DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY

REGIONAL SURVEYS DEIVISION

# PRELIMINARY REPORT
# GEOLOGY OF ISLANDS OF THE WESTERN CONTINENTAL SHELF OF SOUTH AUSTRALIA

by

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24th September, 1973

Rept.Bk.No. 73/226
G.S. No. 5230
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## INTRODUCTION

In January and February of 1973 R.B. Major spent three weeks on board the Commonwealth lighthouse tender "Cape Pillar". The geology of islands, reefs, shoals and capes was mapped from St. Francis Island to the west in the Great Australian Bight to Troubridge Shoal to the east in Gulf St. Vincent.

## SUMMARY OF THE GEOLOGY

East of the longitude 135°30' (approx.) the rocks were granulites, gneisses, metamorphosed leuco-granitic and metamorphosed basic dykes which may or may not be overlain by the calcareous aeolianite Bridgewater Formation. The granulites, gneisses, leuco-granitic rocks and basic dykes generally had foliations, or were oriented, between northwest and northeast. West of the above line of longitude the rocks were generally unfoliated granites, volcanics and basic dykes which may or may not be overlain by the Bridgewater Formation. Because of their lack of layering these rocks are believed to be younger than those to the east. A granite from Pearson Island in the western group has been dated at 1550 million years and so the eastern rocks are expected to be older than this.

The geology will be summarised in tabular form. Rocks east of longitude 135°30' approximately.

| Name of Outcrop | Rock type in descending order of age | Petrological Number | Comments |
|---|---|---|---|
| South Neptune Island | Microgabbro dykes | P115,116/73 | Pet. - basic granulite. Cpx, opx, bronze biotite youngest intrusive. |
| | Quartz intrusions<br>Aplitic rocks | P112,113/73 | Pet. - acid gneiss and gneissic granite. |
| | Disrupted basic ?dyke | P114/73 | Pet. - basic granulite with opx and biotite. |
| | Porphyritic augen gneiss | P103/73 | Host rock - pet. - acid gneiss with biotite and hornblende. Foliation MNW |
| | | | The relationships of the quartz intrusions, theaplitic rocks and the disrupted basic ?dyke were not seen. |
| | Xenoliths | | Granitic and leuco-granitic rocks. |
| Althorpe Island | Bridgewater Formation | P94/73 | About 100 m thick. Gastropod fossils. |
| | dolerite or norite dykes. | P90/73 | Oriented NNW, N, NE, dip W or NW. Pet. - metamorphosed. |
| | Quartz-feld-spar rocks (layered) | P92,93/73 | Appear to intrude host rock P78/73. |
| | Porphyritic biotite granite. | P78/73 | Host rock. Similar to P103/73 |
| | Biotite gneiss | P91/73 | Pet. - acid gneiss.<br>Pet. - acid granulite with biotite and hornblende. Xenoliths in P78/73. |
| Wedge Island | Bridgewater Formation | | Up to 200 m thick at southern end. |
| | Dolerite dykes | P117/73 | Pet. - metadolerite with cpx, opx, bronze biotite and hornblende. Trend NNE and N. |
| | Aplitic dykes | | Not examined. Relation to dykes not known. |
| | Porphyritic biotite hornblende granulite. | P104/73 | Host rock. Foliation of biotite and hornblende is irregular in orientation. |

| Name of Outcrop | Rock type in descending order of age | Petrological Number | Comments |
|---|---|---|---|
| Dangerous Reef | Pink biotite aplitic granite + pegmatite | P76/73 | Pet.-hornblende biotite granitic gneiss. |
| | porphyritic hornblende biotite granite | P75,80/73 | Pet.-acid gneiss with hornblende and biotite. |
| | Porphyritic foliated hornblende granite | P74/73 | Pet.-granulite. |
| | | P33/71 | The relation of P75,80/73 with P74/73, P33/71 could not be seen - they appear to be almost identical in the field. |
| Cape Donington | Calcrete (near lighthouse) | | |
| | ?Basal Bridgewater Fmn. | | |
| | Norite, metadolerite. | P82,87,89, 118/73 | Plagioclase, hypersthene, augite, biotite in noritic rocks. |
| | Granulite, lineated granulite, acid gneiss, porphyroclastic acid gneiss. | P84-86,88, 118/73 | Acid rocks may contain microcline, plagioclase, quartz, pyroxene, hornblende, biotite. Metadolerites appear to intrude the acid rocks. |
| Winceby Island | Calcrete | | |
| | Amphibolite | P81/73 | Plagioclase hornblende biotite. |
| | Granofels | P83/73 | Quartz,plagioclase, K feldspar, biotite. Microcline, plagioclase, quartz. K feldspar, plagioclase, quartz, biotite, hornblende. (P77 intrudes P79). Gneisses contain elongate bodies of amphibolite. |
| | Granitic gneiss | P77/73 | |
| | Acid gneiss | P79/73 | |
| Williams Island (brief visit only) | Bridgewater Formation Basic rock. | | |
| | Biotite-hornblende granite | P57/73 | Quartz, K feldspar, plagioclase, biotite, hornblende. |
| | Gneissic biotite granite | P58/73 | Quartz, K feldspar, plagioclase, opaques, biotite. |
| West Point (not visited) | ?Basic dyke | | |
| | Pink granitic rock | | |
| | Grey rock | | |

| Name of Outcrop | Rock type in descending order of age | Petrological Number | Comments |
|---|---|---|---|
| Cape Wiles (not visited) | Bridgewater Formation | | |
| Liguanea Island (not visited) | ?Bridgewater Formation<br>?Gneiss | | |
| West of Long. --135°30'-- | | | |
| Four Hummocks | Granitic rock | P859/72 | |
| Perforated Island (not visited) | Bridgewater Formation<br>Crystalline basement | | |
| Rocky Island (not visited) | ?Granitic rock | | |
| Greenly Island (not visited) | Basic dykes<br>?Granitic dykes.<br>?Granite | | |
| Pearson Island (not visited) | Calcrete<br>Bridgewater Formation<br>Biotite granite | P32/71 | 1550 million years (K/Ar-biotite) |
| Flinders Island | Bridgewater Formation<br>Aplites<br>Granite | P44,45/73<br>P40/73 | K feldspar, quartz, plagioclase, biotite. |
| Topgallant Islands (not visited) | Bridgewater Formation<br>?basement | | |
| Hart Island (not visited) | Red and black rhyolite | P691,692/72 | P692 is dykes in P691 |

| Name of Outcrop | Rock type in descending order of age | Petrological Number | Comments |
|---|---|---|---|
| Fenelon Island (not visited) | Bridgewater Formation<br>?Alkali granite | | |
| Masillon Island (not visited) | Bridgewater Formation<br>?Basic dykes<br>?Granophyric granite | | |
| St. Francis Island | Calcrete<br>Bridgewater Formation | | |
| | Rhyolite | P42,53,54/73 | K feldspar, plagioclase, quartz, mafics. |
| | Porphyritic dacite | P55/73 | Plagioclase phenocrysts, K feldspar, quartz, epidote, biotite, opaques. |
| | Alkali granite | P56/73 | K feldspar, quartz, plagioclase, aegirine-augite, riebeckite. |
| | Metabasic dykes | P47/73 | Feldspar, epidote, amphibole, biotite, chlorite, quartz, opaques. |
| | Granophyric granite | P41/73 | K feldspar, quartz, plagioclase, aegirine-augite. |
| Freeling Island (not visited) | Calcrete<br>Bridgewater Formation<br>Granite | | |
| Dog Island (not visited) | Calcrete<br>Bridgewater Formation<br>Basic dyke<br>Granite | | |
| Egg Island (not visited) | Calcrete<br>Bridgewater Formation | | |
| | Meta-basic dyke | P123/73 | Epidote amphibolite: plagioclase, amphibolite, epidote, biotite. |
| | Granophyric granite | P122/73 | Quartz, microcline, plagioclase, biotite. |

| Name of Outcrop | Rock type in descending order of age | Petrological Number | Comments |
|---|---|---|---|
| Smooth Island (not visited) | Calcrete<br>Bridgewater Formation<br>Granophyric granite | P124/73 | Quartz, microcline, ?plagioclase, P124 like P122. |
| West Island (not visited) | Calcrete<br>Bridgewater Formation<br>?Granitic rock | | |
| Evans Island | Calcrete<br>Bridgewater Formation<br>Adamellite | P43/73 | Quartz, microcline, alloite, biotite |
| | Biotite granodiorite | P49/73 | Feldspar, quartz, biotite, muscovite, pyroxene, chlorite. |
| | Diorite | P50/73 | Plagioclase, amphibole, biotite, quartz, pyroxene, chlorite. |
| | Amphibolite | P51/73 | Plagioclase, epidote, hornblende, biotite, quartz. |
| Lacy Island (not visited) | Bridgewater Formation<br>Granite | P126/73 | Microcline, quartz, plagioclase, sphene. |

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