall trees. Not sociable, unlike many other herons; usually seen singly or in scattered groups. Very shy.

The call mentioned above is the only one ever heard by the author.

About nestsite and nest almost nothing is known from Java; the nest, found by the author on Pulau Panaitan and assumed to be of this species, because there were no other herons there, was a very large structure about 6 metres above the ground in fairly thick, dry forest bordering the mangrove (Hoogerwerf 1953b, 1967).

B 58 ARDEA CINEREA RECTIROSTRIS Gould

Common Heron

Not common in this area; all records concern single birds almost invariably from deeply-flooded swamps of the Niur region, but on rare occasions the species was found in the estuaries of large rivers, and once along the south coast. It should be considered an occasional visitor to the reserve.

General remarks. Common in Java with an extensive range, though mainly restricted to the coast and its vicinity. Its habitat resembles that of the preceding species and that of *Ibis cinereus* but it also occurs in that of the Purple Heron, though it is considerably less common far from the coast; like the latter species it is a shy bird. In behaviour it resembles the European subspecies which, however, prefers a different habitat.

Sound, nestsite and nest are rather similar to those of the European Common Heron. In Java nests may be found in low shrubs or very tall trees, but the author never found breeding birds from the coast and almost always the nests were in colonies mixed with other herons, ibises, cormorants, etc. (Hoogerwerf 1936a., 1948a, 1951).

B 59 EGRETTA INTERMEDIA INTERMEDIA (Wagler)

Smaller Egret

Probably a few are resident in the reserve, but observations were not frequent. Most observations are from the Djaman-Niur area, where the most extensive monsoon swamps are. Generally in small parties often with Little Egrets, Cattle Egrets or Pond Herons.

Also found on dry game pastures and in dried-up marshes, preying on grasshoppers and insects. Feeds on fish, shrimps, etc. along the coast as well.

General remarks. Common in Java, up to at least 800 m above sea level, although above a few hundred metres not frequent. Habitat as the preceding species but also often in flooded and dried-up ricefields, on dry pastures and other open plains, often with other small herons, feeding on small fish, frogs, lizards, grasshoppers, crickets and perhaps the ectoparasites of cattle.

This egret too is a silent bird but occasionally, especially in the mating and breeding seasons, it utters various discordant sounds.

It breeds in colonies in trees and shrubs at different heights, often in tidal forests or other coastal woods, but also far from the coast and almost invariably in colonies with other herons.

B 60 EGRETTA ALBA MODESTA (Gray)

Larger Egret

More frequent than the preceding species. Prefering the beach, especially the estuaries of large rivers along the north coast. Sometimes as many as 10 to 20 together and in the company of other egrets. Once a small flock was found feeding on insects on a dry game pasture, which has never been recorded elsewhere. Not recorded yet from the south coast.

Found beeding in a colony with the preceding species, where yellow-billed adults and courting birds with black bills were seen at the same time. Once, in September, four young birds were present in the same heronry, still unable to fly.

General remarks. Perhaps less common in Java than the Smaller Egret and certainly more restricted to the coast and immediate vicinity where it is found on mudflats, sandy beaches and coral reefs, etc. Therefore its habitat is more similar to that of the Common Heron than to that of the preceding species as is the case with its behaviour, for it is less sociable than the other two egrets. However, it does occur in small flocks, sometimes with the smaller egrets.

Its cry differs from that of all other herons known from Java; it is a hoarse rather far-carrying, crowlike "keraaaa-keraaaa" often uttered in the mating and breeding season, but also by frightened birds.

Nestsite and nest resemble those of the preceding species, but it probably does not nest far inland.

B 61 EGRETTA GARZETTA NIGRIPES (Temminck)

Little Egret

A fairly common species in the reserve, often associating with the Smaller Egret and other herons. A more pronounced habitat preference for the beach and coral reefs than the Smaller Egret. Often in small parties. Feeds in slightly flooded marshes and deeper waterholes on fishes, shrimps and frogs, and on dry ground on grasshoppers and other insects, especially those disturbed by grazing game. In August 1941 a great many of this and the other two egrets gathered along the mouth of the Tjitelang where they roosted amid a dense Nipa (*Nypa fruticans*) complex. Breeding in the reserve is not proved.

General remarks. This and the Cattle Egret are perhaps the most common egrets of Java, occupying about the same range. As far as the author is aware, habitat and behaviour are almost the same as the Smaller Egret but perhaps it is more frequently a visitor to the shore and it may also be more generally distributed inland.

Frightened birds utter a discordant cry resembling that of the Smaller Egret, but courting birds produce a remarkable call, a gargling "bloob-bloob . . . blooboob".

Nestsite and nest do not differ from those of the Smaller Egret but the present species often breeds far from the coast, even in villages and big cities when sufficient tall trees are available (Hoogerwerf 1937).

B 62 EGRETTA SACRA SACRA (Gmelin)

Reef Heron

As everywhere in Java, never seen away from the coastal regions where almost all available habitats are visited but perhaps prefering coral reefs. Solitary birds were most frequent in the reserve, but also several birds feeding close together; once ten were found

scattered over a few hundred metres. During a trip of some hours along the south coast in January, twenty were counted of which 16 were in white, and only 4 in dark, phase plumage. However, on other occasions, dark birds were in the majority, once 6 dark to 1 white along the beach of Tjikuja Bay. Breeding was not recorded here but it is almost certain that the species nests on the rocky islands just off the west coast where *Sterna anaethetus* may breed as well.

General remarks. Common but restricted to the beaches and the small islands off the coast where it frequents all available habitats and does not worry about people and human habitations nearby. Not sociable except when it breeds and even then only a few pairs associate. The ratio of individuals in the light to those in the dark phase plumage differs locally and perhaps also at different times within the same area, but broadly speaking the dark form predominates in Java.

They are silent birds, occasionally uttering an insignificant screech.

Although not breeding in colonies some pairs breed near each other, both in shrubs and trees and on coral blocks and in crevices of rocks, etc. The nest is similar to that of the egrets (Hoogerwerf 1967).

B 63 NYCTICORAX NYCTICORAX NYCTICORAX (Linnaeus)
Night Heron

Almost certainly resident but its nocturnal habits make it difficult to prove this and to estimate the numbers involved. However, it was found in many different localities and in May 1938 approximately 100 roosting birds were found in mangrove bordering the Djaman swamps. In the Niur heronry, breeding was repeatedly recorded and occasionally their nests were the most numerous (10-15). Young were still present in July.

General remarks. Common in Java and generally distributed up to at least 800 m above sea level, but perhaps scarce above 500 m. It occupies the same habitat as other Javan herons, but with a pronounced preference for the cultivated parts of the island, especially ricefields,

flooded or dried-up. As with both small egrets and *Bubulcus ibis* Night Herons are not shy as evidenced by the selection of roosts and nesting places in trees in villages and towns. They are nocturnal, rarely feeding during daytime when they roost in the foliage of shrubs and trees or similar cover.

They are perhaps more noisy than most herons, for their characteristic "koowak-koowak" can often be heard, especially during the night.

They breed in colonies, often mixed with other herons. Nestsite and nest do not differ from those of the egrets, but the nest is often better concealed amid dense foliage because the birds shun sunlight (Hoogerwerf 1936b., 1966).

N 64 GOISAKIUS MELANOLOPHUS MELANOLOPHUS (Raffles)
Tiger Bittern

This heron is difficult to see in the reserve because it apparently inhabits swamps, marshes, heavily wooded banks of brooks and rivers and similar places, which have difficult access, but it is perhaps less dependant on water than most other herons. There is only one record. On February 23, 1941 a single bird was flushed from a small brook close to an extensive marsh with a dominant vegetation of the large swampfern *Acrostichum aureum.*

General remarks. This is a regular, perhaps even common, migrant in Java up to at least 500 m above sea level. Although sight records are uncommon because of the bird's shyness, it occasionally lives quite openly as in the Botanic Gardens at Bogor where it was regularly observed during the rainy season of 1943. There it was often found feeding on paths through scrub jungle or wildernesses where sunshine hardly penetrated, but also on open lawns, bordered by shrubs or trees and often exposed to bright sunlight. When frightened it often tried to escape by running swiftly, only flying into the foliage of shrubs or trees if approached too close. During its stay in the Botanic Gardens it did not display any dependance upon water.

It is a silent bird but when disturbed it utters a soft growling "korrrr-korrrr".

B 65 BUTORIDES STRIATUS JAVANICUS (Horsfield)
Little Green Heron

It is remarkable that within this area there are not more than ten records. Elsewhere in Java it is a common mangrove heron and the reserve seems extremely well suited for it. Most birds, almost invariably alone, were encountered along the beach, others in or along the mangrove and along rivers quite close to the shore. All records are during the rainy season so it is not unlikely that some were the migratory sub-species *amurensis*.

General remarks. Common in Java and frequenting exactly the same habitat as the Reef Heron, prefering, however, muddy and shady environments including the interior of tidal forests and creeks and other muddy locations at some distance from the sea. But it does not penetrate far inland and the author believes that birds found far inland belong to the migratory race *amurensis*. It is not gregarious though often several may be found nearby.

They are silent birds, but occasionally they utter a fairly far-carrying "tjeukkk-tjeukkkk".

The species does not breed in colonies; the nest resembles that of the Little Egret, but it averages smaller; it is made in trees or shrubs, often in the mangrove but occasionally far away from the coast, for the author once found a nest in a private garden in the city of Surabaya (Hoogerwerf 1965c, 1967).

B 66 ARDEOLA RALLOIDES SPECIOSA (Horsfield)
Pond-Heron

Fairly regularly recorded pre-war but records since are fewer than ten, despite this being a common species in Java. In September 1937 there were about sixty feeding around a muddy waterhole, remnant of a large monsoon swamp and many were seen in May 1938 and in August 1941, usually with other herons, especially *Egretta garzetta*. On two occasions fledglings were observed, probably hatched in the reserve, but nests were never found.

General remarks. Perhaps the most common heron in Java, also found considerably higher than almost all other herons, for it occurs up to at least 1500 m above sea level. It occupies the same habitat as the smaller egrets and the Night Heron. With the latter it shares a preference for cultivated areas, especially ricefields although it is not uncommon along the shore where it is often found in the same environment as *Butorides striatus*. It is gregarious, often associating in flocks sometimes with other small herons, but single birds or small groups are common too.

Usually silent but courting birds utter a very remarkable call.

Nestsite and nest do not differ much from those of the other smaller herons; in colonies often with other species. It often nests in clumps of bamboo in villages or elsewhere close to human habitation (Hoogerwerf 1948c).

B 67 BUBULCUS IBIS COROMANDUS (Boddaert)

Cattle Egret

Unlike the preceding species, this was recorded more frequently after the war than prewar. Although birds in breeding plumage were observed and the species was noted in almost all months, nests were never found in the reserve. There are no records outside the Djaman-Niur area and almost invariably small flocks (up to 25) were seen, feeding on grasshoppers and other insects, often in the neighbourhood of grazing or ruminating game or of grubbing wild boar and sometimes associating with egrets. Feeding on ectoparasites on the backs of grazing *banteng* (wild oxen), deer and wild boar was not often seen, but occasionally they joined the Jungle Crow and Javanese Minah in doing this. In November 1954 Cattle Egrets were seen feeding on caterpillars in tall trees which has never been recorded elsewhere in Java.

General remarks. Although in most cultivated parts of Java Cattle Egrets are not as frequently found as the Pond Heron, it occupies the same range and is one of the most common herons. Its habitat resembles more that of the Little Egret except, however, that it does

not visit the beach, not even the tidal forests, and that it often seems to avoid water though flooded ricefields and other swampy locations are not avoided. Like *Egretta garzetta* it prefers lower elevations and is most frequently found in ricegrowing regions, often in the company of water buffaloes and cattle where it feeds on ectoparasites and all kinds of insects and small vertebrates disturbed by the animals' activities. Almost invariably Cattle Egret associate in small flocks, often together with the Smaller and Little Egret and with *Ardeola ralloides.*

Still more silent than most of the other herons but occasionally it utters a soft "huw-huw".

Nestsite and nest closely resemble those of the Little Egret with which the Cattle Egret often nests in mixed colonies, frequently in tall trees in villages and towns (Hoogerwerf 1936, 1950b.).

B 68 IXOBRYCHUS CINNAMOMEUS (Gmelin)

Chestnut Bittern

Difficult to discover in such rough country as Udjung Kulon. The few times it has been recorded single birds were involved, flushed from an open marsh covered with high bulrushes, sedges etc., a common habitat; it never was found in heavily shaded places. The occurrence here of the small migrant bitterns, *Ixobrychus sinensis* and *I. eurythmus* is possible.

General remarks. A very common bird though this is often not evident because of its shyness. Like both the preceding species it occurs up to at least 1500 m above sea level, and unlike those species, the higher elevations are as favoured as the lowlands. Although the ricegrowing parts of Java may carry the densest population, this chiefly holds good when the fields are flooded, the rice is higher than about 50 cm and the crop has not yet reached maturity. From this it is evident that there must be sufficient additional feeding possibilities; these are formed by swamps, marshes, banks of rivers and lakes, etc. provided enough tall, graminaceous or herbaceous plants are available to offer the necessary concealment. It is among such

dense cover in open areas that this small bittern spends almost its entire life.

Usually silent but occasionally a harsh "kok-kok-kok-kok-kok" or "kek-kek-kek-kek-kokkokkok" is uttered.

It does not form colonies when breeding but several nests may be found close together. Nest and nestsite resemble those of *Rallus striatus* but the nest averages larger and is often more solidly built.

B 69 DUPETOR FLAVICOLLIS FLAVICOLLIS (Latham)
Black Bittern

There are only three prewar records all of the same month (January 1943) of birds flushed from the thickly grown banks of a brook and a river in the Tjibunar area, quite close to the south coast. In choice of habitat this larger bittern resembles the preceding species, but it is much rarer than the Chestnut Bittern in Java.

General remarks. Probably uncommon in Java although it is difficult to determine its real status because it is even more shy than the preceding species and is nocturnal. It is a bird of the lowlands, rarely occurring above 500 m, frequenting almost exactly the same haunts as the Chestnut Bittern, though its preference for ricegrowing areas is less pronounced at least in daytime, but in addition it also visits shady places. It seems less familiar with man than most other small herons and prefers the quieter corners of the cultivated regions. Not gregarious; almost invariably single birds are found, as is clear when flushed from the ricefields by snipe shooters.

Its call is not known to the present author.

The only nest found by the author resembled that of the Cattle Egret; it was placed on a tree at a height of approximately 6 metres. The usual nestsite is probably in dense swampy vegetation.

(To be continued).