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THE VASCULAR FLORA AND TERRESTRIAL VERTEBRATES OF VOSTOK ISLAND,  
SOUTH-CENTRAL PACIFIC

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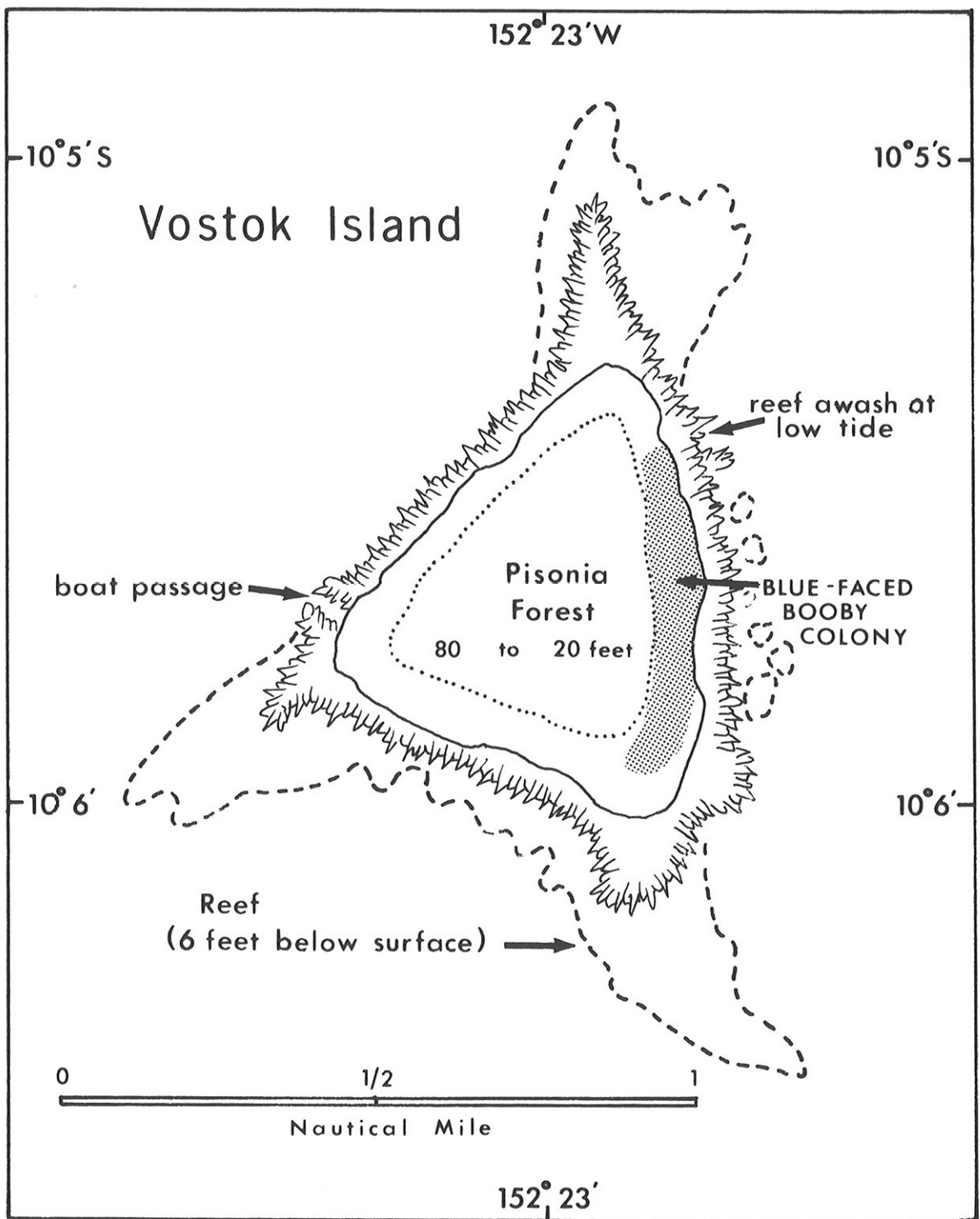


Figure 1. Map of Vostok Island (modified from Bryan, 1942).

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by Roger B. Clapp<sup>2/</sup> and Fred C. Sibley<sup>3/</sup>

In 1965 Vostok Island was visited briefly by Sibley and five members of the Pacific Ocean Biological Survey Program (POBSP) of the Smithsonian Institution. Observations were made from 0900 15 June through 1300 16 June and collections were made of vascular plants, fish, reptiles, birds, mammals, and avian ectoparasites. A small number of seabirds was banded.

Previous information on the biota of Vostok is remarkably scant, limited largely to a few semi-popular accounts (e.g., Bryan, 1942) and a short note on vegetation (Fosberg, 1937). No professional biologists had landed on the island and almost nothing was known of the avifauna, nor were the specific identities of the mammal and reptiles occurring there known.

This paper fills some of the gaps in our knowledge of the biota of Vostok, reports recent observations of the vascular flora, and provides a summary of earlier information.

DESCRIPTION

Vostok is a small, triangular coral island in the southern Line Islands, located at 10°06'S and 152°23'W (Figure 1). It lies 86 miles north-northwest of Flint Island and 125 miles west of Caroline Island. It is about 60 acres (Maude, 1953), or 0.24 square kilometers, in area, and the land surface is no more than 3 to 4.6 meters above sea level.

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The south and west beaches extend to a maximum width of about 45 meters and rise abruptly to a crest that coincides with the edge of the forest that occupies most of the interior of the island. At high tide waves reach the top of the west beach. Recently deposited sand at the top of this beach, and eroded soil at the forest edge, indicate that storm waves occasionally deposit salt water in the interior. The east beach ranges in width from 23 to 30 meters. Above it is a flat area of coral sand and beach rubble that is as much as 90 meters wide at the southeast point.

#### VEGETATION

Fosberg (1937) reported that the flora of Vostok consisted of but two plants, Boerhavia repens L. (as B. diffusa) and Pisonia grandis R. Br. on the basis of observations and collections made by Captain W. J. Anderson in 1935. These were also the only two vascular plants seen and collected by the POBSP in 1965. Specimens:

Boerhavia repens L.

Anderson s.n. (BISH, US); C. R. Long 3191, 3202, 3203, 3204, 3208  
(all Univ. Hawaii).

Pisonia grandis R. Br.

Anderson s.n. (BISH, US); Long 3192 (Univ. Hawaii).

The central portion of the island is occupied by a triangular stand of Pisonia forest that has been wind-sheared by easterly winds (Figure 2). Moving westward from the eastern edge of the forest, the Pisonia becomes successively denser and taller, reaching a height of about 30 meters at the edge of the west beach. No seedlings were found, but sprouts from fallen trees and exposed roots were numerous. No fruits were found.

A few Boerhavia plants were found on the sandy edges of the clearings but the most vigorous growth was found in a stand running from the north to the southeast point. This stand varied from about 3 to 20 meters in width.

On the floor of the forest is a thick humus (to 35 cm) composed of decayed leaves and wood. Crusts of a blue-green alga were found on the humus, rotting tree trunks, and rocks. Occasional clearings within the forest are also covered with a thick humus that overlies a phosphatic hardpan.

## NON-AVIAN VERTEBRATE FAUNA

The only reptile found on the island by the POBSP was the Azure-tailed Skink (Emoia cyanura) of which three specimens (USNM 158350-158352) were collected. These skinks were common and appeared to be most abundant on the forest floor. This species had not been previously recorded from Vostok, although Bryan (1942) reported that "lizards" occurred there. No geckos were seen, but no search was made for them after dark when they would have been most readily found. Several turtles, presumably the Green Turtle (Chelonia mydas), were seen swimming offshore but no nests or signs of their activity were found on the island.

Rats have been known to occur on Vostok since 1935 when they were seen (but not identified to species) by Anderson (undated). Twelve specimens (USNM 361438, 441-449) (two specimens were apparently lost in transit) collected by the POBSP proved to be Polynesian Rats (Rattus exulans). On a geographic and mensural basis (Table 1) these rats appear to belong to the race R.e. exulans, widespread in the Polynesian area. They were abundant throughout the forest but were apparently most numerous in areas where the large Pisonia were interspersed with shorter trees, and under Black Noddy colonies.

Rats were seen feeding on stems and leaves of Pisonia and Boerhavia and one was seen feeding on the carcass of a Black Noddy. A coconut crab (Birgus latro) was seen feeding on a dead rat.

## AVIFAUNA

Prior to the POBSP survey only two species of birds were found from Vostok. On 22 October 1884 J.R.H. MacFarlane visited Vostok from the H.M.S. Constance and "obtained two specimens of the small Black-cheeked Noddy, Anous melanogenys [= Black Noddy, Anous tenuirostris], and some of their eggs" (MacFarlane, 1887). W. J. Anderson (ms.) noted that "white love birds" [= White Tern, Gygis alba] were present when he visited the island from the motor sampan Islander in 1935.

In the following annotated list of POBSP observations and collections of Vostok birds, the figures in parentheses are an estimate of the total flying population, i.e., breeding and nonbreeding adults, subadults and immatures. All specimens were collected on 15 June 1965 except the Golden Plover which was collected the following day.

Annotated list of birds

BLUE-FACED BOOBY (475 ± 50)

Sula dactylatra

Blue-faced Boobies nested solely on the coral rubble on the east side of the island. Nests were scattered uniformly over the area. A

Table 1. Measurements (mm) and weights (g)  
of specimens of Rattus exulans

Museum No.	Sex	Head and Body	Tail	Hind Foot	Ear	Weight
USNM 361442	♂	105	155	29	18	47
361445	♂	125	148	28	18	51
361446	♂	150	165	30	19	88
361447	♂	130	160	27	18	62
371448	♂	147	165	29	19	82
_____*	♂	138	162	29	19	82
361438	♀	128	155	26	17	47
361441	♀	132	163	29	17	70
361443	♀	118	_____	27	18	65
361444	♀	140	160	29	18	65
361449	♀	110	143	26	17	30
_____*	♀	113	140	27	18	38

\* Data from measurements of specimen evidently lost in transit.

complete count of nests revealed: 78 with 2 eggs, 19 with 1 egg, 5 with small young, and 9 with large young. The number nesting in mid-June 1965 was 111 pairs. The total number of breeding pairs for 1965 was undoubtedly larger, since many prenesting pairs were seen standing about. This observation and the data obtained by the nest count suggest that the primary period of egg laying is May through June or possibly July. In addition to the above birds, a small number of immatures were seen that were apparently no longer dependent on their parents for food. Presumably these were young that fledged late in the preceding breeding season. A roosting club of about 75 boobies was found at the south end of the nesting area. Five of these birds had been banded on islands of the Phoenix and Line groups 11 to 19 months previously. POBSP personnel banded 317 adults, 7 immatures and 6 nestlings. Two recaptures of Vostok banded birds have been recorded subsequently from the Phoenix Islands (Table 2).

Specimens: 3♀♀, all three were collected from nests with two eggs. USNM 495693, ovary 20x8 mm, largest ovum 13x5 mm, weight 1660 g; USNM 495694, ovary 35x10 mm, largest ovum 5 mm, weight 1373 g; USNM 495695, ovary 10x6 mm, largest ovum 2.5 mm, wt. 2020 g.

BROWN BOOBY ( 25 ± 5)

Sula leucogaster

Seven nests were found, 4 with eggs, 1 with a small chick, and 2 with large chicks. This count was probably complete.

All nests were on the ground on the east side of the island near or under the forest canopy, and all but one were within one or two meters of its edge. The exception was 3.5 to 5 meters within the forest, but this nest adjoined a man-made lane.

Table 2. Movements of Blue-faced Boobies involving Vostok Island

Birds banded on other islands recaptured on Vostok 15-16 June 1965

Band Number	Where banded	When banded	Age when banded	Nautical miles traveled	Direction traveled	Recaptured as
737-21939	Jarvis I., Line Is.	14 Mar. 1964	Subadult	839	SE	Adult male* in roosting club
737-22604	Enderbury I., Phoenix Is.	17 Nov. 1963	"	1,172	ESE	Adult female in roosting club; had been banded in roosting club on Enderbury
737-48497	Jarvis I., Line Is.	14 Mar. 1964	Adult	1,172	"	Adult male in roosting club
757-66538	Birnie I., Phoenix Is.	8 Nov. 1964	Immature	1,186	"	Adult male* in roosting club
757-67888	Phoenix I., Phoenix Is.	12 July 1964	Adult	1,139	"	Adult female in roosting club
757-67904	" "	" "	" "	" "	" "	Adult male; status undetermined

Birds banded on Vostok 15-16 June 1965 recaptured on other islands

Band Number	Age when banded	Where recaptured	When recaptured	Age when recaptured	Naut. miles traveled	Direction traveled	Remarks
587-82671	Immature	Phoenix I. in Phoenix Is.	10 Oct. 1966	Adult female	1,139	WNW	Captured in roosting club
757-89930	Adult	Enderbury I. in Phoenix Is.	14 Feb. 1966	Adult	1,172	"	Evidently not breeding

\* These birds were sexed by voice at a period in the development of the Blue-faced Booby when differences in voice are not a reliable method of differentiating the sexes (POBSP unpub. data).

One immature and several nonbreeding adults were also seen. An adult, the immature, and the two large chicks were banded.

Specimen: ♂, USNM 495690, testes 14x5 mm, wt. 1065 g.

RED-FOOTED BOOBY (3,000 ± 1,000)

Sula sula

An estimated 1,000 nests were found in Pisonia trees throughout the forest. Nests ranged from ca 4.5 meters above the floor in the small trees on the east side of the forest to ca 27 meters in the taller trees further to the west. Members of the field party climbed to some of the lower nests and found eggs and young. From the ground young were seen in some of the higher, inaccessible nests.

Specimens: ♂, 2 ♀♀. USNM 495103, ♂, testes 15x6 mm, wt. 803 g; USNM 495104, ♀, ovary 16x8 mm, largest ovum 3 mm, wt. 873 g; USNM 495701, ♀, ovary 18x10 mm, largest ovum 4 mm, wt. 766 g.

GREAT FRIGATEBIRD (4,500 ± 1,500)

Fregata minor

An estimated 1,500 nests, most of them at heights of 9 to 27 meters, were widely distributed in the trees. POBSP observations, though limited because of the inaccessibility of most nests, indicate that these Frigatebirds were in the early stages of their breeding cycle. Many males with expanded throat pouches and several birds gathering Boerhavia stems and Pisonia twigs for nesting material were seen. The few nests that were examined contained eggs. It is possible that very small young may have been present, but none could be seen from the ground.

Specimens: 2 ♂♂, 1 ♀. USNM 495089, ♂, testes 24x13 mm, wt. 990 g; USNM 495091, ♂, testes 13 mm, wt. 757 g; USNM 495090, ♀, largest ovum 30 mm, wt. 1358 g.

LESSER FRIGATEBIRD (500 ± 125)

Fregata ariel

Lesser Frigatebirds were seen sitting on nests in one compact colony in the tops of a few trees in the east-central part of the forest. An estimated 100 nests were present but their contents were not checked. Since no young could be seen from the ground and since displaying males were not recorded, the nests presumably contained eggs, small young, or both.

Specimens: 2 ♂♂. USNM 495082, testes 25 mm, wt. 800 g; USNM 495706, rt. testis 11x4 mm, wt. 614 g.

GOLDEN PLOVER

Pluvialis dominica

A flock of nine plovers was seen on 16 June on the sand at the southwest corner of the island. One was collected.

Specimen: USNM 495721, ♂, testes 2x4 mm, wt. 126 g.



## BRISTLE-THIGHED CURLEW

Numenius tahitiensis

Four Bristle-thighed Curlews, one of which was collected, were seen foraging along the beach on 15 June. A single bird, probably one of the above, was seen the following day.

Specimen: USNM 495733, ♂, testes 7x1 mm, wt. 360 g.

## WANDERING TATTLER

Heteroscelus incanum

A single bird was noted along the beach on 16 June. The flock of 19 unidentified shorebirds seen the previous day may have been of this species.

## SOOTY TERN (40-50)

Sterna fuscata

During the two-day survey 40 to 50 Sooty Terns were flying low over the island in groups of 3 to 5 individuals. None were seen in the typical prebreeding swirls, and no evidence of previous attempts at nesting was found. Probably these terns were wandering individuals from nearby colonies, such as those on Caroline Atoll and Malden Island.

Specimens: 2 ♂♂, 1 ♀. USNM 495477, ♂, left testis 8x3 mm, wt. 159 g; USNM 495478, ♂, left testis 5x3 mm, wt. 183 g; USNM 495476, ♀, ovary 12x7 mm, largest ovum 4x4 mm, wt. 203 g.

## BROWN NODDY (500 ± 100)

Anous stolidus

On the east side of the island about 50 Brown Noddy nests were found in dense, shrubby Pisonia, at a height of 1.5 to 3 meters. Nests contained both eggs and young. Relatively few birds were seen by day, but numbers increased considerably at dusk when foraging birds returned from the ocean.

Specimen: USNM 495561, ♀, ovary 12x8 mm, largest ovum 2 mm, wt. 172 g.

## BLACK NODDY (3,000 ± 1,000)

Anous tenuirostris

Black Noddies nested in colonies throughout the forest at heights of 9 to 12 meters. An estimated 1,000 nests were present, containing eggs or young.

Specimens: 4 ♂♂, USNM 495580, testes 9x6 mm, wt. 98 g; USNM 495581, testes 6x3 mm, wt. 102 g; USNM 495582, testes 10x5 mm, wt. 100 g; USNM 495583, left testis 10x8 mm, wt. 106 g.

## WHITE TERN (1,250 ± 750)

Gygis alba

Although common throughout the forest, only a few White Terns were found nesting. Only eggs were found, all in trees; young birds may have been overlooked

One adult was banded.

Specimens: 2 ♂♂, 3 ♀♀. USNM 495604, ♂, rt testis 5x3 mm, wt. 118 g; USNM 495606, ♂, left testis 5x3 mm, wt. 108 g; USNM 495603, ♀, ovary 13x5 mm, wt. 110 g; USNM 495605, ♀, ovary 10x8 mm, largest ovum 4 mm, wt. 105 g; USNM 495607, ♀, ovary 7 mm, ova granular, wt. 105 g.

#### SUMMARY

During a visit to Vostok Island in June 1965 a POBSP field party found two species of vascular plants (Pisonia grandis, Boerhavia repens), one lizard (Emoia cyanura), one mammal (Rattus exulans), and twelve species of birds including nine central Pacific seabirds and three shorebirds.

Eight of the seabirds were breeding (Blue-faced, Brown, and Red-footed Boobies; Great and Lesser Frigatebirds; Brown and Black Noddies; and White Tern) while the remaining species (Sooty Tern) apparently was a visitor. The three shorebirds (Golden Plover, Bristle-thighed Curlew, Wandering Tattler) are migrants to the islands of the central Pacific.

The specific identities of the lizard and mammal are reported for the first time. Of the birds, only the Black Noddy has been reported previously.

#### ACKNOWLEDGEMENTS

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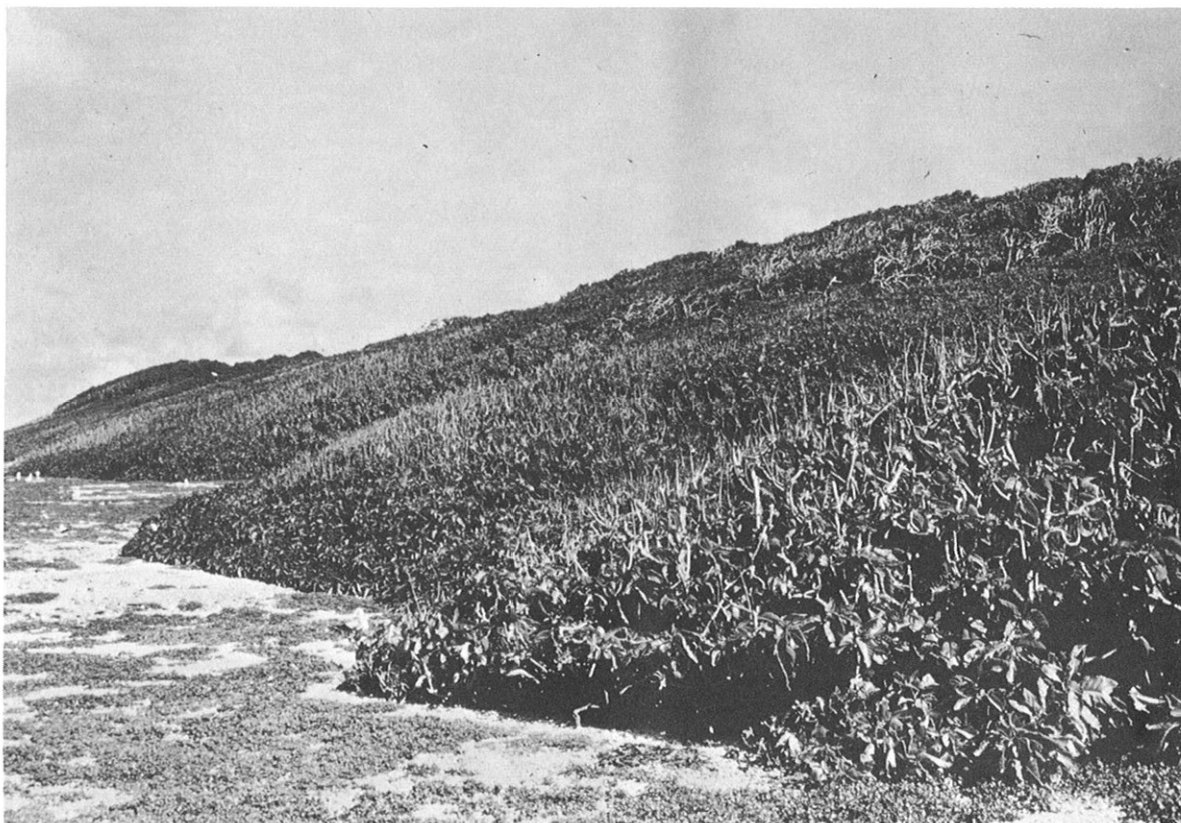


Figure 2. Wind-sheared eastern edge of *Pisonia* forest, viewed from northeast, *Boerhavia repens* in left foreground (photo by C. R. Long, June 1965).

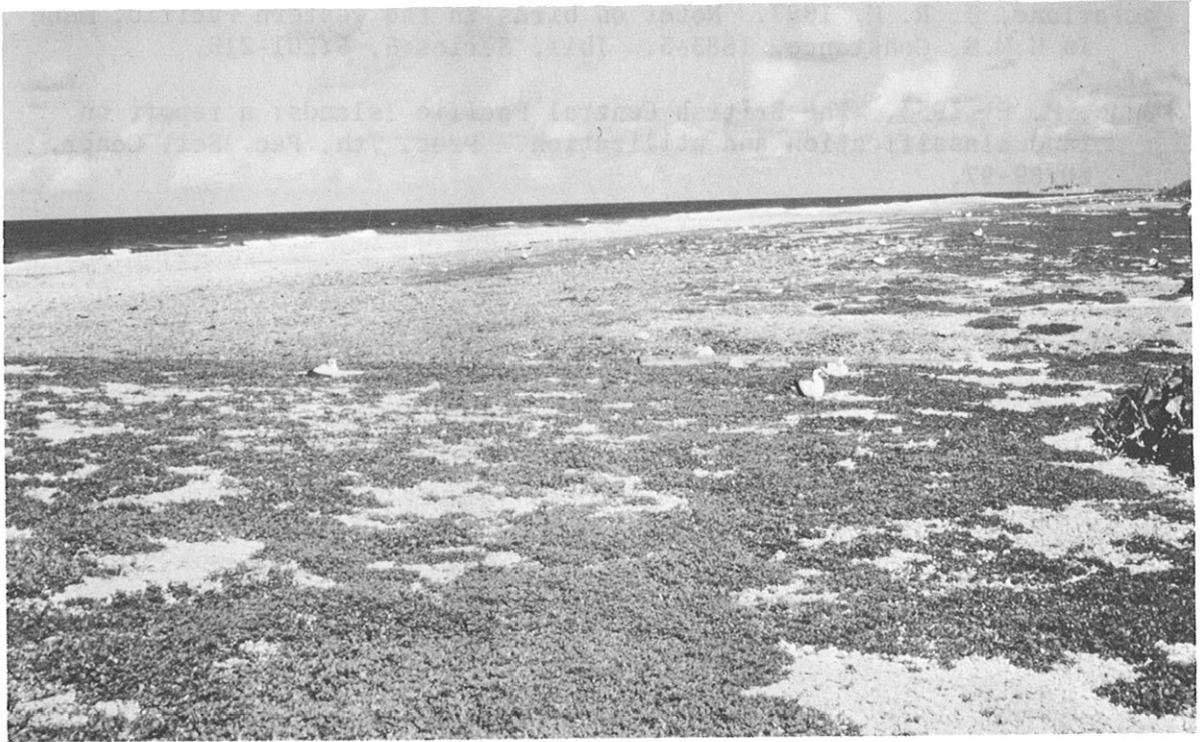


Figure 3. East side of island, viewed from north, showing Boerhavia repens covering coral gravel flat in foreground, blue-faced booby nesting colony in distance (photo by C. R. Long, June 1965).

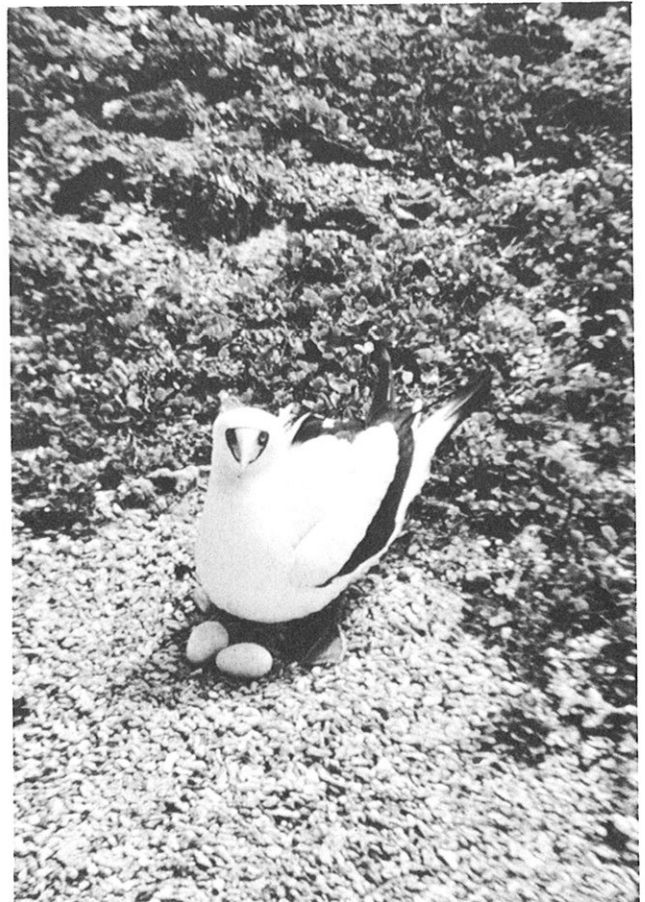


Figure 4. Blue-faced booby with eggs, on coral gravel with Boerhavia repens (photo by R. S. Standen, June 1965).