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REGIONAL GEOLOGY OF THE SOUTHERN FURNEAUX GROUP

by Joshua D. Cocker
Oregon State University, Corvallis, Oregon, U.S.A.

(with one table and four text figures)

ABSTRACT

COCKER, J.D., 1980 (31 v): Regional geology of the southern Furneaux Group. *Pap. Proc. R. Soc. Tasm.*, 114: 49-68. ISSN 0080-4703. Department of Geology, Oregon State University, Corvallis, Oregon, U.S.A.

The Lower Palaeozoic Mathinna Beds are intruded and contact metamorphosed by sixteen Devonian, granitoid plutons in the southern Furneaux Group, northeastern Tasmania. Contact metamorphic aureoles range from 200 m to 2 km wide and on Clarke Island the metamorphic assemblage cordierite-andalusite-biotite-quartz-potash feldspar is preserved. Approximately 70 per cent by area of the granitoid terrain is composed of garnet and/or cordierite-bearing biotite granites (eight plutons), 20 per cent biotite granites (five plutons) including two altered plutons, and 10 per cent hornblende-biotite granodiorites (three plutons). The granitoids were intruded by widespread dolerite dykes of pre-Tertiary age. Cainozoic sedimentary sequences are thin and irregularly distributed. Mid-Tertiary sediments formed in lagoonal and shallow water marine environments have been reworked during the Quaternary by alluvial and aeolian processes. In the Rooks River tinfield the cassiterite, which was eroded from the pervasively altered Rooks River granite, is thought to be a lag deposit derived by reworking of the Tertiary sediments. Potential areas of exploration include the southern end of the Lee River valley near the strongly altered Rooks River granite and the alluvial fans north and south of the altered Hogans Hill granite pluton.

INTRODUCTION

This report summarizes the regional geology of the southern Furneaux Group (fig. 1), particularly the geology of the granitoid rocks. Some 20 islands in and south of Franklin Sound are considered with emphasis on Cape Barren and Clarke Islands. Sixteen granitoid plutons outcrop over some 60 percent of the southern Furneaux Group (fig. 2). The Lower Palaeozoic Mathinna Beds which are poorly exposed, especially inland, occur on Clarke and Badger Islands and in the northeast of Cape Barren Island where they are probably continuous with outcrops on Tin Kettle Island and Flinders Island. Marine, alluvial and aeolian Cainozoic sediments are poorly exposed in broad, low-relief, low altitude areas between granite mountains. Bedrock exposure is variable from excellent along some coastal sections to very poor, especially in the eastern half of Cape Barren Island where sand dunes and tea-tree marshes cover large tracts of ground.

Previous geological studies of the southern Furneaux Group include a comprehensive summary of the regional geology (Blake 1947), discussion of the mines and prospects (Keid 1949) and an outline of the geology, especially the Cainozoic sediments, in western Cape Barren Island (Coscombe 1965). Other contributions to the Tertiary geology of the southern Furneaux Group were by Johnston (1879), Crespín (1945) and Quilty (1971); and Sutherland (1973) discussed the Cainozoic geology and geomorphology of Flinders Island (fig. 1). Groves (1973) briefly described the distribution of different textural granitoid types on Flinders Island.

This work is based on reconnaissance field mapping and Figures 2, 3 and 4 are produced from aerial photo layouts without ground control. Consequently, the universal

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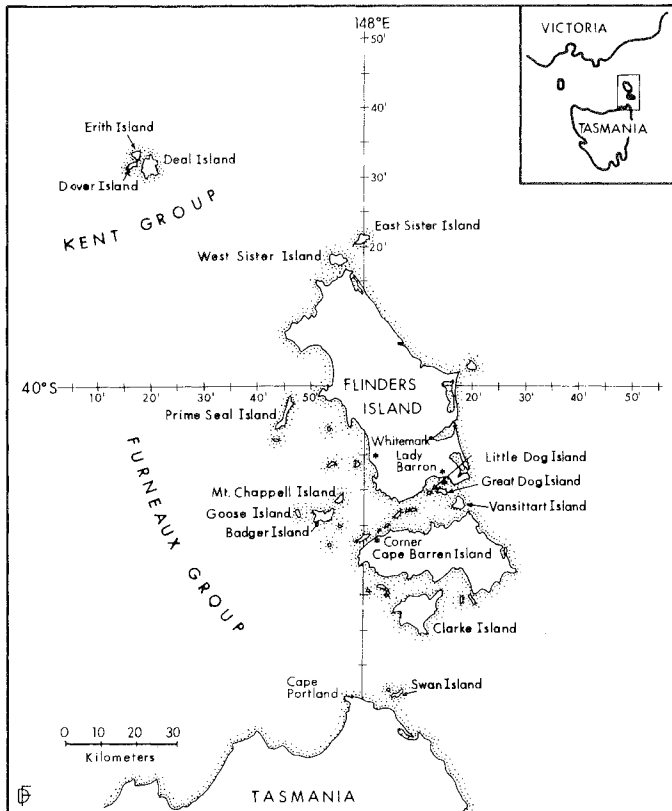


FIG. 1.- Locality map for the southern Furneaux Group.

areas, slaty cleavage is present in most exposures. The change in fold vergence east and west of Puncheon Point may be interpreted as evidence for the disruption of the regional fold trends by the granitoid plutons. As there is excellent exposure, the regional structure of the Mathinna Beds could be clearly defined if detailed field studies were carried out.

Stratigraphic markers and fossils have not been found in these sediments, but the preponderance of sandstones and coarse siltstones indicates that they belong to the arenite-lutite sedimentary association found in eastern Tasmania (Banks 1962). Beds of sandstone rarely exceed 1 m in thickness and graded turbidite units with a variety of sedimentary structures are the most common bedded units. Sedimentary structures comparable to those at Scamander (Williams 1959) are well exposed along the north coast of Badger Island and along the north-east coasts of Clarke and Cape Barren Islands.

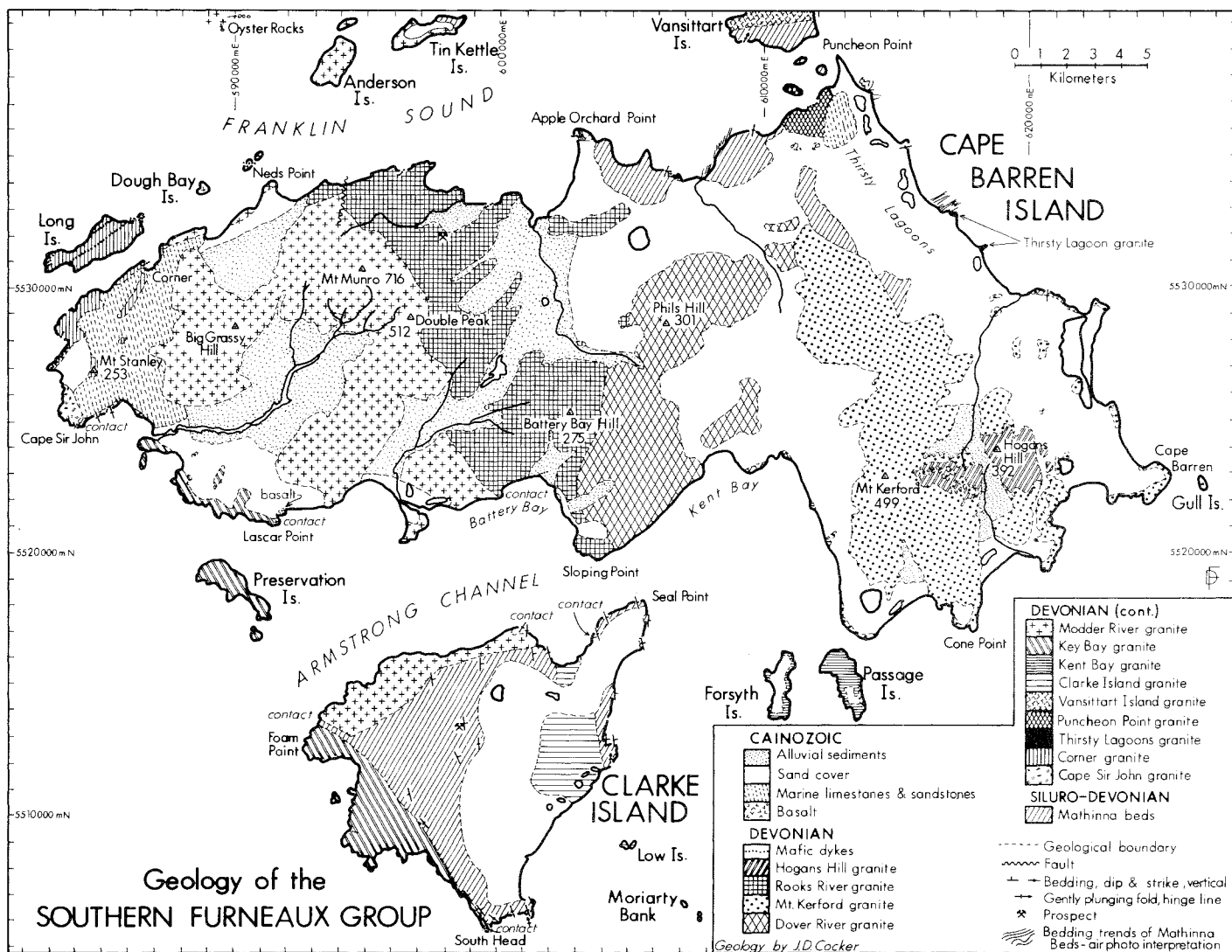
Numerous well-exposed coastal Mathinna Beds-granitoid rock contacts outcrop in the southern Furneaux Group. Clearly exposed contacts are noted in figures 2 and 4. The width of the contact metamorphic zones varies from 200 m to 2 km. In thin-section the

grid co-ordinates used in this work are only approximate and strictly apply to the cited figures and those in Cocker (1977a). Samples referred to in this report are housed at the Geology Department, University of Tasmania.

MATHINNA BEDS AND CONTACT METAMORPHISM

Folded, low-grade regionally metamorphosed siltstones and sandstones which are contact metamorphosed by the granitoids are correlated with the Mathinna Beds in north-eastern Tasmania. These rocks are well exposed along the north coast of Cape Barren Island, on Clarke Island (fig. 2), and along the northern and southern coasts of Badger Island (fig. 4). Field measurements and aerial photograph interpretation of the structures indicate that the Mathinna Beds strike mainly in a northerly direction with shallowly plunging folds characterized by steep axial surfaces (vertical $\pm 20^\circ$), long planar limbs and sharp closures. Away from contact metamorphosed

FIG. 2.- Regional geology of the southern Furneaux Group.



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hornfels consist of fine-grained, equigranular quartz, feldspar and mimetic, red-brown biotite (43916, 43920). In spotted hornfels secondary white-mica and chlorite replace cordierite and/or andalusite. Sieve-textured white-mica up to 2 mm in width is common in some samples. The contact at South Head on Clarke Island is outstanding, as in well-exposed coastal outcrops primary cordierite, andalusite and biotite can be found in spotted hornfels up to 2 km from the Key Bay granite. As the granitoid-Mathinna Beds contact is steeply dipping, the wide contact-metamorphic aureole may reflect the intrusion of the Clarke Island granite, or an unexposed pluton, at depth. Also at South Head adjacent to the contact are several small outcrops of contact migmatite. The cordierite of the hornfels occurs as pseudo-hexagonal, cyclically twinned porphyroblasts with abundant inclusions of quartz and biotite and is surrounded by K-feldspar, andalusite and biotite (43301) or by a quartz-K-feldspar-biotite groundmass (43917) in the outer zone of the aureole. Unaltered contact metamorphic minerals besides biotite have not been recorded previously from north-eastern Tasmanian contact aureoles.

GRANITOID PLUTONS

On a broad scale, the larger granitoid plutons tend to be rectangular in shape with their largest dimension oriented north-south, parallel to the regional Mathinna Beds structure. This structural fabric is similar to that on the northeastern Tasmanian mainland. The plutons were intruded following the folding of the Mathinna Beds, but may have been affected by regional tectonic events which controlled the development of K-feldspar megacryst foliations. Although variably developed, the foliations are widespread and commonly trend north-south. The relatively steep, straight and sharp contacts and the lack of marked marginal deformation of the Mathinna Beds indicates that individual plutons were probably emplaced along fault controlled margins by roof-lifting. Minor stoping of the country rocks also occurred during emplacement. The sharp, transgressive contacts and lack of primary muscovite in the granites suggests that these plutons were emplaced at high levels in the crust, probably less than 6-9 km deep.

The granitoid plutons will be considered in three groups distinguished by their mafic mineralogy. Eight plutons are characterized by the occurrence of garnet and/or cordierite. Three small hornblende-biotite granodiorite plutons occur in the west of the southern Furneaux Group and biotite occurs as the single mafic silicate in five granite plutons, including the strongly altered Rooks River granite. The intrusive relations and common textural variants of each pluton are summarized in table 1. The main features of each pluton are discussed below. The petrogenesis of the granitoids is discussed in Cocker (1977a and in prep.).

MT KERFORD GRANITE

The Mt. Kerford granite, although well exposed around the southeastern coast of Cape Barren Island and Gull Island, has poorly exposed external contacts. Relative ages with the Kent Bay and Dover River granites are unknown, but the Mt. Kerford granite is intruded by the Hogans Hill granite and its associated dykes. The two textural variants of the Mt. Kerford pluton, a porphyritic phase and an equigranular phase, intrude each other and occur as inclusions one in the other. The porphyritic rock type forms approximately 50 percent of the outcrop on Cape Barren, Gull Island and south of the Hogans Hill granite. The northern half of the pluton which is poorly exposed is dominantly the medium-grained, equigranular rock type.

In hand specimen, quartz, K-feldspar, plagioclase and biotite are the main minerals with minor garnet and secondary white-mica. Garnet is a widely distributed accessory mineral (<0.01%), especially in the southern half of the pluton, and is also concentrated in spherical to lenticular masses. At FR/128.197, on the eastern side of Kent Bay, the garnet occurs in a crudely layered complex with a 0.3 to 0.5 m thick

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TABLE 1

GRANITOID PLUTONS

Plutons	Intrusive Relations	Common Textural Variants
<u>Garnet and/or cordierite-biotite granitoids:</u>		
Mt. Kerford granite*	Intruded by Hogans Hill granite; intrudes Mathinna Beds	Medium grained, equigranular and porphyritic variants
Hogans Hill granite	Intrudes Mt. Kerford granite	Porphyritic granites and porphyries
Key Bay granite	Intrudes Mathinna Beds	Medium grained, equigranular granites
Modder River granite	Intruded by Rooks River granite; intrudes Mathinna Beds	Medium grained, equigranular and porphyritic granites
Dover River granite	Intruded by Rooks River granite; intrudes Mathinna Beds	Fine and medium grained equigranular granites
Clarke Island granite	Intrudes Mathinna Beds	Medium grained, equigranular granite
Kent Bay granite	Intrudes Mathinna Beds	Medium grained, equigranular granite
Puncheon Point granite	Intrudes Mathinna Beds	Fine grained, equigranular granite
<u>Biotite granitoids:</u>		
Rooks River granite	Intrudes Mathinna Beds, Dover River granite and Modder River granite	Wide variety of equigranular and porphyritic phases
Corner granite	-	Medium grained, megacrystic and equigranular granites
Thirsty Lagoons granite	Intrudes Mathinna Beds	Fine grained, equigranular granite
Mt. Chappell Island granite	-	Fine grained, equigranular granite
Vansittart Island granite	Intrudes Mathinna Beds	Wide variety, equigranular and porphyritic phases
<u>Hornblende-biotite granitoids:</u>		
Cape Sir John granodiorite	Intrudes Mathinna Beds	Medium grained, equigranular granodiorite
Badger Island granodiorite	Intrudes Mathinna Beds	Medium grained, equigranular and megacrystic granodiorites
Unicorn Point granodiorite	Intrudes Mathinna Beds	Medium grained, equigranular and megacrystic granodiorites

*No attempt is made in this report to establish formal lithological terms or form terms. Geographic names have been used to identify each pluton and may be retained following detailed mapping and further characterization. Lithological terms after Streckeisen (1975).

basal garnet-rich layer (up to 60% garnet) overlain by a relatively thin (0.1 m) biotite-rich layer. Flow sorting and possibly gravitational settling are proposed as the mode of concentration of the garnet. Approximately spherical garnet-rich masses

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occur as elongated clusters, in some cases along rock type irregularities, and may be remnants of ruptured, layered complexes. Mafic inclusions are rare in the Mt. Kerford granite.

In thin-section garnet, quartz and biotite are early crystallized phases which were followed by plagioclase and K-feldspar. Common secondary minerals are white-mica after feldspars and chlorite after biotite. Garnet, biotite and plagioclase occur as euhedral to subhedral grains and most grain boundaries are relatively straight with little evidence for subsolidus deformation. The mineralogy for both textural variants is similar. Garnet dodecahedra include quartz, biotite, apatite, zircon, ilmenite, pyrrhotite and rutile. The proportion of inclusions tends to be erratic, but in 43252 zones of apatite-ilmenite and quartz-biotite inclusions mimic the outline of a single garnet grain. Pale-green biotite replaces the garnet along cracks, and commonly extends from the garnet into the surrounding K-feldspar. The early crystallized red-brown biotite booklets include apatite and zircon and may be intergrown with vermicular quartz around the booklet margins. The plagioclase composition of the Mt. Kerford granite ranges from An 40, with oscillatory zoning in most grains, to approximately An 20. The zoned portions are commonly flanked by a relatively wide sodic rim especially adjacent to K-feldspar. The perthitic K-feldspar includes all other phases and in the porphyritic rocks includes the groundmass, as do sodic mantles rimming zoned plagioclase. Quartz probably has a long crystallization history in this pluton as it is included in early formed garnet, is embayed in the porphyritic rocks and is commonly euhedral against K-feldspar in the equigranular rocks.

Cordierite pseudomorphed by intergrown white-mica is found in 43232, 43235 and 43242. In 43249, from a microgranitic phase of the porphyritic rock type (FR/249.223), light-green "spots", up to 5 mm in diameter, are composed of an isotropic light-brown compound partially replaced by white-mica and sea-green biotite. The amorphous compound has replaced anhedral cordierite which is intergrown with other phases in the rock.

The composition of the garnet in the Mt. Kerford granite and in other plutons discussed below is restricted to the following range - almandine 73 - 86%; pyrope 6 - 20%; grossular 3 - 5%; spessartine 3 - 5% (molecular). Similarly, the biotite in these plutons is rich in Fe and Al ($Fe/(Fe+Mg) = 0.73 - 0.93$; $Al^{VI} = 0.72 - 1.33$) (Cocker, in prep.).

HOGANS HILL GRANITE

The Hogans Hill granite is a small pluton composed of porphyritic granite and granite porphyries that crop out around Hogans Hill. The largest area of outcrop is wedge-shaped to the south and is capped by two small areas of the Mt. Kerford granite. The hill to the west of Hogans Hill is composed of a series of shallowly south-dipping dykes joined by short vertical sections. Further to the northwest (near FR/155.242), similar north-south striking dykes, up to 30 m wide, outcrop and are comparable to smaller dykes intruding the Mt. Kerford granite within a radius of five km from Hogans Hill. Contacts between the Hogans Hill granite and the Mt. Kerford granite, although poorly exposed, are well defined especially those contacts with the equigranular Mt. Kerford granite. Mafic inclusions were not observed in this pluton.

Red garnet occurs as a euhedral to subhedral, partially pseudomorphed phenocryst phase, up to 10 mm in diameter. Unlike other garnet-bearing plutons, concentrations of garnets are rare and the proportion of garnets is relatively low. The garnets tend to be surrounded by red-brown biotite, comparable to the phenocryst biotite and replaced by pale green biotite in cracks. Quartz, red-brown biotite, apatite, zircon and ilmenite are included in the garnets. The red-brown biotite occurs as individual booklets up to 5 mm in width and as aggregates of grains. The groundmass

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biotite is altered to chlorite. Feldspar phenocrysts enclose groundmass grains and commonly form synneis twins. The perthitic K-feldspar has been pervasively altered and is clouded with minute fluid (?) inclusions. The plagioclase is less altered than the K-feldspar, with zoned crystals commonly replaced by a net of white-mica. The plagioclase phenocryst compositions range from An 32 to An 10 whereas the groundmass plagioclase ranges from An 25 to An 10. The groundmass of the porphyries is aplitic and may be replaced by coarse-grained white-mica and quartz intergrowths.

KEY BAY GRANITE

The Key Bay granite outcrops on Clarke, Preservation and Cape Barren Islands, where along coastlines the contact relations are well exposed. On Clarke Island the Mathinna Beds form a narrow screen between this pluton and the Modder River granite in the north, and to the south along the coast the contact is steeply dipping and conformable with the Mathinna Beds structure. Stopped Mathinna Beds inclusions up to 100 m² are relatively common along this boundary in comparison with other Furneaux Group contacts. At South Head (ER/997.058) where the metamorphic aureole is up to 2 km wide, the contact is characterized by a well exposed predominantly stromatic contact migmatite, whereas further north (ER/988.070) the migmatite has a schollen structure. The Key Bay granite-Modder River granite contact is exposed as a straight (161°), sharp boundary at Lascar Point on Cape Barren Island. Unfortunately, the intrusive relations could not be established from this contact. Between Cape Barren and Clarke Islands this contact may have been displaced by a fault which strikes northeast along the Dyas Corner River valley.

The main rock type in the Key Bay granite is a coarse-to medium-grained, equigranular granite, but K-feldspar, megacryst-rich microgranites and porphyries are common on Cape Barren Island and are continuous along strike to the opposite coast on Preservation Island. From ER/988.219 to ER/995.215 along the coast, K-feldspar megacryst-rich rocks predominate and the strike directions of rock type boundaries, expressed as variations in the megacryst content and alignment of the megacrysts, approximately parallel the strike of the main contact at Lascar Point.

Garnet is a rare accessory phase in the porphyries of the Key Bay granite. In the equigranular granite the garnet occurs in irregular to rounded concentrations with up to 60 per cent garnet and biotite. These concentrations, up to 1 m in diameter, are common around Key Bay, are poorly developed at Lascar Point and were not observed on Clarke Island. Subhedral to anhedral garnets, up to 10 mm in diameter, are replaced by pale green biotite and enclose quartz, red-brown biotite, apatite, zircon and ilmenite. In thin-section, a red to colourless isotropic compound, which is replaced by sea-green mica and white-mica, replaces primary cordierite (43202). The amorphous compound enclosed remnant cordierite grains, quartz, red-brown biotite and andalusite. In this pluton the red-brown biotite occurs as clusters of subhedral grains in the equigranular rock variants and as phenocryst and groundmass grains in the porphyries. The biotite of the garnet-biotite concentrations is similar to the biotite of the equigranular rocks. The biotite includes zircon, apatite and Fe-Ti oxides and appears to be early in the paragenesis with garnet and quartz. Plagioclase grains have complex zoning patterns and range in composition from An 50 to An 10. Commonly the core is partially replaced by fine-grained white-mica, which also occurs as larger grains (up to 2 mm) after K-feldspar. The K-feldspar is perthitic, has poorly developed cross-hatch twinning and includes all other phases. The late paragenesis of the K-feldspar, its alignment and high modal abundance in some outcrops suggests that part of its crystallization may have occurred under subsolidus conditions.

MODDER RIVER GRANITE

The Modder River granite outcrops on Cape Barren and Clarke Islands. Along an

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irregular eastern contact the Rooks River granite intrudes this pluton, but on other boundaries the contact relations are not apparent. Distinction between the Modder River and Corner granites is difficult, as the proportion and size of K-feldspar megacrysts vary in both plutons. In general the Modder River granite has a finer groundmass, but this was not clearly established along the north coast of Cape Barren Island. Included in the Modder River granite are exposures of granite on Dough Bay, Oyster Rocks, Tin Kettle and Anderson Islands where good outcrop reveals variation in grain size of both groundmass and megacrysts from island to island. In these localities, the contacts are steeply dipping and discordant to the Mathinna Beds structure, but on a small scale both conformable and disconformable, dilational and wedge-shaped dykes are exposed.

The main rock type of this pluton is a fine- to medium-grained, equigranular, biotite granite with a variable proportion (up to 30%) of K-feldspar megacrysts. The megacrysts range in size from 10 to 100 mm and are commonly aligned and segregated. Although a real variation in the proportion of megacrysts was established, distinct contacts between these areas were rarely found. Small-scale variations in the proportion of megacrysts occur in the Big Grassy Hill area. A characteristic field feature of this pluton is the widespread, sporadic development of biotite-rich layered complexes. These complexes occur as approximately equidimensional masses up to 40 m wide, with a fabric defined by the variation in biotite content, forming layers which are paralleled by tabular K-feldspar megacrysts. Most of the layering is sub-horizontal, but in one steeply inclined, channel-like structure the K-feldspar grains and small inclusions are imbricated and suggest sedimentary-style deposition. Biotite-rich inclusions are relatively common in this granite, occurring as scattered individual inclusions and swarms associated with biotite layers. Many of the inclusions are similar to hornfelsed Mathinna Beds and tend to concentrate near the country rock contacts, especially along the north coast of Clarke Island. On Tin Kettle Island rectangular inclusions, up to 100 m long, occur adjacent to the contact. A planar vertically dipping foliation, defined by oriented masses of biotite grains, was noted on Clarke Island.

In thin-section the texture and mineralogy of the Modder River granite is comparable to that in other aluminous phase-bearing granites. Subhedral plagioclase and biotite are included in anhedral perthitic K-feldspar and anhedral quartz. The K-feldspar megacrysts are simply twinned and enclose the groundmass around their margins. The plagioclase has normal and oscillatory zoning with core compositions from An 35 to An 45 and sodic and myrmekitic rims. The plagioclase is partially replaced by fine-grained (0.01-0.02 mm), felted, white-mica and rarely chlorite and epidote. The biotite content of the Modder River granite is high and for some specimens exceeds 25 per cent. The maximum pleochroic colour of the biotite is red-brown, although minor pale-coloured secondary biotite, intergrown with quartz, occurs as a fringe on large biotite booklets which are adjacent to K-feldspar. Zircon and two generations of apatite are the principal inclusions in the biotite. The K-feldspar is variably clouded by fine-grained fluid inclusions which in some grains are spatially related to perthitic albite. Quartz has undulatory extinction and sutured grain boundaries. White-mica occurs as a secondary phase in plagioclase and rare grains up to 0.5 mm wide in K-feldspar are also interpreted as secondary in origin. Chlorite after biotite is variably developed.

Cordierite, as partially pseudomorphed anhedral to subhedral grains, has been identified in three samples (43068, 43070, 43068). These samples occur in the northern half of the pluton and cordierite occurs with garnets in a biotite-rich layered complex near the Mathinna Beds contact on Tin Kettle Island. Further mapping and petrography may reveal a more widespread distribution of these phases and differentiate rock variants in this pluton.

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DOVER RIVER GRANITE

Although the Dover River granite is well exposed along the southern coast of Cape Barren Island, poor inland exposure and lack of contact exposure means that both internal and external relations are poorly understood. The author was unable to locate the contact between the Dover River granite and the Rooks River granite with accuracy, because although there is good outcrop, similar rock types in both plutons are difficult to distinguish in hand specimen. Granite porphyry dykes which may be part of the Rooks River granite intrude the Dover River granite pluton. Two main rock types, fine-grained and medium-grained equigranular granites, are distinguished. North of Phils Hill the fine-grained rock predominates, whereas in the southern half of the pluton the medium-grained rock is predominant, with microgranites and porphyries as small, poorly defined masses. K-feldspar megacrysts and biotite define a cataclastic foliation in some northern outcrops. The proportion of biotite-rich inclusions is low but variable in this pluton, and discontinuous small-scale biotite layering is relatively common in areas of good exposure.

In hand specimen the characteristic feature of all rock types is the thinness of biotite booklets. The biotite is intimately intergrown with white-mica. In the medium-grained rock types a dominant textural feature is the inclusion of euhedral quartz grains in K-feldspar. This texture is also characteristic of the medium-grained Rooks River granite. The bulk of the plagioclase crystallized as zoned grains, with core compositions up to An 35, but a generation of smaller, unzoned, altered, oligoclase grains are common in the porphyries. The larger plagioclase grains are replaced by felted white-mica, whereas the second generation plagioclase is altered with minute fluid inclusions. The perthitic feldspar is similarly altered. The biotite has a maximum absorption colour of dark red-brown, and is variably altered to green biotite, and chlorite. The white-mica of the mica intergrowth is possibly a primary mineral, whereas coarse-grained, sieve-textured white-mica is a common secondary mineral, replacing K-feldspar. Rare biotite-quartz microinclusions comparable in lithology to the Mathinna Beds occur in this pluton.

Cordierite occurs in several textural variants of the Dover River granite. In the fine-grained granite rare cordierite is replaced by pale green biotite and white-mica. Cordierite, pseudomorphed by pale green biotite and white-mica, forms spherical 'spots' up to 10 mm in diameter in a small microgranite mass at FR/054.208 (43878). A microgranite dyke (43870) near the top of Phils Hill carries pseudomorphed cordierite as part of a granular texture.

CLARKE ISLAND GRANITE

The Clarke Island granite is a poorly exposed, vertically dipping dyke-like body conformable in shape to the regional Mathinna Beds structure. The close spatial association with, and many similar characteristics to, the Modder River granite suggests that this pluton may be part of the Modder River granite. Low Island to the south-east of the pluton is a granitoid rock and may be part of this pluton.

The Clarke Island granite occurs as massive outcrops of a medium-grained equigranular rock, with a poorly developed K-feldspar megacryst alignment which is most prominent at the contact exposures. At the north-eastern contact, layering parallel to the dyke walls has entrained numerous Mathinna Beds inclusions. The form of this layering is similar to that in the Modder River granite.

The petrography of the Clarke Island granite is similar to that of the Modder River granite except that the K-feldspar has well developed cross-hatched twinning. A second possible discriminating feature is the occurrence of small garnets in the Clarke Island granite. Garnets are included in plagioclase and K-feldspar and are partially

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replaced by biotite. There is little evidence for euhedral margins in these grains, but in all other aspects (including composition) they are comparable to garnets in nearby plutons.

KENT BAY GRANITE

The Kent Bay granite is exposed on Forsyth and Passage Islands, and on isolated headlands along the eastern side of Kent Bay. Contacts with the Mt Kerford granite are not exposed. A penetrative mineral alignment defined by K-feldspar megacrysts and biotite is well developed on Forsyth and Passage Islands, striking 134 - 154°. Inclusion-swarms and individual inclusions are fairly common in this rock type; the swarms are often associated with biotite layering which is cut by the foliation. The inclusions may be divided into two groups, a biotite- and K-feldspar megacryst-rich hornfels and Mathinna Beds hornfels, both of which range in size up to 1 m in diameter. Remnants of an external Mathinna Bed contact in large stoped blocks of country rock are exposed on the eastern coast of Passage Island.

The main rock type of this pluton is a fine-to medium-grained, equigranular, biotite granite. The proportion of K-feldspar megacrysts rarely exceed 5 per cent. The mineralogy and petrography are similar to those of the Modder River granite except that the K-feldspar has incipient cross-hatched twinning. Also Mathinna Beds microinclusions are possibly more common in the Kent Bay granite than in the Modder River granite.

Garnets have been identified in two samples (43276, 43279) and pseudomorphed cordierite in sample 43276. In both samples the anhedral garnet is included in plagioclase and is partially replaced by pale-coloured biotite. The cordierite was subhedral in form and is completely pseudomorphed by pale green biotite and white-mica. In hand specimen the cordierite is comparable to isolated grains seen in the layered complex in the Modder River granite on Tin Kettle Island. The garnet in the Kent Bay granite has similar characteristics and chemistry to those in other garnet-bearing plutons.

PUNCHEON POINT GRANITE

The Puncheon Point granite is a poorly exposed, fine-grained, equigranular, biotite-cordierite granite. This pluton outcrops near Puncheon Point on Cape Barren Island and on nearby offshore islands and reefs where it is almost surrounded by country rocks. Complex outcrop patterns in the intertidal zone suggest that the roof region of the pluton is being exposed. Reconnaissance mapping indicates that this pluton extends to Flinders Island and the eastern half of Great Dog Island (fig. 1), although between this area and Puncheon Point a variably textured, pink to cream biotite granite outcrops on Vansittart Island and the western half of Great Dog Island. The Puncheon Point granite carries few inclusions and is distinguishable in hand specimen by aggregates of biotite, chlorite and white-mica after cordierite (up to 5%). The pseudomorphed cordierite is distributed as part of the equigranular rock fabric and as such is distinguished from the cordierite in other Tasmanian granitoids.

In thin-section, subhedral plagioclase occurs as large (up to 5 mm) zoned grains (up to An 41) and as clusters of small (up to 0.5 mm) grains included in the variably cross-hatched K-feldspar. Red-brown biotite, which is strongly chloritized, includes zircon and apatite and is also included in the K-feldspar. The K-feldspar is variably cloudy and this alteration may be correlated with the high proportion of white-mica which, with quartz, replaces the K-feldspar. The pseudo-hexagonal to anhedral cordierite is replaced by intergrown white-mica and pale sea-green biotite. Unaltered cordierite is replaced by intergrown white-mica and pale sea-green biotite.

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ROOKS RIVER GRANITE

This pluton includes a variety of altered rock types comparable with those in plutons associated with primary and secondary cassiterite deposits on the Tasmanian mainland. This similarity, and the occurrence of the largest secondary cassiterite deposits in the Furneaux Group in Cainozoic sediments surrounded and underlain by the Rooks River granite, suggests that this pluton has been the source for the cassiterite. Considerably more field work was carried out in this pluton in an attempt to identify specific source rocks, and further reduce the number of possible alluvial targets by defining areas of distribution of derived sediments.

The Rooks River Pluton is an irregularly-shaped body (fig. 2, 3) tapering to the south where it forms reefs off the northeastern corner of Clarke Island, and possibly extending as a narrow dyke-like body between the Mathinna Beds and the Dover River granite across the Dover River valley. This pluton intrudes the Modder River granite along an irregular, steeply dipping contact with a relief of some 500 m. The contact is offset by at least one and possibly two faults. At ER/970.245 and ER/947.324 the boundary between the Rooks River granite and the Modder River granite is well exposed, with short segments (up to 200 m long) of straight, steeply dipping contact, between the medium-grained, equigranular Modder River granite and a granite porphyry carrying micro-inclusions of the former rock type (43800). The porphyry may be a chilled margin to the medium-grained, equigranular Rooks River granite or a separate rock type which has intruded the contact. Porphyry dykes intrude the Modder River granite commonly up to 100 m from the contact. Adjacent to dykes and the main contact, the Modder River granite has been altered, displaying cream to pink feldspars. The eastern contact with the Dover River granite is poorly located and the medium-grained, equigranular

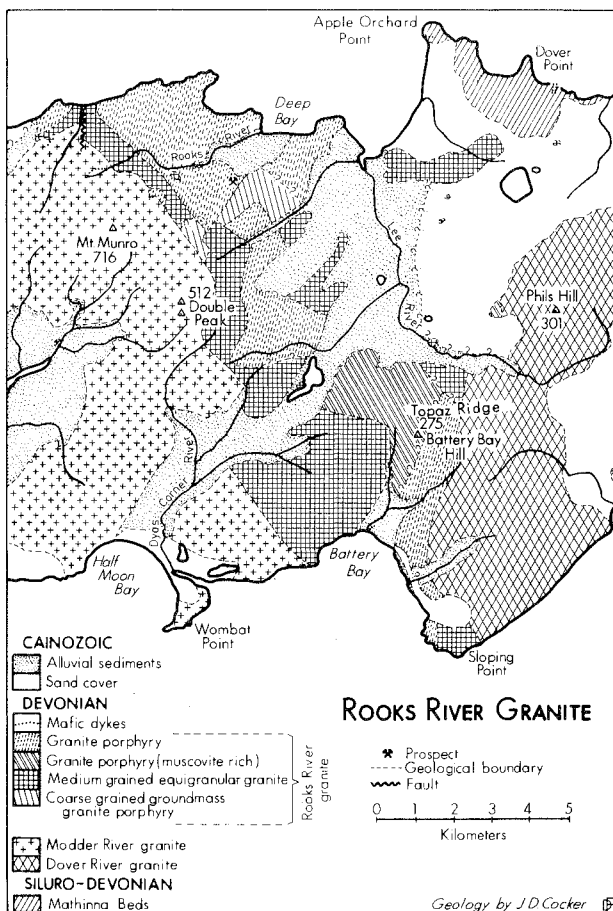


FIG.3.- The Rooks River granite.

with the Dover River granite is poorly located and the medium-grained, equigranular

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granite shown (fig. 3) as part of the Rooks River pluton at Sloping Point may be part of the Dover River granite. The contact relationships are obscured by a variety of micro-granites and granite porphyries occurring as irregular bodies with gradational margins and as dykes.

This pluton is mapped as four major rock types (fig. 3), although the boundaries between these are mainly gradational, and intermediate rock types such as a porphyritic, medium-grained granite complicate relationships. Aplites, microgranites, porphyries and pegmatites are minor rock types. The main internal structural feature of the pluton is a band of the medium-grained rock type adjacent to the southwestern contact. Porphyries are the dominant rock type in the centre of the pluton, the contact between the porphyries and the medium-grained rocks, at least in the Rooks River area, being fairly straight and steeply dipping. On a large scale no reliable age relationships were established between these two main groups of rocks, but on a small scale both rock types intrude each other and occur as rounded inclusions in each other. Porphyry dykes commonly intrude both main rock types, have a variety of attitudes and rarely exceed 100 m in strike length. The fresher outcrops of all rock types are cream to pink-coloured while weathered outcrops are dark pink to red in colour.

The characteristic textural feature of this pluton is the equigranular grain size in both fine- and medium-grained rocks. Megacrysts in the medium-grained rocks and phenocrysts in the porphyries are commonly aligned with a north-south orientation. There is little biotite alignment and rare biotite layering is associated with minor pegmatites. Mafic inclusions are also rare in this pluton. Quartz veins are irregularly developed, steeply dipping and strike at 39 - 49°.

The granite porphyries are extremely variable in the phenocryst mineral content (5-90%) and in the proportions of different phenocrysts. Feldspars, clusters of embayed quartz grains and biotite booklets occur as prominent phenocrysts, with feldspars being the most common. White-mica is a widespread secondary phase in the porphyries and in the Battery Bay Hill area forms up to five per cent of the porphyry, replacing groundmass feldspars. The aplite and porphyry dykes are similar in hand specimen to the main granite porphyry. A distinguishing characteristic of the dykes is the occurrence of miarolitic cavities commonly associated with stringers of coarser-grained (up to 10 mm) minerals.

In thin-section, the feldspar phenocrysts enclose the groundmass which is composed of equidimensional grains with straight boundaries and is usually less than 1 mm in grain size. Phenocrysts rarely exceed 50 mm in length. In the coarse-grained groundmass porphyry (fig. 3), the grain size of the groundmass ranges from 1 to 3 mm. Plagioclase phenocrysts occur as normally zoned grains with core compositions in the range An 30 to An 35. Commonly the phenocryst cores are altered to fine-grained white-mica whereas their margins and the groundmass plagioclase grains are clouded. The groundmass plagioclase is albite-acid oligoclase, poorly-zoned and commonly deformed with bent, broken and wedge-shaped twins. The dustiness of the K-feldspar is variable, the smaller grains being generally more altered. The maximum absorption, pleochroic colour for the biotite in this granite is red-brown, but alteration to yellow-green biotite, chlorite and carbonate is widespread. The degree of alteration is variable, with the northern area of the pluton having less-altered biotites. The larger grains tend to be altered on their margins, whereas much of the groundmass biotite is completely altered. The biotite includes zircon, apatite and allanite. Allanite occurs as zoned and amorphous grains and is a common accessory in most samples in the Battery Bay Hill area. The porphyries carry white-mica after the groundmass feldspars and in the Battery Bay Hill area (fig. 3) 10 mm wide sieve-textured grains are well developed. Other minor phases in the porphyries are fluorite octahedra after plagioclase and rare tourmaline (43824). The rare occurrence of tourmaline in this altered pluton is in contrast with many altered plutons with widespread tourmaline on the Tasmanian mainland.

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Although the medium-grained rock type is equigranular, the texture is more interlocking than in the porphyries, as K-feldspar includes all phases. The inclusion of subhedral to euhedral quartz in the K-feldspar is characteristic in hand specimen. Most mineralogical characteristics of the medium-grained rocks are similar to those of the granite porphyries. Two generations of plagioclase grains are not clearly identifiable, but core compositions are similar and range from An 35 to An 40. Patchy zoning is also common in some cores.

Miarolitic cavities are relatively common in the Rooks River granite. They occur up to 2 mm in diameter in the aplitic and porphyry dykes and form up to five per cent of the rock (43811). In thin-section, cavities have been found in the typical granite porphyries, in the coarse-grained groundmass porphyries and in the medium-grained granite. Commonly triangular in shape, the cavities are bound by quartz and feldspar crystal faces and are composed of amorphous material which may be replaced by axinite or chlorite.

CORNER GRANITE

The Corner granite is a medium- to coarse-grained, megacrystic granite exposed along the coast near the Corner settlement and around Long Island. The contact between this pluton and the Modder River granite was not located in this work. Both plutons have similar characteristics although the Corner granite tends to be coarser grained and carry more K-feldspar megacrysts. The contact between this pluton and the Cape Sir John granodiorite is not exposed.

In outcrop the Corner granite is heterogeneous with well-developed, short biotite layers, common aplite-pegmatite dykes and pegmatite pods, widespread tourmaline nodules and a high proportion of mafic inclusions. In many outcrops the K-feldspar megacrysts are aligned (129 to 174°) and commonly parallel the steeply dipping biotite layers. On Long Island an 80 m long, layered complex is composed of biotite and parallel K-feldspar megacrysts, similar to the layered complexes in the Modder River granite. The short biotite layers are commonly cross-cutting and in some cases resemble sedimentary cross-bedding. Southwest of the Corner, mafic inclusions, some of which resemble the Mathinna Beds, are aligned in the K-feldspar foliation. The tourmaline nodules tend to occur in irregularly spaced clusters. Tourmaline is also a component in the pegmatites and is fairly common along joint planes in the granite. Further evidence for the activity of a fluid phase is shown by the intensely altered, red granite at ER/862.307. In outcrop over some 50 m² all the phases of this rock are altered and replaced by chlorite, epidote and fluorite. In thin-section the Corner granite resembles the Modder River granite.

THIRSTY LAGOONS GRANITE

This rock type is poorly exposed on two rocky points and offshore rocks on the northeastern coast of Cape Barren Island. The contact with the Mathinna Beds is not exposed, but small folds adjacent to the contact may be related to the intrusion of the granite. The Thirsty Lagoons granite is a fine-grained, equigranular, biotite-muscovite granite. The muscovite may be secondary in origin, after cross-hatched K-feldspar. The K-feldspar is slightly altered, and in contrast to most other Tasmanian granitoids the plagioclase is densely clouded with minute inclusions.

MT CHAPPELL ISLAND GRANITE

The Mt Chappell Island granite is well exposed around the northern and eastern coasts of Mt Chappell Island (fig. 4). The contacts with the Badger Island granodiorite were not examined. The Mt Chappell Island granite is a uniformly fine-grained, equigranular, biotite granite. Muscovite aplites intrude this pluton and

the Badger Island granodiorite.

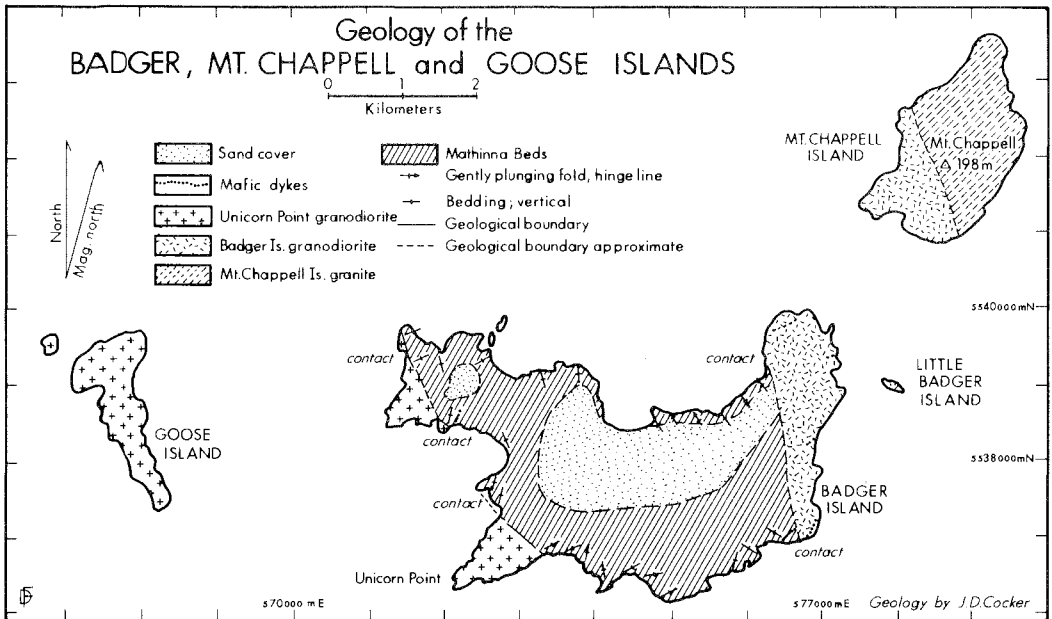


FIG.4.- Geology of the Badger, Mt Chappell and Goose Islands.

VANSITTART ISLAND GRANITE

The Vansittart Island granite is exposed on Vansittart, Great Dog and Little Dog Islands at the northeastern end of Franklin Sound (fig. 1, 2). This pluton is composed of a variety of cream to pink granites with a wide range of textures comparable with those of the Rooks River granite.

CAPE SIR JOHN GRANODIORITE

The Cape Sir John granodiorite is well exposed as massive foliated coastal outcrops on southwestern Cape Barren Island. The contact with the Corner granite is not exposed. The eastern Mathinna Beds contact is exposed as a conformable structure. The Mathinna Beds are indurated spotted hornfels, laced with quartz veins, and have been intruded by a pipe or pod-like mass of granodiorite with abundant inclusions which are similar to inclusion rafts in the main body of the granodiorite. Separate inclusions, and those in rafts up to 50 m long, are biotite-rich mafic rocks some of which are Mathinna Beds and others of deep, presumably relict, origin. The cataclastic foliation, bearing $149-164^{\circ}$, is enhanced by elongate inclusions aligned in the plane of the foliation. An irregular cross-cutting system of chloritic, cataclastic joint zones is well developed in most outcrops.

In hand specimen, the foliation is prominent with aligned biotite masses and mosaics of felsic minerals. The granodiorite is medium-grained with a variable

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K-feldspar megacryst content. The megacrysts are commonly aligned in the foliation. The hornblende content of this rock type is less than one per cent. In thin-section the deformation is seen in kinked and recrystallized biotite and bent, broken and wedge-shaped twins in the plagioclase. Kink bands and healed kinks in the biotite are marked by ragged lines of inclusions and recrystallization into mosaics of smaller grains around the margins of the larger biotites. The quartz in the granodiorite is composed of grain mosaics in which individual grains have straight extinction and rare triple point boundaries. The static annealing indicated by quartz and biotite recrystallization was possibly caused by younger intrusions. The maximum absorption colour of the biotite is dark greenish-brown to red-brown and is comparable with other Tasmanian granodiorites. Chlorite and white-mica are secondary products after biotite and feldspars, respectively. The K-feldspar is somewhat dusty and includes all other phases. The plagioclase subhedra are complexly zoned with normal and oscillatory zoning sequences and albitic rims. Core compositions up to An 45 are common. Accessory minerals include apatite, zircon, sphene and orthite.

BADGER ISLAND GRANODIORITE

The Badger Island granodiorite (fig. 4) is exposed in the northeast of Badger Island and southwest of Mt. Chappell Island. On Badger Island both country rock contacts are well exposed and similar to the southeastern contact of the Cape Sir John granodiorite. The inclusion-rich intrusions isolated from the main body of the granodiorite are well exposed at the southeastern contact. These structures, 20 to 40 m wide, are composed of up to 60 percent country rock inclusions associated with curved biotite layering. The occurrence of 1 m long 'pods' of altered granitoid with miarolitic cavities and tourmaline suggest that these structures at some stage carried a high fluid content. Many of these features are comparable to those found along contacts in the Sierra Nevada Batholith (Moore and Lockwood 1973). They have not been recorded from other Tasmanian granitoid rock contacts.

In both hand specimen and thin-section, the Badger Island pluton is similar to the Cape Sir John pluton and both areas may belong to the same mass. The foliation (164-180°) on Badger Island is less developed than at Cape Sir John and the proportion of K-feldspar megacrysts may be higher on Badger Island. Annealed quartz grains were not noted in thin-section in the Badger Island granodiorite. Accessories for both rocks are similar.

UNICORN POINT GRANODIORITE

The Unicorn Point granodiorite is exposed in southwestern Badger Island and Goose Island. Extensive country rock contact exposures on Badger Island are transgressive on a large scale. On a small scale both conformable and disconformable structures are exposed. Mathinna Beds inclusions are relatively common in this rock type and inclusion swarms occur near the contacts. A variably developed K-feldspar megacryst foliation can be found in most outcrops. In two locations northeast of Unicorn Rocks rhythmic biotite layering in a 1 m thick sequence is well exposed over 50 m. This layering has been displaced by a healed fault which cannot be traced beyond the biotite layers.

The Unicorn Point granodiorite is a medium-grained, megacrystic, biotite granodiorite with rare hornblende grains. The biotite booklets in thin-section have a maximum absorption colour of dark red-brown and are included with all other phases in the K-feldspar. The biotite and plagioclase show little evidence of deformation and quartz mosaics are rare. The quartz is subhedral against K-feldspar and in most thin-sections is clearly embayed. Other features which allow distinction from the Badger Island granodiorite are the higher proportion of relatively perthitic K-feldspar and the coarser grain size.

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GRANITE PORPHYRY DYKES

Some 20 granite porphyry dykes of variable orientation (15-104°, 152°) intrude the Modder River, Rooks River, Dover River and Kent Bay granites and the Mathinna Beds in central and eastern Cape Barren Island. The predominant mafic mineral is chloritized biotite, but some phenocrysts may be chloritized hornblende. These felsic porphyries outcrop as dykes up to 100 m long and 2 m wide, and in one locality near Battery Bay Hill have a cylindrical jointing pattern oriented along the dyke. A characteristic feature of some dykes is a spherulitic groundmass. The spherulites, composed of feldspar and quartz, occur in a variety of shapes and are commonly nucleated around embayed felsic phenocrysts. Other dykes have an aplitic groundmass and all samples have variable carbonate, epidote and sericite alteration.

MAFIC DYKES

Two generations of mafic dykes intrude and granitoid rocks and the Mathinna Beds of the Furneaux Group and eastern Tasmania. Cocker (1977b) has documented these dykes in the St. Helens area, where the spessartites are possibly related to the Cretaceous appinite suite at Cape Portland (fig. 1) (Jennings and Sutherland 1969) and the tholeiitic quartz-dolerites are thought to be pre-Permian in age, although some of the dykes may belong to the extensive Jurassic dolerites. The dolerites are widely distributed in eastern Tasmania and extend to the Hogan Islands (Hope *et al.* 1974) near Victoria. Several reports discuss the distribution of the dolerites including McNeil (1965), Groves (1972, 1977) and Jennings (1977). Blake (1947) located many dolerites especially in the Franklin Sound area and this work has extended their distribution (fig. 2, 4).

In the southern Furneaux Group, the dolerite dykes have a northeasterly strike and are not confined to particular granitoid plutons. Although most of the dykes occur between Cape Barren and Flinders Islands, isolated dykes occur in Battery Bay and in southwestern Clarke Island. Also more dykes may occur in the Mathinna Beds than those shown in figure 2, as these structures are commonly parallel to the bedding and are superficially similar in appearance to the thickly-bedded sediments. Coastal outcrops of the dolerites commonly exceed 100 m in length and rubble exposures can be traced for 3 km. Dyke widths vary from several millimetres to 10 m. In coastal exposure the dolerites occupy tensional fractures in the granitoid rocks and commonly wall irregularities may be matched across the dykes. Post-crystallization movement can be inferred from intense veining and slickensided joint surfaces in some dykes. Narrow zeolite- or carbonate-bearing veins occupy joints in dykes, and at Lady Barron on Flinders Island (fig. 1) a dyke is cut by a 5 cm wide, altered oligoclase, and chloritized biotite-bearing vein (43943) which does not extend beyond the margin of the dyke. These veins may be residual fluids from the crystallization of the tholeiitic magma.

In hand specimen the ophitic texture is preserved away from chilled margins, in grain sizes up to 5 mm. Porphyritic dolerites with plagioclase phenocrysts are rare and chlorite amygdaloids are widespread, but variably developed. In some dykes inclusions of granitoid rocks are common. The primary phase assemblage of labradorite, titanite, skeletal Fe-Ti oxides and minor pyrrhotite is variably altered to chlorite, epidote, calcite, amphibole, biotite and rarely prehnite after plagioclase phenocrysts.

Only one lamprophyre dyke carrying hornblende and biotite in an idiomorphic groundmass was identified near Puncheon Point. In hand specimen the mafic phenocrysts clearly distinguish this rock from the dolerites.

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TERTIARY SEDIMENTS AND BASALT

Calcareenites crop out poorly over a wide area in western and northeastern Cape Barren Island, and erratically in the centre of Badger Island. Quilty (1971) has dated the western Cape Barren Island sediments and a small outcrop on Preservation Island as Miocene. The eastern Cape Barren Island and Badger Island calcarenites may not be their stratigraphic equivalents. The calcareous, mollusc-rich sands overlying a basalt outcrop at Lascar Point on Cape Barren Island, opposite the Preservation Island locality, may be of a similar age, but post-basaltic sediments on Flinders Island are tentatively dated as Pliocene-Pleistocene (Harris 1965). The western Cape Barren Island calcarenites were deposited under shallow, marine conditions (Quilty 1971).

A variety of lithologies from the deeper levels in the Rooks River alluvial workings include carbonaceous and pyritic sediments which suggest a coastal lagoonal environment of deposition, in contrast to the sedimentological environment of the calcarenites nearby. The lagoonal sediments have been dated as Oligocene-Lower Miocene (Harris 1965) and in the Rooks River valley have a thickness of up to 59 m (Standard 1972). Based on the distribution of basement outcrops similar thicknesses of Tertiary sequences may occur in the nearby Lee River valley and possibly the Dyas Corner River valley.

Alkali-olivine basalt is exposed on a small tidal platform east of Lascar Point.

QUATERNARY SEDIMENTS

Quaternary sand cover and alluvial sediments are widespread in the low-lying, poorly-drained country in central and eastern Cape Barren Island, and eastern Clarke Island (fig. 2). Sand cover includes parabolic dunes up to 3 km long and sandy soils composed of coarse-grained felsic minerals from weathered granitoids. The alluvial sediments of the Rooks River, Lee River and Dyas Corner valleys are usually less than 9 m thick and overlie Tertiary sediments. A disconformity between Quaternary sand and gravel and Tertiary sediments is exposed in the Rooks River alluvial workings, in which the younger sediments occur above and as infillings in mud cracks in the Tertiary rocks. To some extent the Quaternary sediments in the larger valleys are probably wind-sorted lag deposits resulting from the removal of finer grain sizes to the dune fields in the east. Most streams have limited accumulations of alluvial material with the exception of the Modder River valley, and alluvial fans north and south of Hogans Hill. The alluvial sediments in the Modder River valley are widespread although usually less than 20 m thick. Bedrock outcrops occur in numerous streams. There are no extensive alluvial sediments on Clarke Island.

The elongate, parabolic dunes have westerly wind vectors similar to lunette dunes around deflation lakes in central and eastern Cape Barren Island and north-central Clarke Island. Two major dunes in the Thirsty Lagoons area climb low hills and have well preserved hairpins. These dunes are unrelated to the modern coastal parallel and blowout dunes as their sand appears to have been derived from the alluvial plains in the centre of the islands, rather than from the coastal areas.

MINERALIZATION

Primary cassiterite mineralization in the southern Furneaux Group is restricted to minor occurrences. These include a miarolitic cavity-rich aplite carrying minor cassiterite and molybdenite in the Rooks River granite (ER/978.318), and a cassiterite-bearing pegmatite intruding the Mathinna Beds on Clarke Island (ER/985.134). Both occurrences have been prospected with some ore being assayed from Clarke Island (Blake 1947). The genetic association for the single, Clarke Island, feldspar-white-mica-

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quartz pegmatite (43932) is not known. No modern prospecting has been attempted to test the extent of the pegmatite. The Rooks River aplites have low economic potential, but may be the source rock type for cassiterite in the nearby sediments. Molybdenite crystals (43866) up to 1 cm in diameter were also found in quartz veins south of Double Peak (ER984.286). Blake (1947) noted 'aplitic granite' as carrying cassiterite at Mt Kerford and on his map indicates a 'tin lode' in Kent Bay. The site of the 'tin lode' is a garnet-bearing pegmatite (43294). Blake (1947) also records minor gold and graphite occurrences in the Mathinna Beds on the north coast of Cape Barren Island.

The main mineralization on Cape Barren Island consists of secondary cassiterite deposits. To define areas with the greatest potential for secondary cassiterite deposits, possible source rocks for cassiterite have been identified. Two plutons, the Rooks River granite and the Hogans Hill granite, have characteristics similar to granites which carry primary cassiterite and are closely associated with secondary deposits in Tasmania. Sedimentary sequences resting on and near both plutons have been prospected, and cassiterite has been produced from the Rooks River area. This regional mapping approach to cassiterite prospecting has greatly reduced the area of primary targets in the sedimentary sequences around the island. Further exploration should be concentrated on streams which drain these two altered plutons. Using this guideline the sediments in the Modder River tin field do not warrant further exploration. The source of the cassiterite in this area may be the Rooks River granite, the cassiterite possibly being shed from this mass when the topographic configuration was different from the present, as only a small area of the granite is drained by the present river system. Also cassiterite-bearing dykes or quartz veins from the Rooks River granite may outcrop in the upper watershed of the Modder River. The high ilmenite content in these and other sediments in the Cape Barren Island area is probably derived from the dolerite dykes which intrude most rock types.

Detailed mapping of rock types within the Rooks River granite may be used to further restrict the areas of potential cassiterite-bearing sediments. Based on the similarities between the cassiterite-bearing aplites and the granite porphyries, and the location of the Rooks River tin field in an area which drains mainly porphyry rock types, the southern end of the Lee River drainage system possibly has the greatest potential for cassiterite-bearing sediments. Further weight is given to this proposal by the high white-mica content of the granite porphyry in this area. The increased degree of alteration in this area is also emphasized by the occurrence of alluvial topaz along Topaz Ridge, to the north of Battery Bay Hill (fig. 3).

Extensive drilling in the Rooks River tin field (Appleby and McEwan 1966; Standard 1972) revealed variable and low cassiterite contents in the Tertiary sediments. The higher concentrations in the upper (mainly Quaternary) sedimentary sequence, which has been mined, may be related to recent alluvial and aeolian reworking of the older coastal sediments. A similar cassiterite distribution may occur in the Lee River valley. The sediments north and south of Hogans Hill have the form of alluvial fans, and a marine sedimentary component is not expected in this area.

SUMMARY

The geological history of the southern Furneaux Group is similar to that of the northeastern Tasmanian mainland. The Siluro-Devonian Mathinna Beds, following low-grade regional metamorphism and folding, were intruded by at least sixteen granitoid rock plutons. The granitoids were intruded in turn by a swarm of tholeiitic dolerite dykes, probably pre-Permian in age. There is no geological record after the dolerite dykes in the Furneaux Group until the Tertiary when thick sediment sequences were deposited in different sedimentary environments. The main Quaternary features in this area are parabolic dunes and lunettes, and modern parallel dunes and blowouts on the present coastline.

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The granitoid plutons in the southern Furneaux Group are characterized by the occurrence of aluminous mafic phases. In four plutons garnets or cordierite are a widespread accessory or minor phase. In four other plutons garnet and corierite are rare accessory minerals. These eight plutons constitute some 70 per cent of the exposed granitoid rock outcrop. Secondary cassiterite deposits are concentrated in sediment sequences derived from two of four altered, biotite-bearing plutons. Both altered plutons are younger than the surrounding granitoids. Three small hornblende-biotite granodiorite plutons occur in the western area of the southern Furneaux Group.

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