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Section 5 – Palaeontology

1, 19. PRELIMINARY NOTES ON THE OCCURRENCE OF THE ALLANDALE AND ULLADULLA FAUNAS IN TASMANIA

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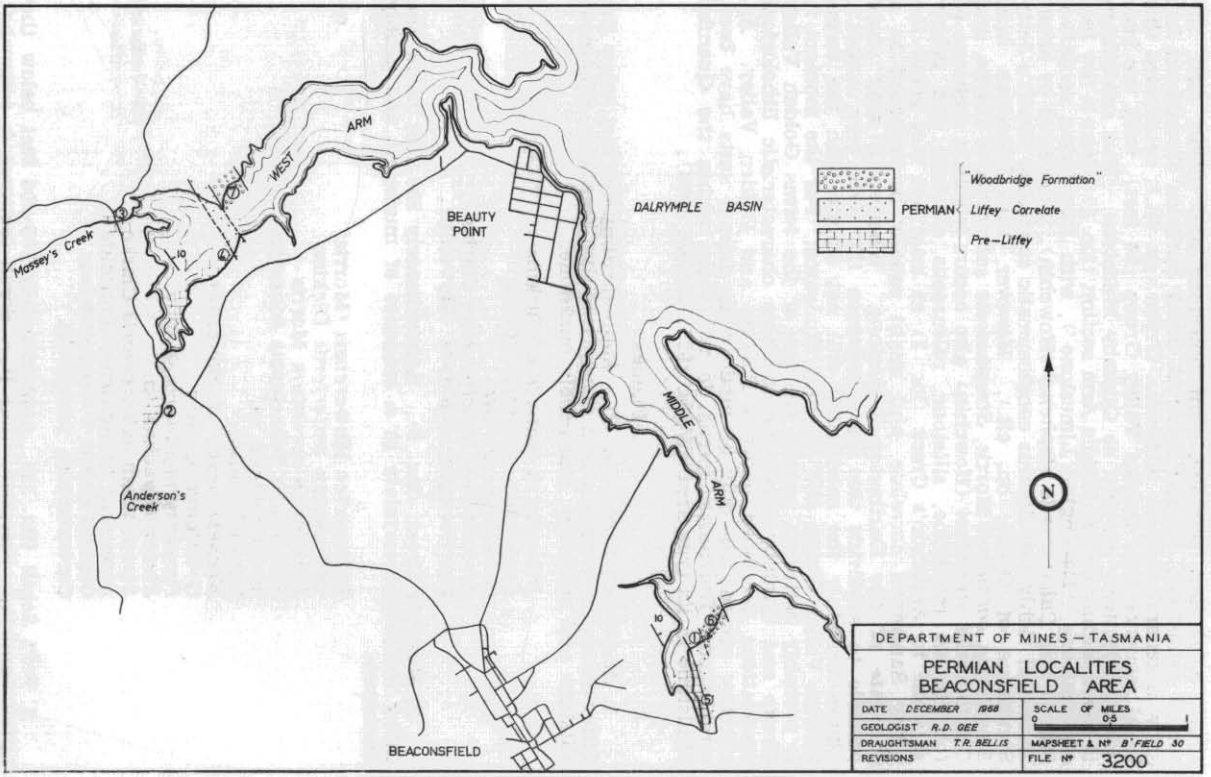
BEACONSFIELD AREA

Recent regional mapping of the Beaconsfield Sheet (Geological Survey of Tasmania, 1 inch to 1 mile series) by Dr. R. D. Gee has revealed the occurrence of a well-exposed and more or less complete Permian sequence ranging from basal pebbly mudstone through to carbonaceous sandstone and shale overlain by Triassic sandstone above (Green, 1959). Information obtained from exposed sequences immediately adjacent to, but outside the area mapped by Green (op. cit.), show that the generalised succession differs very considerably from that stated by Green (op. cit.) and summarised by Banks (1962). Dr. Gee will publish these details elsewhere.

One of the best lithological markers within the succession is a unit approximately 110 feet thick and composed of well-washed, coarse-grained, current-bedded quartz sandstone with carbonaceous streaks (fig. 31, loc. 1). This sandstone is probably of freshwater origin and its lithological character and stratigraphical position indicate correlation with the Liffey Sandstone of the Western Tiers sections between Poatina and Golden Valley (McKellar, 1957; Wells, 1957; Green, 1959; Clarke, 1968). Below this in sections exposed in Anderson's Creek (loc. 2), Massey's Creek (loc. 3), the south bank of West Arm (loc. 4), and the east bank of Middle Arm (loc. 5), the basal beds which are at least 700 feet in thickness, comprise an extremely varied sequence of tillitic conglomerate, mudstone, silt-



5 cm

FIGURE 31.

stone, calcareous siltstone, thin limestone and pebble rich, ill-sorted sandstone. Fossils occur at many horizons throughout but show a general increase upwards. Green (op. cit.), subdivided this basal sequence into Golden Valley Group (54 feet), with the beds below collectively grouped as Quamby Mudstone. This subdivision is based mainly on the Middle Arm section (loc. 5) where a few feet of limestone ('Darlington Limestone'), with *Eurydesma cordatum* Morris and *Calcitornella stephensi* (Howchin), is followed by about 50 feet of richly fossiliferous conglomeratic sandstone (Swift's Jetty Sandstone of Green, op. cit.). However, thin limestone with *Eurydesma cordatum* Morris, *Strophalosia subcircularis* Clarke, and *Calcitornella stephensi* (Howchin) also occurs within a sequence of fossiliferous mudstone, siltstone, calcareous siltstone and pebbly siltstone in Anderson's Creek (loc. 2) at least 590 feet below the Liffey Sandstone correlate, and might equally be regarded as a correlate of the Darlington Limestone. Whereas it may prove possible to subdivide this basal sequence (Dr. Gee pers. comm.), almost certainly the subdivision will not equate with the terms Golden Valley Group and Quamby Mudstone. For the moment it is probably better to restrict the use of the terms Golden Valley Group and Quamby Mudstone to those characteristic lithological associations developed between Poatina and Golden Valley. An effective control will only be made when faunal units have been established. Diagnostic fossils do not occur within the Quamby Mudstone in its type area (Wells, 1957; Clarke, 1968).

Faunas

1. *Anderson's Creek* (loc. 2). Approximately 590 feet below the Liffey Sandstone correlate in a sequence of thin limestone, calcareous siltstone and mudstone, and pebbly mudstone.

Deltopecten waterfordi Dickins
Eurydesma cordatum Morris
Grantonia sp. nov.
Strophalosia subcircularis Clarke
Calcitornella stephensi (Howchin).

2. *Massey's Creek* (loc. 3). Approximately 390 feet below the Liffey Sandstone correlate in a sequence of mudstone and pebbly mudstone.

Deltopecten illawarensis (Morris)
Deltopecten waterfordi Dickins
Eurydesma cordatum Morris
Eurydesma hobartensis Johnston
Merismopteria sp.
Parallelodontid
Keeneia ocula (J. Sowerby)
Grantonia sp. nov
Pseudosyringothyris sp. nov.
Streptorhynchus sp.
Strophalosia subcircularis Clarke
Stenopora tasmaniensis Lonsdale
Crinoid debris ? *Camptocrinus*
Carbonaceous fragments.

3. *Port Sorell* (fig. 32). Approximately 100-200 feet below the Liffey Sandstone correlate. The Port Sorell sequence is somewhat removed from the other sections and is faulted against Cambrian

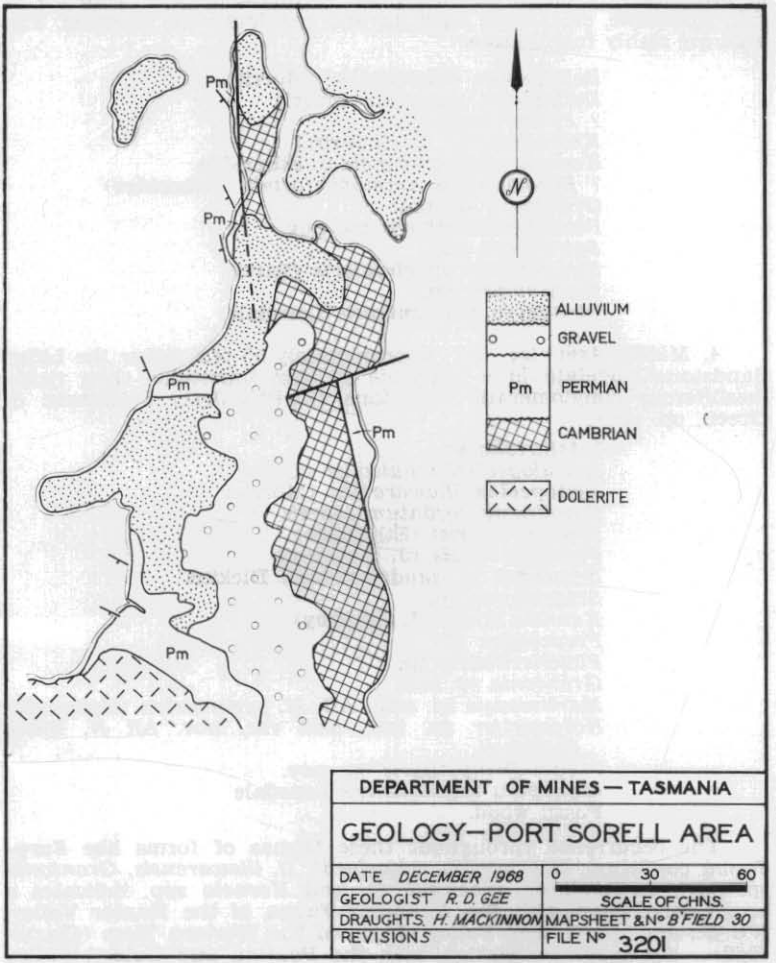


FIGURE 32.

5 cm

rocks, but is here included for completeness. The lowest exposed rocks are sandstone and conglomeratic sandstone without fossils but these are followed by siltstone and calcareous siltstone with *Grantonia* sp. nov., *Strophalosia subcircularis* Clarke and *Peruvispira* in profusion. A small gap then occurs followed by a sequence of thin limestone, calcareous siltstone and conglomeratic siltstone. The beds are richly fossiliferous.

Deltopecten illawarensis (Morris)
Eurydesma cordatum Morris
? *Australomya* sp.
Keeneia ocula (J. Sowerby)
Keeneia platyschismoides Etheridge
? *Paromphalus ammonitiformis* (Etheridge)
Grantonia sp. nov.
Pseudosyringothyris sp. nov.
Spiriferella sp.
Strophalosia subcircularis Clarke
Martiniopsis sp.
Stenopora tasmaniensis Lonsdale.

4. *Middle Arm* (loc. 5). Approximately 55 feet below the Liffey Sandstone correlate in a sequence of thin limestone, then richly fossiliferous conglomeratic sandstone (Swift's Jetty Sandstone of Green, op. cit.).

? *Astartella* sp.
Aviculopecten tenuicollis (Dana)
Deltopecten illawarensis (Morris)
Eurydesma cordatum Morris
Myonia morrisi (Etheridge)
Pyramus laevis (J. Sowerby)
Schizodus cf. *sandimanensis* Dickins
Stutchburia sp.
Kenneia ocula (J. Sowerby)
Peruvispira sp.
Fletcherithyris sp.
Grantonia sp. nov.
Martiniopsis sp. nov. Aff. *M. symmetrica* (Campbell)
Notospirifer sp. nov. and var. nov. Aff *N. hillae* Campbell.
Pseudosyringothyris sp. nov.
Stenopora tasmaniensis Lonsdale
Fossil wood.

The occurrence throughout these faunas of forms like *Eurydesma cordatum, Deltopecten waterfordi, D. illawarensis, Grantonia* sp. nov., *Strophalosia subcircularis,* and *Keeneia* spp. indicates a broad correlation with the Allandale Fauna of the Hunter Valley, N.S.W., and the Golden Valley Group of the Western Tiers (Clarke, 1968). An exact correlation with the Poatina and Golden Valley sections is not evident. Apart from a single specimen of a syringothyroid from the Glencoe Formation of Western Creek (M. R. Banks, pers. comm.), and a single brachial valve of ? *Pseudosyringothyris* sp. collected by A. P. Bravo from the Billop Sandstone near Poatina, syringothyroids are virtually absent on the Western Tiers. Similarly *Martiniopsis* is very rare and *Notospirifer* absent. *Keeneia platyschismoides* is here very subordinate to *K. ocula* which does not occur at Golden Valley, and the Glencoe

Peruvispira is specifically distinct from the Beaconsfield species. These considerations may indicate that the rocks here immediately beneath the Liffey Sandstone correlate are younger than the fossiliferous parts of the Golden Valley at Poatina and Golden Valley. That is, they may be the lateral equivalents in age of the poorly fossiliferous Macrae Mudstone which has the characters produced by a restricted depositional environment, possibly brackish or estuarine (Clarke, 1968). If this is so then the Glencoe and Billop Formations may be a little older than the Allandale Fauna proper since at Middle Arm the conglomeratic sandstone immediately beneath the Liffey correlate yield *Pyramus laevis, Myonia morrisi* and other lamellibranchs in profusion. Indeed these beds comprise what must be the nearest development of a true Allandale Fauna so far recorded from Tasmania. It also seems possible that the Beaconsfield pre-Liffey Sandstone correlate sequence may include time equivalents of the Quamby Mudstone of the Western Tiers section. If this postulation is correct then the abundant occurence of *Pseudosyringothyris, Martiniopsis,* and *Notospirifer* in the Beaconsfield sections may be the result of a prolonged period of favourable bottom conditions. Their rarity or absence in the Western Tiers sections may be the result of less stable conditions and more frequent periods of unfavourable sedimentation (the Quamby and Macrae Mudstones). Possible support for this latter contention may lie in the adjacent Frankford sheet where preliminary mapping by A. B. Gulline reveals the presence of marine horizons within a true basal tillite, which is followed by a varied and fossiliferous lithological sequence below a Liffey Sandstone correlate.

The Liffey Sandstone correlate is succeeded at both West Arm (loc. 7) and Middle Arm (loc. 6) by a variable marine sequence about 150-160 feet thick (= 'Woodbridge Formation' of Green, op. cit.). The lowest beds comprise siltstone and pebbly siltstone rich in bryozoa but lacking in shelly fossils. About 10 feet of coarse conglomeratic sandstone with *Paraconularia derwentensis* (Johnston) in some abundance occurs over the interval 70-80 feet above the Liffey correlate. These beds are immediately followed by a few feet of compact, richly fossiliferous calcareous siltstone. The fossils include:—

? *Cancellospirifer* sp. Cf. *C. maxwelli* Campbell
Fletcherithyris sp. nov. and var. nov. Aff. *F. parkesi* Campbell
Fletcherithyris sp. nov. Aff. *F. amygdala* (Dana)—*F. farleyensis* Campbell Group
Fletcherithyris reidi Campbell
Grantonia sp. nov. Aff. *N. hardmani* (Foord) of Waterhouse 1964
Licharewia sp. nov.
Martiniopsis sp. *M. angulata* (Campbell—*M. costata* (Waterhouse) group
Martiniopsis sp. Aff. *M. globosa* (Campbell) or *M.* sp. juv. Cf. *M. globosa*
Martiniopsis ingelarensis (Campbell)
Pterospirifer sp. nov.
Spiriferella sp. *S. rajah* (Salter)—*S. supplanta* Waterhouse group
? *Streptorhynchus* sp.
Wyndhamia dalwoodensis Booker

Wyndhamia clarkei (Etheridge)
Conocardium sp.
Aviculopecten farleyensis (Etheridge and Dun)
Aviculopecten fittoni (Morris)
Aviculopecten cf. *squamuliferus* (Morris) of Etheridge and Dun 1892, pl. 2, fig. 4.
Aviculopecten tenuicollis (Dana)
Myonia sp. (or *Vacunella*)
Schizodus sp.
Stutchburia cf. *variabilis* Dickins
Keeneia sp.
Hyolithes sp.
Stenopora crinita Lonsdale
? *Calycoblastus* sp.
Large michelinoceratids
Ostracods
Fenestellids

The remaining part of the sequence below the 'Garcia correlate' of Green (op. cit.) comprises siltstone with much fenestrate bryozoan debris and thin bands of pebbly sandstone with *Martiniopsis* sp. nov. Aff. *M. profunda* (Campbell) and large trunks of fossil wood.

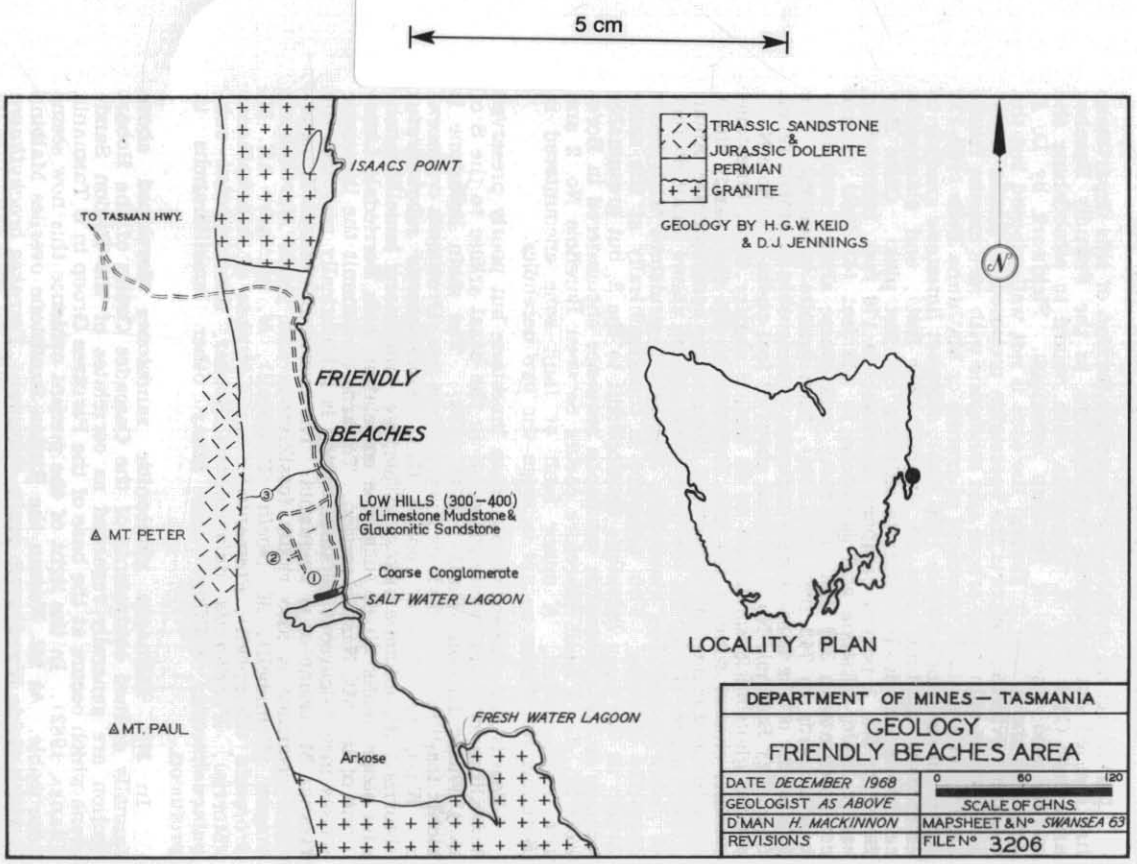
The occurrence of *Paraconularia derwentensis* (Johnston) in the lower parts of this unit indicates a correlation with the main parts of the Cascades Group of the Hobart Section. The fauna from the calcareous siltstone immediately above is interesting and important for several reasons. The extraordinary abundance and variety of the fauna is unusual in the Tasmanian Permian. *Hyolithes* sp., *Conocardium* sp., and large michelinoceratids are unknown elsewhere in Tasmania. The occurrence of the last named group raises the hope that goniatites may yet be found in Tasmania. Probably of most importance, however, is the specific composition of the fauna and its stratigraphical age. Certain forms like orthotetids and blastoids are unknown above the Cascades Group of S. Tasmania (Banks, 1958; 1962). The occurrence of *Fletcherithyris reidi, F.* sp. nov. Aff. *F. amygdala—F. farleyensis* group, *Wyndhamia dalwoodensis,* and *Stenopora crinita* might support a correlation with the Grange Mudstone. Alternatively, *Stenopora crinita, Wyndhamia dalwoodensis, Licharewia* sp. nov., *Pterospirifer* sp. nov. could support a correlation with Malbina A. The occurrence of *Fletcherithyris* sp. nov. Aff. *F. parkesi, Martiniopsis ingelarensis, M.* sp. Cf. *M. angulata—M. costata* group, *M.* sp. Aff. *M. globosa* or Cf. *M. globosa* sp. juv., and ? *Cancellospirifer* sp. Cf. *C. maxwelli* which all occur in the Ingelara Shale of Queensland (Campbell, 1953) would also support the correlation with Malbina A. The most likely correlation therefore seems to be with Malbina A of the Hobart section (=Ulladulla Fauna of Runnegar, 1968). As a corollary there seems little doubt that the middle and upper parts of the so-called 'Woodbridge Formation' at Beaconsfield is significantly younger than the top of the 'Woodbridge Group' on the Western Tiers where the Dabool-Weston-Garcia sequence (McKellar, 1957) yields a straightforward Fauna II (Clarke, 1969). The Garcia Sandstone is not a correlate of the Risdon Sandstone of S. Tasmania and the 'Garcia correlate' of Green (op. cit.) is neither a correlate of the Garcia Sandstone nor a correlate of the Risdon Sandstone.

FRIENDLY BEACHES, COLES BAY (fig. 33)

During recent months the Economic Section of this department has carried out geological investigations in the Friendly Beaches area near Coles Bay, E. Tasmania with regard to establishing the quality and reserves of Permian limestone. Fieldwork by D. J. Jennings shows that in general the area is not well-exposed but the available evidence supports the succession proposed by Banks (1955; 1962) *viz.* a thin basal arkose and sandstone with rare marine fossils resting on a variable basement of granite or Mathinna Beds (100-120 feet), coarse conglomerate (150 feet), compact limestone grading to calcareous siltstone near its summit (200 feet), and glauconitic sandstone and lesser coquinite siltstone (60 feet plus). Coles Bay Borehole No. 1 proved compact limestone to 178 feet, interbedded sandy shale, siltstone and sandstone to 220 feet (42 feet), coarse conglomerate to 390 feet (170 feet), and coarse arkose with basal boulder beds to 745 feet (355 feet), then granite basement. The thickening of the basal arkose indicates considerable basement relief. Coles Bay Borehole No. 2 collared about 60 feet above Borehole No. 1 proved glauconitic sandstone to 60 feet, a shatter zone, limestone, another shatter zone at 140 feet, limestone to 235 feet, sandy shale, siltstone and sandstone to 280 feet, then coarse conglomerate. About ½ mile further N (fig. 33, loc. 3) a creek section shows about 60 feet of richly fossiliferous glauconitic feldspathic sandstone with lesser coquinite siltstone. This sequence is topographically at the same height as the main limestone development to the S, but presumably belongs to the glauconitic sandstone sequence encountered in Borehole No. 2. A fault therefore occurs between Borehole No. 2 and the creek section. A minor fault or fault zone encountered in Borehole No. 2 also occurs between the two boreholes.

Fossils are rare below the main limestone but poorly preserved lamellibranchs and spiriferids occur in the basal arkose to the S of Salt Water Lagoon (Banks, 1958; 1962). The main limestone is richly fossiliferous and yields *Euryphyllum* spp., *Grantonia cracovensis* Wass, *Terrakea* cf. *pollex* Hill, *Taeniothaerus subquadratus* (Morris), *Wyndhamia jukesi* (Etheridge) and many lamellibranchs and other fossils which suggest a correlation with Berriedale Limestone of the Mt. Nassau section. Towards its summit the limestone passes into calcareous siltstone which is lithologically very like the Grange Mudstone of S Tasmania. The overlying glauconitic sandstone sequence is also richly fossiliferous and yields *Martiniopsis magna* (Campbell), *M. isbelli* (Campbell), *M.* sp. nov. Aff. *M. profunda* (Campbell), *Pterospirifer* sp., *Terrakea* cf. *brachythaera* (Morris), *Wyndhamia dalwoodensis* Booker, *Aviculopecten subquinquelineatus* (M'Coy) and many other lamellibranchs in profusion.

In NE Tasmania glauconitic sandstones developed above faunally defined equivalents of the Cascades Group of the Hobart section are generally regarded as correlates of the Risdon Sandstone which occurs at the base of the Ferntree Group in S Tasmania (Banks, 1962). In the light of the present evidence this now seems improbable. At Mt. Nassau the Risdon Sandstone overlies Malbina E which yields *Wyndhamia ovalis* (Maxwell), *Terrakea brachythaera* (Morris), *Martiniopsis mantuanensis* (Campbell), *Vacunella curvata* (Morris) and *Astartila intrepida* Dana (Banks and Read, 1962; Banks, 1962; Runnegar, 1968; and personal observation). This is without doubt Fauna IV (Dickins, 1964; Runnegar, 1968) and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TRIASSIC SANDSTONE & JURASSIC DOLERITE
PERMIAN
GRANITE
GEOLOGY BY H.G.W. KEID & D.J. JENNINGS
N
ISAACS POINT
TO TASMAN HWY.
FRIENDLY BEACHES
LOW HILLS (300'–400') of Limestone Mudstone & Glauconitic Sandstone
MT. PETER
Coarse Conglomerate
SALT WATER LAGOON
FRESH WATER LAGOON
MT. PAUL
Arkose
LOCALITY PLAN
DEPARTMENT OF MINES — TASMANIA
GEOLOGY
FRIENDLY BEACHES AREA
DATE DECEMBER 1968
GEOLOGIST AS ABOVE
D'MAN H. MACKINNON
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MAPSHEET & N° SWANSEA 63
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FIGURE 33.

suggests correlation with the Mantuan Productus Bed of Queensland (Banks and Read, op. cit.; Banks, 1962). The age of the present fauna from the Friendly Beaches area is less certain. *Martiniopsis magna* and *M. isbelli* are confined to Fauna IV in Queensland (Campbell, 1961; Runnegar, 1968). *Terrakea brachythaera* characterises Malbina E in S Tasmania and thus supports the evidence of the martiniopsids. On the other hand, *Wyndhamia dalwoodensis* is unknown in Fauna IV and in S Tasmania does not occur above Malbina A. *Martiniopsis* sp. nov. Aff. *M. profunda* (Campbell) is identical with specimens from the 'Woodbridge Formation' of the Beaconsfield area which also yields a 'mixed' Fauna II-Fauna IV with *W. dalwoodensis*. The writer therefore tentatively suggests correlation with Malbina A of the Hobart section. The alternative correlation with Malbina E would effect a complete overlap of Faunas II and IV which on the evidence from elsewhere in Tasmania and E Australia is improbable.

CONCLUSIONS

(1) Faunas from below Liffey Sandstone correlates in the Beaconsfield area of N Tasmania provide evidence that the Allandale Fauna of Tasmania is much more varied than in its type area of the Hunter Valley, N.S.W.

(2) The overlap of Faunas II and IV in Tasmania is considerable. Originally Faunas I-IV were proposed as faunal subdivisions of the Permian rocks of the Bowen Basin, Queensland (Dickins, 1964). More recent work has tended to raise doubts as to the recognition of Fauna I. The lowest faunal division is termed the Allandale Fauna by Runnegar (1968) and is not definitely known in Queensland. Whereas Faunas II and IV have been widely recognised and accepted, Fauna III is not known outside its type area in Central Queensland (Runnegar, 1968). Elsewhere, as for example on the S coast of N.S.W., Faunas II and IV are separted by a faunal overlap termed the Ulladulla Fauna (Runnegar, 1968). Since both Fauna III and the Ulladulla Fauna occur between Faunas II and IV they may be coeval, but certain palynological evidence tends to suggest that the Ulladulla Fauna may be older than Fauna III (Runnegar, 1968). Evidence from Tasmania cannot clarify the relative ages of the Ulladulla Fauna and Fauna III, but it does suggest that the overlap between Faunas II and IV is very considerable and may be greater than that of the Ulladulla Fauna in a strict sense. *Martiniopsis magna, M. isbelli* and *Wyndhamia clarkei* are not known below Fauna IV, but in Tasmania they occur in association with *W. dalwoodensis* which typifies Fauna II and is not known to occur above the Ulladulla Fauna elsewhere in E Australia (Runnegar, 1968).

(3) It is apparent that rocks of many different lithologies and ages have been allocated severally to an ill-defined 'Woodbridge Group' or 'Woodbridge Formation' (McKellar, 1957; Wells, 1957; Green, 1959; Banks, 1962). The 'Garcia correlate' of Green (op. cit.) is not a correlate of the Garcia Sandstone at Poatina, nor is it a correlate of the Risdon Sandstone of S Tasmania. The glauconitic sandstone sequence developed above faunal correlates of the Cascades Group in the Coles Bay area, E Tasmania, is not a correlate of the Garcia Sandstone at Poatina, and it is improbable that it is a correlate of the Risdon Sandstone of S Tasmania. Officers

of the Geological Survey of Tasmania are currently involved in redefining the stratigraphical nomenclature of the Western Tiers and Beaconsfield Permian successions and it is to be hoped that their results will greatly clarify the current situation.

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