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RECORDS.

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NOTES ON HEAVY MINERAL BEACH SANDS IN  
DAMPIER PENINSULA NORTH-WESTERN AUSTRALIA

by

R.O. Brunnschweiler

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## SUMMARY

Heavy mineral beach sands with a locally high concentration of the combination ilmenite (66%), magnetite (17.8%), zircon (11%) and Rutile (1.6%) are found on the central south-west coast of Dampier Peninsula, north-western Australia. It is believed that further investigations might locate extensive deposits of heavy mineral beach sands in other places along the shores of the Desert Basin.

## INTRODUCTION

The discovery of the heavy mineral deposit here described was made by the writer during the 1950 field season in Dampier Peninsula, when geological mapping of the area was carried out in conjunction with Mr. Hampton Smith, Consulting Geologist for Ampol Petroleum Co., Sydney. When traversing the southern west coast from Broome to Carnot Bay the writer noticed the presence of black-sand beaches in several places and he eventually took a sample from one of the best localities.

At first not much attention was paid to the sample, because it was believed to consist essentially of magnetite, possibly derived from iron cemented Tertiary sandstones, which are widespread in the coastal area. However, when finalizing the report on the geology of the Peninsula, the writer asked for a detailed analysis of the sample. It was then discovered that it was composed mainly of ilmenite.

## OUTLINE OF THE LOCAL GEOLOGY AND PHYSIOGRAPHY

The coast of Dampier Peninsula, between Gantheaume Point and Carnot Bay, has a northerly trend and is formed by a plateau escarpment (Dampier Plateau; Brunnschweiler, 1952), which is almost continuous and fairly straight.. This coastal escarpment is carved out of the Lower Cretaceous Broome Sandstone. North of Willie Creek the Broome Sandstone is, in most places, overlain by 2-10 feet of fluviatile-estuarine sandstones of Tertiary age, which are iron cemented and deep black in colour (Emeriau Sandstone). South of Willie Creek the original escarpment is mostly hidden beneath late Pleistocene coastal eolianites, consisting of more or less vegetated sand dunes.

Except at Gantheaume Point (altitude 80 feet) and Coulomb Point (40 feet), the escarpment is generally about 20 feet high. There is one major inlet in this coast line, Willie Creek, - formerly a tidal flat or lagoon which originated partly in the Pleistocene and partly in the mid-Recent phases of higher eustatic sea-levels. Elsewhere the plateau escarpment has suffered only minor dissection in the form of narrow gullies and small, seaward-sloping washouts.

The entire array of plateau headlands is fronted by very gently curved or near-straight beaches. The longest and widest of these is Cable Beach, which extends without interruption from Gantheaume Point to Willie Creek (about 15 miles). Gently curved, it faces north-west at Gantheaume Point and west-southwest near Willie Creek. The beaches between Willie Creek and Carnot Bay are not as long and continuous as Cable Beach. Except for the southernmost one, between Willie Creek and Cape Boileau, they are also narrower. In many places at Spring tides the sea reaches the foot of the plateau escarpment behind the beaches.

The beach line north of Cape Boileau is interrupted not only by the protruding headlands, but also by fairly hard beach-rock platforms which have been formed by the cementing of the sands themselves. On such platforms loose sand is found only as a thin cover on the higher, landward end. This type of consolidated beach is most commonly found extending from both sides of protruding headlands and around the heads of inlets.

In general, therefore, the beaches between Cape Boileau and Carnot Bay appear to be discontinuous and rather thin littoral deposits, which were laid down on a shallow and gently seawards sloping marine erosion terrace, carved out of the Lower Cretaceous Broome Sandstone. However, there are a few localities, where the accumulation of unconsolidated beach sands is appreciably greater, and it is in one of these places that a particularly high concentration of heavy minerals was discovered.

#### LOCATION AND ACCESSIBILITY OF THE DEPOSITS

Heavy minerals seem to be present in most of the beach sands on the west coast of the Peninsula, but their concentration on the beach surface is, in most places, not high enough to be particularly noticed. D.J. Guppy states (verbal communication) that in 1948 he had noticed blackish sands on the beaches at and near Broome. The writer remembers seeing rather similar sands in various places on the central west and the far north-west coast, i.e. in the Beagle Bay and Pender Bay areas.

However, by far the highest surface concentration of heavy minerals was found on the central south-west coast between James Price Point and Coulomb Point. Here the moderately wide beach (20-40 yards) in front of a continuous line of perpendicular cliffs, which are from 20 to 40 feet high, is literally black in many places. Any sample taken at random from the black patches and seams will yield a very high percentage (over 90%) of heavy minerals.

The beach between James Price Point and Coulomb Point is fairly easily accessible and about 40 miles by land from Broome, although there are no roads or bush tracks maintained in the area at present.

The Broome-Beagle Bay track can be used as far as Willie Creek but from the Creek onwards there is only an old and overgrown track, which can be followed to a point about 5 or 6 miles north of Cape Boileau. However, a road could be made through the sandy soil of the "Pindan" bush without much difficulty. Such a road would have to by-pass the Willie Creek clay pan, which is an impassable bog during the wet season.

Furthermore, the beach may be accessible for barges, but the high tide range and the high surf on this wide open coast would render landing and loading operations rather difficult at times.

The other localities mentioned, Beagle Bay and Pender Bay, are respectively 85 and 110 miles by road from Broome and would be less easily accessible particularly because of the coastal eolianites (sand dunes), which fringe these bays in most places. Access from the sea would involve similar difficulties as those expected on the Coulomb Point beach.

#### COMPOSITION AND PROVENANCE OF THE HEAVY MINERAL SANDS

The actual concentration of heavy minerals in the beach sands near Broome, between James Price Point and Coulomb Point, at Beagle Bay and Pender Bay is not known. The analysis below is of a surface sample from about 5 miles north of James Price Point, where the sand has the following composition (analysis by Mr. J. Ward) :

Ilmenite	66.0	%
Magnetite	17.8	
Zircon	11.0	
Rutile	1.6	
Quartz	3.2	
Other Minerals (leucosene, tourmaline, monazite and garnet)	0.4	
	<u>100.0</u>	%

The determination of the chromium content of the ilmenite is at present being carried out by the Ore Dressing Division, C.S.I.R.O. in Melbourne. The commercial possibilities of the deposits appear to depend almost entirely on the result of that determination, because ilmenite is the only heavy mineral in the sands present in commercial quantities.

The provenance of the heavy minerals can only be conjectured. The large deposits on the coast of Eastern Australia appear to be derived from Mesozoic sandstones exposed in the coastal hinterland (Gardner, 1952 A). This relation may also be present in Dampier Peninsula. However, the sandstones of the Lower Cretaceous Dampier Group (Brunnschweiler, 1952) are composed almost exclusively of quartz when analysed in thin sections. Furthermore, it is also surprising that there should be such marked differences in the surface concentration of the minerals. Apart from minor changes in the thickness and the extent of interbedded siltstones, the Cretaceous sandstones exposed in all the coastal cliffs of the Peninsula west coast are very uniform.

A possible derivation of the heavy minerals directly from the Pre-Cambrian shield west of the sedimentary Desert Basin should also be kept in view. Although the nearest outcrops of the Pre-Cambrian are almost 200 miles away, it might be possible for eastward currents to shift the material as far as the coast of Dampier Peninsula, where the heavy minerals become concentrated in favourable environments. If that is really the case one may, also expect heavy mineral deposits along the Eighty Miles Beach south-west of Broome.

#### EXTENT OF THE DEPOSITS.

Without detailed investigations it is impossible to produce even a rough estimate of the heavy mineral reserves in Dampier Land. Little is known about the thickness of the sand on the 8 miles long beach between James Price Point and Coulomb Point. It may be anything from 5 to 30 feet depending on the underlying erosion terrace. The width of the beach - although fairly consistent in that area - ranges between 60 and 120 feet.

#### ACKNOWLEDGMENT

The friendly services of Mr. J. Ward, of the Bureau, who made the analysis of heavy minerals, are gratefully acknowledged.

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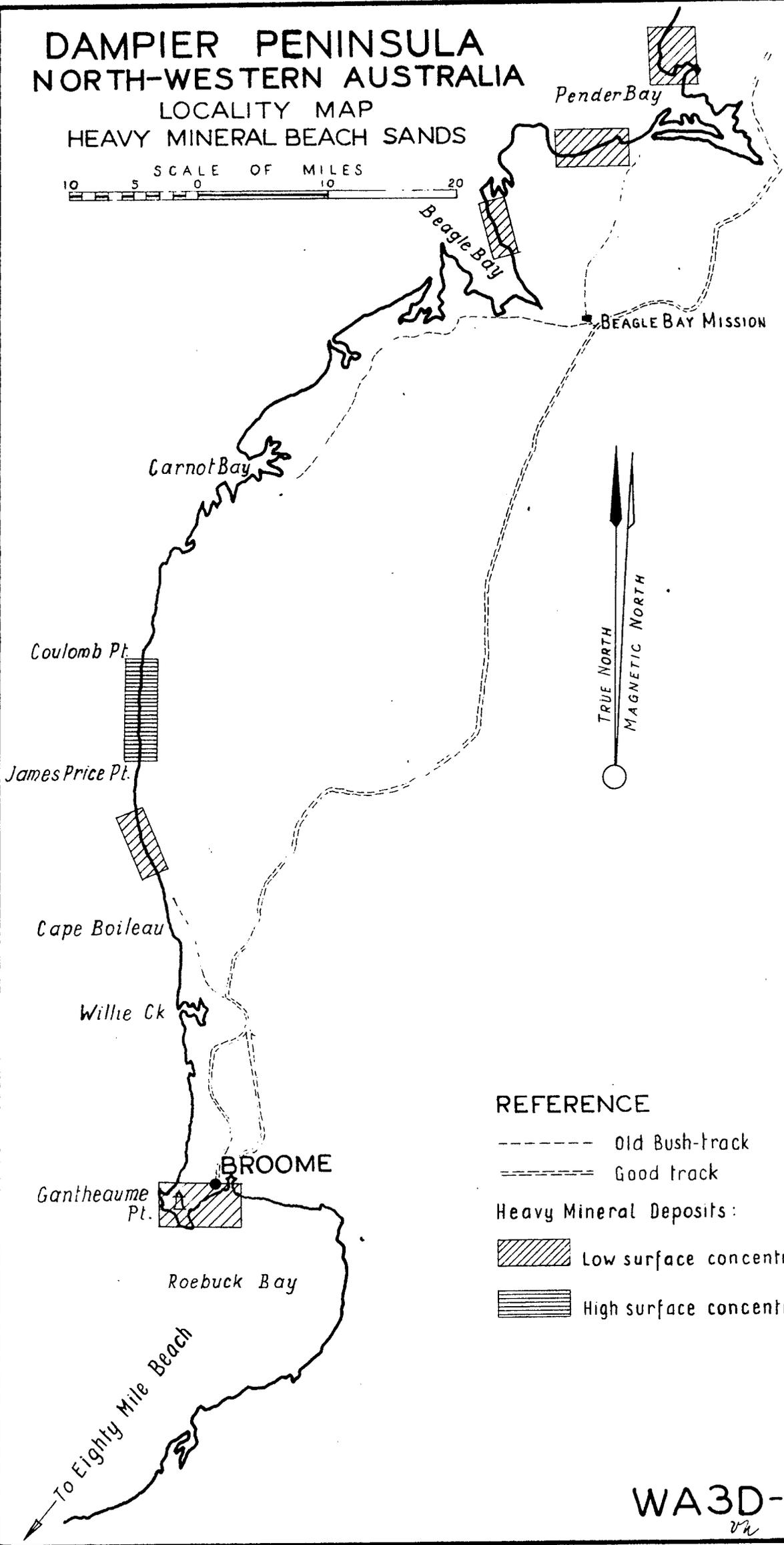
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A. Dark coloured sandstones of probable Lower Cretaceous age (Mullaman Group) had been noted in places in the Northern Territory and heavy mineral concentrate from sandstones of the Group along the coast of Coburg Peninsula have been examined by H.B. Owen.

# DAMPIER PENINSULA NORTH-WESTERN AUSTRALIA

## LOCALITY MAP HEAVY MINERAL BEACH SANDS

SCALE OF MILES  
10 5 0 10 20



### REFERENCE

- Old Bush-track
- Good track

### Heavy Mineral Deposits:

-  Low surface concentr.
-  High surface concentr.

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