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NATURAL HISTORY OF THE HOGAN GROUP

1. PHYSICAL ENVIRONMENT AND VERTEBRATE FAUNA

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(with one text-figure)

INTRODUCTION

The Hogan Group, consisting of eight islands and islets, lies in Bass Strait about 42 km southeast of Wilson's Promontory. Together with the islands of the Kent and Furneaux Groups, lying further to the southeast, the Hogans formed part of a landbridge linking Tasmania to the Australian mainland during the last glacial period of the Pleistocene. The Hogan Group, though small in size, is of particular biogeographical interest as it was the first section of the landbridge on the eastern side of Bass Strait to be isolated by the postglacial rise in sea level.

The islands were named in 1802 by Mr. John Black of the brig *Harbinger*, the first vessel to sail through Bass Strait from England after the strait's discovery by Bass and Flinders in 1798 (Flinders 1814). From this time most of the islands of Bass Strait were inhabited or at least regularly visited by sealers. In 1831 George Augustus Robinson recorded sealers living on Deal Island, in the Kent Group, and also on Curtis Island, which is about 20 miles southwest of the Hogan Group (Plomley 1966). Stokes (1846) noted that dogs had been released on Hogan Island by the sealers and Doome (1874) related an account of sealers living in the group some years earlier.

As the seals in Bass Strait diminished in number, the sealers turned to hunting kangaroos and farming on the smaller islands. Eventually even the more isolated islands such as those of the Hogan Group were leased for grazing purposes even if they were not continuously inhabited. The first recorded lease of Hogan Island was issued on the 12th October, 1900, and with the exception of the period from the 1st October, 1928 to the 12th April, 1930, the island has been under lease ever since. From 1900 to 1959 the lease covered the whole group of islands, and from 1959 onwards only Hogan Island itself. The present lessee, Mr. B.R. Stackhouse, who has held the lease since 24th May, 1967, now runs about 100 head of cattle on Hogan Island and sheep have occasionally been run there in the past. Mr. Stackhouse informed us that he knew of no grazing on any of the islands other than Hogan itself, but sheep bones were found on Long Island by the expedition. The island is regularly burnt about once every five years by the lessee, and accidental fires may be more frequent. No buildings have been erected on the islands excepting an automatic light which was placed on the summit of Hogan Island in 1965. Cattle yards have been built at the southern end of the bay on the east coast of Hogan Island, and a concrete trough has been placed around a spring at the northern end of this bay to provide a permanent supply of fresh water for the stock.

Eleven members of the McCoy Society for Field Investigation and Research visited the Hogan Group from 22nd January to 2nd February, 1968. Most of the work reported in this series of papers was carried out on Hogan and Long, the two largest islands, and a short visit was made to East Island. Hogan Island was surveyed and diagrams of the geology and vegetation prepared with the aid of air photographs. The dimensions of the group were obtained from the Sailing Directions for Victoria including Bass Strait (Victorian Government 1959).

THE PHYSICAL ENVIRONMENT

The Hogan Group (see fig. 1) lies at latitude 39° 13' and longitude 146° 59', 1.6 km south of the Victorian-Tasmanian border. The islands lie on the Bassian Rise, the line of shallowest water between Tasmania and the mainland (Jennings 1959). The cliffs on the western coast of Hogan Island plunge down steeply 55 to 64 m (30 - 35 fathoms) to the flat floor of Bass Strait, but the water between Hogan Island and the other islands of the group is shallower. Hogan Island is about 2.4 km long and 0.8 km wide at its widest point. It is steeply cliffed on the west coast but slopes gently down to the sea on the east. At 133 hectares it is the largest island of the group and its highest point, on a ridge running north-south along the west coast, is 130 m. Close to the northeast point of Hogan Island and separated from it by a narrow channel 61 m wide lies Long Island, which is about 0.4 km long and 150 m wide, covering an area of 14 hectares and reaching a height of 66 m. East Island, 9.7 hectares in area and 50 m high, lies 3.2 km to the east of Hogan Island. Of the remaining islands, the three close to Hogan Island are steep rocky peaks, with little vegetation. The Twin Islets to the north are, respectively, 34 and 46 m high, and Round Islet to the southeast is 47 m high. These three islands are each less than 0.4 hectares. Two small rocks, Seal Rock, 4.6 m high, and Northeast Islet, 20 m high, lie to the northeast of Hogan Island.

The nearest weather stations to the group are those on Wilson's Promontory and Deal Island. The average annual rainfall for the standard 30 year period is 775 mm on Deal Island, and 1070 mm at Wilson's Promontory lighthouse, in both cases spread evenly throughout the year, with a slight winter maximum. However, both Wilson's Promontory and Deal Island (290 m) are considerably higher than Hogan Group and it is possible that rainfall on the latter is less than 760 mm. The only weather station on a small low island in Bass Strait is at Goose Island, 97 hectares and 16.5 m in height, the most westerly island of the Furneaux Group, which has an average annual rainfall of 560 mm. No temperature data are available from the Deal Island station, but both Deal Island and Hogan Group have mild maritime climates similar to that of the Furneaux Group, with both lower maximum and higher minimum temperatures than Tasmania or Victoria (Bureau of Meteorology 1954).

GEOLOGY

The geology of Hogan Island is shown in figure 1. The group is part of the granite bathylith of supposed Devonian age which extends from Wilson's Promontory to northeastern Tasmania. This granite occurs in two distinct types, a porphyritic and a fine grained variety, the former being almost identical in appearance to the granite of Wilson's Promontory which has been described by Reed (1959). On small areas of Hogan Island there is a thin deposit of Pleistocene dune limestone, and beach deposits have formed on the eastern coast.

Porphyritic Granite

Porphyritic granite outcrops on the summit of Hogan Island where it forms a capping over the fine granite and it also forms most of the coastal cliffs and headlands. The other island of the group appear to be composed entirely of porphyritic granite. It consists of phenocrysts of feldspar up to two inches in length and a finer matrix of quartz, biotite and feldspar. Tourmaline nodules are common, particularly at the northeast corner of the island. This granite is strongly jointed in north-south and east-west directions and also has a pronounced horizontal jointing pattern.

Fine grey granite

Fine grey granite constitutes the main body of Hogan Island with small outcrops through the dune deposits and on the east coast. The rock consists of equigranular quartz, feldspar and biotite and has a northeast-southwest jointing pattern. The junction between the two types of granite is very sharp where it is exposed at the summit and north and east coasts. There is no apparent transitional zone or shatter-

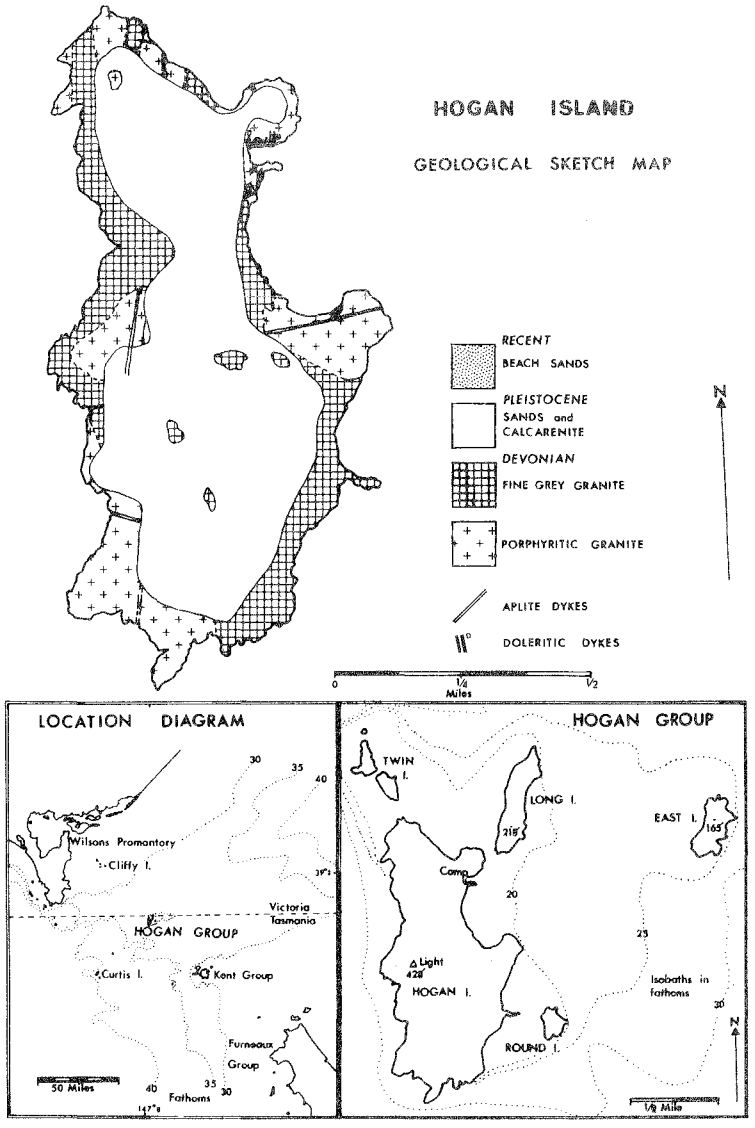
HOGAN ISLAND
GEOLOGICAL SKETCH MAP
RECENT
BEACH SANDS
PLEISTOCENE
SANDS and
CALCARENITE
DEVONIAN
FINE GREY GRANITE
PORPHYRITIC GRANITE
APLITE DYKES
DOLERITIC DYKES
N
0
1/4
Miles
1/2
LOCATION DIAGRAM
Wilsons Promontory
Cliffy I.
Victoria
Tasmania
HOGAN GROUP
Curtis I.
Kent Group
Furneaux
Group
50 Miles
Fathoms
HOGAN GROUP
TWIN
I.
LONG I.
EAST I.
Camp
Light
428
HOGAN I.
ROUND I.
Isobaths in
fathoms
N
1/8 Mile

FIGURE 1

ing at the contact between the two granites and no differential erosion. At the summit the contact is in a horizontal plane while on the coast the contact is vertical with a very irregular strike.

Dyke Rocks

Aplite dykes up to one foot wide occur in the porphyritic granite striking north-south and east-west and in the fine grey granite they strike southeast. These dykes have associated tourmaline nodules in some areas. Dolerite dykes were found on the northeast point of Hogan Island. A number of parallel dykes up to 15 cm wide and 3 m long strike north-south and one dyke, 0.6 m wide and 12 m long was found striking east-west. These dykes are dark brown in colour as they are partly decomposed and ferruginised, but they were identified by petrographic examination.

Pleistocene calcarenite and sands

Much of Hogan Island is covered by a fine brown sand showing fine bedding patterns. Beneath this a layer of calcarenite occurs above the granite. This limestone is only 30 cm thick in most places but is at least 6 m thick on the north-east coast of the island. This rock type has been described elsewhere by Jennings (1968) and it occurs on Wilson's Promontory, Deal and Flinders Islands.

At the interface with the granite a layer of fine grained limestone has formed, presumably through leaching of the calcarenite, and in places where the overlying calcarenite has eroded away this material forms ledges. On the north and east coasts granite boulders form a conglomerate cemented by this calcareous material. Pleistocene limestones were not found on the other islands.

GEOMORPHOLOGY

Hogan Island consists of a high ridge running north-south along the western side of the island, with three shallow valleys draining the area to the north and east of the ridge. No gullies have formed as all rain is caught by the sandy soil and calcarenite sheet; this water is presumably collected by the pre-Pleistocene drainage and reappears as springs at the base of the limestone on the east coast.

The remaining islands and rocks are humped granite masses with cliffed coasts and steep slopes. The western and southern coasts are exposed to the greatest wave action but boulder beaches have built up on the eastern coast of Hogan Island, and two sandy beaches have also formed there. A shore platform is developing on both the east and northeast coasts of Hogan Island. Its formation is assisted by the horizontal jointing of the granite.

The soils of the group are sandy and generally shallow, giving directly onto granite or limestone. Salt spray probably assists in leaching clays produced by decomposition of the granite. Peat which has built up to 50 cm around the springs overlies clays produced from granite gravel. On Hogan Island some soil erosion has taken place and at present a sandy trough about 15 m wide and 91 m in length is being eroded by westerly winds across the ridge south of the summit. There are signs of older scars now stabilised by grass.

THE VERTEBRATE FAUNA

Reptiles

Five species of lizards were collected during a three-hour "tour" of Hogan Island; these are recorded for the island for the first time. All belong to the family Scincidae:

Leiolopisma metallicum (O'Shaughnessy, 1874)
Leiolopisma trilineatum (Gray, 1839)
Leiolopisma entrecasteauxi (Dumeril & Bibron, 1839)
Egernia whitei (Lacepede, 1804)

Tiliqua nigrolutea (Quoy & Gaimard, 1824)

All of these species are shared with Tasmania, Flinders and King Islands, and southern Victoria (Rawlinson 1967). The following are species which are also found in the latter areas (Rawlinson, *op. cit.*) but which appear to be absent from Hogan Island.

Elapid snakes

Denisonia superba (Gunther 1858)
Denisonia coronoides (Gunther 1858)
Notechis ater (Krefft 1866)

Scincid lizards

Leiolopisma ocellatum (Gray 1844) not present in Victoria
Leiolopisma pretiosum (O'Shaughnessy 1874)
Leiolopisma delicata (De Vis 1888)
Rhodona bougainvilli (Gray 1839)

Agamid lizard

Amphibolurus diemensis (Gray 1841)

It was impossible to make a thorough assessment of the reptile fauna of the island in three hours. However, snakes are apparently absent, since other members of the party, who worked on the island for several days, saw no evidence of them. Mr. Stackhouse informed us that "small green snakes" used to be common in tussock areas, but that he has never seen a "big snake" on the island. Further, the sailing directions, (Victorian Government 1959) state that "the island was formerly overun by snakes but they are not now so numerous". It is surprising that the small white-lipped snake *D. coronoides*, often greenish in colour, is now apparently absent, since this species feeds mainly on small lizards, which are abundant. The tiger snake, *N. ater*, occurs in mutton bird rookeries on several small southern Bass Strait islands, similar in physiography and vegetation to Hogan Island, where there is no permanent water or continuous food supply (Worrell 1963). Juvenile snakes eat small lizards; larger individuals eat young mutton birds during several weeks of summer and rely on fat reserves for the rest of the year. It is possible that a population of *N. ater*, once inhabited the Hogan Island rookeries, but the species is now apparently absent. The copperhead, *D. superba*, is certainly precluded from the fauna by a lack of permanent water and suitable cover.

Neither of the small skinks, *L. ocellatum* and *L. pretiosum*, have been recorded north of Flinders Island and both prefer different types of cover from those found on Hogan Island. However, *L. delicata*, *R. bougainvilli* and *A. diemensis* may possibly be found on the island with more thorough searching.

The abundance of small skinks on Hogan Island appeared to be much greater than is the case in favourable mainland habitats. Consequently, the gut contents of the individuals collected were examined: by far the greater bulk of food consisted of small bush flies, which apparently breed in the bird rookeries and in the cattle dung littering the island. A similar situation was reported by Soule (1966); hordes of flies accompanying bird rookeries, on small islands in the Gulf of California, provided abundant food for small lizards during most of the year. Lizards were not seen foraging in the intertidal zone on Hogan Island, unlike those observed by Soule, and no traces of marine organisms were found in the food remains. Thus, it seems that the high density of the small-lizard population, living in a habitat which would normally be inadequate in terms of food supply, is made possible by the presence of mutton birds and cattle.

Conversely, in the absence of snakes, cattle are possibly a very important source of mortality for small lizards. During a short period of collecting in areas grazed or traversed by cattle, four *L. metallicum*, five *L. trilineatum* and three unidentifiable specimens were found, in various stages of decomposition, crushed under loose stones on the ground, where they had apparently taken cover. In the absence, before our arrival, of other large animals, cattle would appear to be responsible for these accidental deaths.

Five separate aggregations of small, white leathery eggs, consisting of eleven, six, four, two and two eggs respectively, were found in moist, friable soil under loose stones. When hatched in the laboratory, they proved to be those of *L. trilineatum*. Two aggregations were undoubtedly in communal laying sites, as this species is not known to lay more than four eggs in one season. The habit of laying in communal nests is not uncommon among small reptiles (Cogger 1967; Goin and Goin 1962).

Birds

Mattingley (1938) recorded silver gulls *(Larus novaehollandiae)*, Pacific gulls *(Larus pacificus)*, sooty oyster catchers *(Haematopus unicolour)*, stubble quail *(Coturnix pectoralis)*, pipit *(Anthus australis)* and blackbird *(Turdus merula)* on Hogan Island. All these species were seen by the 1968 expedition. Mattingley commented that cattle and sheep had "almost obliterated the nesting burrows of the shearwater and the penguin and only a few nesting sites remain". At present two large mutton-bird *(Puffinus tenuirostris)* rookeries each about 1.2 - 1.6 hectares in extent occur on Hogan Island. These are at the northern and southern ends of Hogan Island, high on the eastern slopes of the central spine of the island. Scattered burrows were noted elsewhere on the island, particularly on the headland facing Long Island. Mutton-bird burrows were also found on Long Island. Penguins *(Eudyptula minor)* are present on Hogan Island and two prions were caught in the tents erected at the camp-site, although no burrows of the latter were discovered.

Dorward (1967) noted that small numbers of Cape Barren geese *(Cereopsis novaehollandiae)* lived on Hogan Island. In 1968 none were present on Hogan Island but two were observed on East Island.

Mammals

Only one land mammal, the velvet-furred rat, *Rattus lutreolus velutinus*, was found on the islands of the Hogan Group. This species was trapped in two areas on Hogan Island, three specimens being taken in swampy *Senecio lautus* herbfield near the water trough and five specimens among limestone outcrops close to the north coast of Hogan Island. Bones referable to this species were found elsewhere on Hogan Island and also on Long Island, but no trapping was carried out on the latter. The eight specimens from Hogan Island are registered in the collection of the National Museum of Victoria as numbers C8325 - C8327, C8817 - C8817 and C8846. These specimens differ from the Tasmanian population of *R. l. velutinus* in one cranial measurement, inter-orbital width, with respect to which the Hogan Island rats are somewhat smaller (Wakefield 1969).

In Tasmania *Rattus lutreolus velutinus* occurs in three different types of habitat, which are in order of importance *Nothofagus cunninghami* rain forest, button grass *(Gymnoschoenus sphaerocephalus)* sedgelands and coastal swamp lands (Green 1967). Although this species is certainly also living among tussock grassland on Hogan Island, the habitat in which it was caught at the northern end of the island is very different from the preferred habitats in Tasmania. The limestone outcrops along the north coast of Hogan Island are separated from the boulder beach by about 1.5 m of sand and succulent herbfield, and are exposed to sea spray. Mutton-bird and penguin burrows are common in the small caves and overhangs in the limestone and among the vegetation. The rats appeared to be living mainly in the limestone caves and the large numbers of tracks in the sand about the limestone outcrops suggest that the species is quite abundant. One individual rat observed on several nights was living in a burrow beneath a large granite boulder about 3 m inland, perhaps a 0.3 m higher than the high

tide mark.

Apart from a group of about fifteen seals, probably the fur seal, *Arctocephalus doriferus*, observed on Northeast Islet, no traces of other native mammals were found on the islands. Elsewhere in Bass Strait the bones of mammals, notably those of the Tasmanian pademelon, *Thylogale billardieri*, are very common on eroded sand dunes even on islands where the species are now extinct. Bones of mutton-birds and the native rat only were found on eroded areas on Hogan and Long Islands, and seal bones on East Island. Hogan Island is at the lower extreme of the size range of islands on which the pademelon is known to have lived. The smallest island which supported a population of pedemelons is Kangaroo Island, 140 hectares in size, in the Furneaux Group. The species is now extinct on this island.

In general, the Tasmanian endemic species and subspecies of birds and mammals are those found on the islands of Bass Strait rather than the related Victorian ones. For example, five Tasmanian endemic species of birds have been recorded from the Kent Group (Ridpath and Moreau 1966), and the Tasmanian subspecies of the echidna, *Tachyglossus aculeatus setosus*, is present on King Island and in the Furneaux Group. However, *Rattus letreolus velutinus* on Hogan Island provides the most northerly record of a Tasmanian species or subspecies in Bass Strait. This pattern of distribution may have arisen in the following way. As the sea level fell at the beginning of the last glaciation the more southern part of Bass Strait, being shallower, would have been exposed first, joining the islands of the Furneaux Group to northeastern Tasmania. Subsequently, the Kent Group and the Hogan Group would have become connected to the northern end of Flinders Island. By the time the final water barrier between the Hogan Group and Wilson's Promontory disappeared, the Tasmanian fauna would have had ample opportunity to move north onto the landbridge and to become established there before coming into contact with the fauna of Victoria. It is possible that in many cases, such as that of *R. l. velutinus*, the line of demarcation between the Victorian and Tasmanian faunas remained constant at the point of contact, somewhere between Hogan Group and the present Victorian coastline. Consequently, when the sea level rose again postglacially, the Tasmanian forms were those isolated on the islands of Bass Strait. The Hogan Group would have been one of the first islands to be formed from the landbridge, so that its fauna and flora has been isolated from Tasmania longer than that of the larger islands to the south. The small variation in the Hogan Island population of *R. l. velutinus* is thus probably an example of post-glacial evolution.

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