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DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY

PALAEONTOLOGY SECTION.

FOSSILIFEROUS LIMESTONE OF QUATERNARY AGE FROM NAURU

by

N. H. Ludbrook,
Senior Palaeontologist.

14th December, 1962.

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ABSTRACT:

Limestone collected about 170 feet above sea level south east of Buada Lagoon on Nauru, contains numerous moulds of mollusca which indicate that the rock is of Pleistocene age.

1. INTRODUCTION:

In November, 1961, a block of limestone from Nauru rich in molluscan moulds was submitted to the writer by the Bureau of Mineral Resources which had received the material from the Administrator of Nauru. It was hoped that the mollusca might give some clear indication of the age of the phosphatized limestones of the island.

Although Nauru has been one of Australia's principal sources of phosphate rock since 1919, very little information on the geology of the island has been published. Some geographical data are contained in a paper by Danvers Power (1905, pp. 213-220) and passing reference to Nauru is made by Owen (1923, pp. 1, 3).

2. ACKNOWLEDGEMENTS:

Information on the occurrence of the fossiliferous limestone and on what is known of the geology of the island, has been furnished through Dr. J. M. Dickins by Mr. W. C. White, both of the Bureau of Mineral Resources.

For assistance in providing material for comparison, the writer is indebted to the British Museum (Natural History), Drs. H. Ladd and H. A. Rehder of the United States National Museum, Dr. Myra Keen of Stanford University, and Dr. Stearns MacNeil, U.S.G.S. Menlo Park.

3. GEOGRAPHICAL AND GEOLOGICAL SETTING:

Nauru is situated near the equator in latitude 0°32'54"S, longitude 166°55'0"E. Its area is 4692 acres, greatest length $3\frac{3}{4}$ miles and greatest width, $2\frac{3}{4}$ miles. It rises to a height of about 210 feet, and is surrounded by a flat shore reef 100 to 130 yards wide (Power 1905, p.217). From surface indications only,

the island is regarded as an atoll.

The generally accepted view is that the top part of the limestones forming the island has been phosphatized by downward movement of phosphate from guano deposited on the island by sea birds, although this is not proven.

The samples containing molluscan impressions were collected from the base of the phosphatized layer about 18 feet below the original surface during the mining of phosphate at Anderson's Hill, which was originally 188 feet above sea level. Mining here revealed more than usually fractured limestone pinnacles and limestone agglomerate masses. The location is some 20 chains south-east of Buada Lagoon.

No material from below 170 feet above sea level was submitted.

4. LITHOLOGICAL CORRELATION OF THE LIMESTONE:

As known from the material submitted, the limestone is fairly hard but variable in texture. It has been leached and phosphatized and carries numerous solution channels in which calcareous and phosphatic material has been redeposited. Colour varies from cream - white to light brown.

Although molluscan impressions are abundant, none of the original shell material has been preserved.

Lithologically, the limestone may be compared with the Yontan Limestone of Okinawa (MacNeil, 1960, p.11), material from which, through the courtesy of Dr. MacNeil, the writer was able to examine in the U.S.G.S. Collection at Menlo Park, California. The Yontan Limestone occurs at a maximum altitude of 450 feet, its presence above 250 feet being regarded as due to faulting, and is from 40 to 200 feet thick (MacNeil, l.c. pp. 11,12).

5. FAUNA AND AGE OF THE MATERIAL:

The limestone is crowded with moulds of mollusca, mostly pelecypoda with isolated gastropoda. Preservation is poor on the whole and identification was made from latex casts. These were compared with specimens in the British Museum (Natural History), the United States National Museum and the Geology Department of Stanford University.

The most abundant species is Fragum fragum (Linné) which constitutes probably 90 per cent of the fauna. This is a common species of the Great Barrier Reef and the Indo-Pacific Region, and it is identified without doubt in the Nauru limestone. Other species present are: Gafrarium pectinatum (Linné), the impressions of which may be compared with examples of the species from Samoa; cf. Pitar (Pitarina) striata (Gray), the identification of which, from two latex casts, is approximate only since the adductor scars of the one Nauru specimen showing the internal features are set higher under the hinge than they are in Pitar (Pitarina) striata; and Terebralia palustris (Linné). There are some slight differences mainly in the apparent number of axial ribs between the fossil material and Recent examples of Terebralia palustris.

All of these species are living in the Indo Pacific Region at the present day.

The presence of Terebralia palustris, which inhabits swampy mud flats, mangrove swamps and estuarine swamps, suggests that the material was deposited in the lagoon.

From the available evidence, it is therefore considered that the limestone on Nauru at least above 170 feet above sea level is of Quaternary (Pleistocene) age, probably contemporaneous with the Yontan Limestone of Okinawa.

Deposition of guano would therefore have taken place not before late Pleistocene or Recent time.

6. REFERENCES:

MacNeil, F. Stearns, 1960. Tertiary and Quaternary Gastropoda of Okinawa. U.S. Geol. Surv. Prof. Pap. 339, pp.1-148 pls. 1-19.

Owen, L. 1923. Notes on the Phosphate Deposit of Ocean Island; with remarks on the Phosphates of the Equatorial Belt of the Pacific Ocean. Quart. J. Geol. Soc. Lond. vol. 79, pp.1-15.

Power, F. Danvers, 1905. Phosphate Deposits of Ocean and Pleasant Islands. Trans. Aust. Inst. Min. Eng. vol.10 No.137, pp. 213-232.

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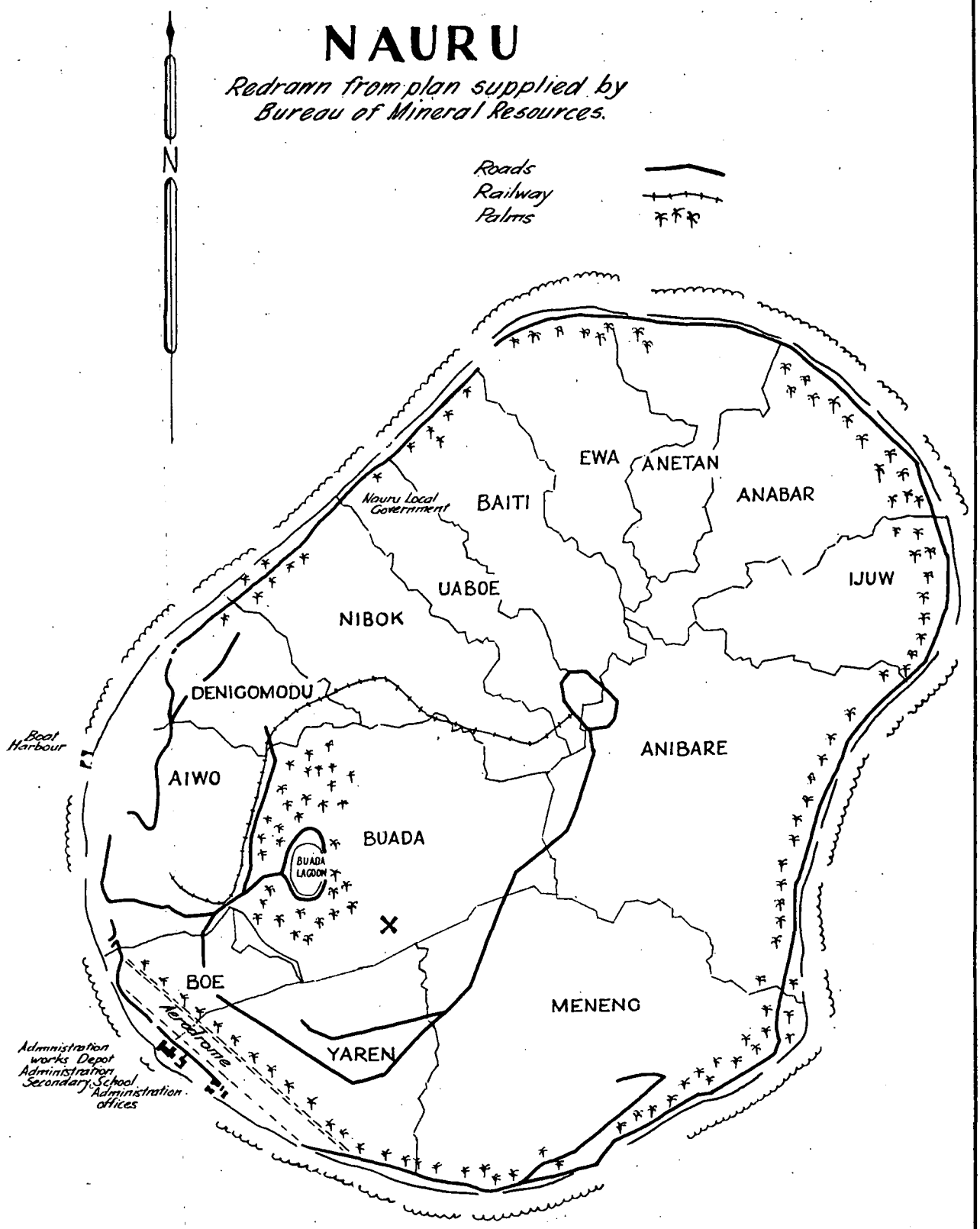
14.12.62.

NAURU

Redrawn from plan supplied by Bureau of Mineral Resources.



✕ *Indicates location of fossiliferous samples south-east of Buada Lagoon*

SCALE

Chains 40 0 40 80 Chains

To accompany report by Dr. N.H. Ludbrook

S.A. DEPARTMENT OF MINES

Approved	Passed	Drn.	NAURU LOCALITY MAP	D.M.	Scale 40 chns. to 1 inch
		Tcd. F.B.		Req.	S3312
		Ckd.			934·5
Director		Exd.			Date 14-12-62

200—9·61 S805