

"PARMEENER SUPERGROUP (LOWER PART), POATINA"

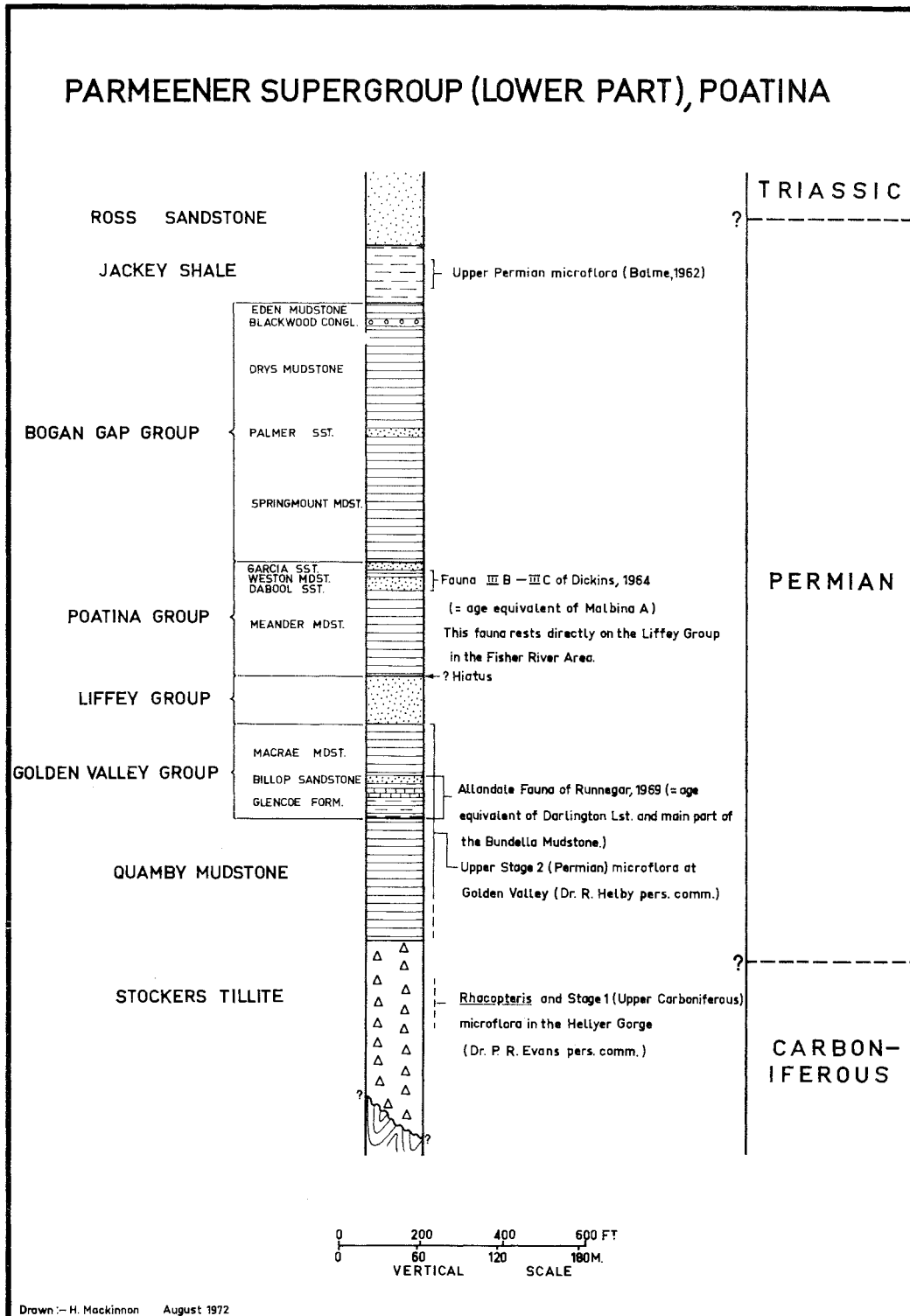
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In Tasmania, the lower (Permo-Carboniferous) rocks of the Parmeener Supergroup are almost everywhere subhorizontal, and rest with pronounced landscape unconformity on a folded basement sequence, which is variously composed of Precambrian and early Palaeozoic strata. In order to appreciate the late Palaeozoic history of the Central Plateau district, it is necessary to understand the nature of this unconformity.

Following more or less continuous marine sedimentation over much of Tasmania from Mesial Cambrian to Early Devonian times, a period of mountain building occurred. This interval of folding and allied deformation, termed the Tabberabberan Orogeny, can be dated very accurately. At many localities in W and NE Tasmania, rocks deformed by the Tabberabberan Orogeny yield shelly faunas and graptolites which indicate ages as young as Early Devonian. At Point Hibbs, limestone and conglomerate yield rich coral and associated shelly faunas which indicate an age perhaps as young as early Mesial Devonian. These rocks, the Spero Bay Group, rest with pronounced unconformity on older rocks but are also deformed by the Tabberabberan Orogeny. At Eugenana near Devonport, undisturbed cave deposits in strongly-deformed Ordovician Gordon Limestone yield late Middle Devonian microfloras (Balme, 1960). Since the Gordon Limestone is conformable with rocks of the later Siluro-Devonian Eldon Group, it is evident that the most important disturbances associated with the Tabberabberan Orogeny must have occurred between the late Early Devonian and the late Mesial Devonian. Following the main period of Tabberabberan deformation, deep-seated granite intrusion occurred. Radiometric data indicate that these granites were emplaced during Late Devonian and Early Carboniferous times (McDougall and Leggo 1965).

In the Hellyer Gorge, south of Wynyard, the plant *Rhacopteris* (Banks, *in* Gulline 1967) associated with diagnostic microfloras (Dr. P.R. Evans pers. comm.) indicate that the oldest deposits present within the Parmeener Supergroup are of Late Carboniferous age. Since derived pebbles of the



9. Columnar section, lower part of the Parmeener Supergroup, Poatina.

Late Devonian-Early Carboniferous granites are present within the lower parts of the Parmeener Supergroup, a period of prolonged erosion, sufficient to uncover once deep-seated intrusions, must have occurred during the Carboniferous Period. Additionally since the lowest rocks of the Parmeener Supergroup frequently show clear evidence of glacial derivation, (a factor which remains true for much of the lower part of the Parmeener Supergroup), ice-sheets of continental extent must have been present during some part of the Carboniferous Period. Sometime late in the Carboniferous Period, conditions ameliorated to cause retreat of the ice-sheets and set in motion the sequence of events evidenced by the Parmeener Supergroup.

At Poatina the folded pre-Parmeener Supergroup basement is nowhere exposed, but at Macrae Hills Precambrian dolomite and near Cressy sheared volcanic rocks of probable Cambrian age are known. Further away from Poatina, but still within the ambit of the Great Western Tiers or Central Plateau region, basement rocks outcrop prominently at Quamby Bluff-Golden Valley, Western Bluff, and the Fisher River area. These basement rocks include Precambrian foliated quartzite and schist, Cambrian slate, Ordovician conglomerate and limestone, and Siluro-Devonian quartzite (see fig. 6).

The lowest unit at Poatina (see fig. 9) is the Stockers Tillite (Wells 1957). It comprises tillite or indurated glacial moraine and characteristically consists of unsorted and sometimes striated boulders and other erratics enclosed within a matrix (or cement) of mud grade. The Stockers Tillite is not exposed in the Poatina road section but has been proved to a thickness in excess of 105 m (345 ft) in boreholes. At Golden Valley it varies in thickness from 0-6.5 m (0-21 ft) and in the Fisher River area it is absent. Rather further distant, in the Hellyer Gorge, NW Tasmania, the Wynyard Tillite contains glaciolacustrine rhythmite sequences as well as tillite, and is almost 610 m (2,000 ft) thick. At Cygnet, S. Tasmania, the Woodbridge Tillite is at least 275 m (900 ft) thick, whereas at Hobart it is absent. Rapid lateral changes in thickness and facies are typical of glacial moraines or boulder clays. Fossils are very rare within these basal rocks but in the Hellyer Gorge, the possible arthropod track *Tasmanadia* is locally abundant. And as noted previously, a little higher in the sequence, the plant *Rhacopteris* and associated microfloras indicate that some part of the Wynyard Tillite is of Late Carboniferous age. Since the lowest faunas obtained from rocks which immediately overlie the Wynyard Tillite are of Permian age, the Carboniferous-Permian boundary most probably

occurs in some part of the Wynyard Tillite.

The lowest rocks exposed in the Poatina road section belong to the Quamby Mudstone. This unit is about 90 m (300 ft) thick and comprises a monotonous and rather uniform sequence of poorly-bedded, dark, pyritic siltstone and mudstone. The extreme rarity of fossils, the presence of glendonites and the crumbling nature of outcrops are further characteristic features. Erratics, too, are generally rare although at Poatina they are commoner than is usual for the Quamby Mudstone. The depositional environment of the Quamby Mudstone is problematical. The general lithological characters and lack of fossils may suggest quiet-water, restricted basinal sedimentation. In the Golden Valley area, the Mersey Coal Basin, the Hellyer Gorge and elsewhere in N and NW Tasmania, the Tasmanite Oil Shale occurs near the base of sequences which occupy the same stratigraphical position as the Quamby Mudstone. Usually this horizon lacks macrofossils but at Mersey Great Bend near Latrobe, the Tasmanite Oil Shale and the enclosing Spreyton Beds are quite richly-fossiliferous no more than 23 m (75 ft) above the summit of the basal tillite. These faunas contain the characteristic cold-water Gondwanan bivalve genera *Eurydesma*, *Deltopecten* and *Megadesmus* together with several important brachiopod species. This fauna is the oldest known Permian fauna anywhere in E. Australia. Thus although direct proof is lacking, the Quamby Mudstone at Poatina is inferred to be of Permian age.

The Golden Valley Group (McKellar 1957; Clarke 1968) comprises three distinct lithological formations. At the base, the Glencoe Formation, which is about 27.5 m (90 ft) thick, consists of richly-fossiliferous siltstone and calcareous siltstone with lenses of impure limestone. Erratics are abundant. The miliolid foraminifer, *Calcitornella*, frequently encrusts both pebbles and the larger faunal components. The Billop Formation comprises 3.5-4.5 m (12-15 ft) of fossiliferous coarsely-conglomerate sandstone. The Macrae Formation consists of about 36.5 m (120 ft) of poorly-fossiliferous dark, carbonaceous and pyritic siltstone and mudstone with lesser light-coloured and coarser-grained siltstone. In fresh outcrops and borehole cores the higher parts of the Macrae Formation are characterised by hydroplastic structures, worm burrows and associated evidence of bioturbation.

Fossils from the Golden Valley Group include the bivalve clams and scallops *Eurydesma*, *Megadesmus*, *Neoschizodus*, *Stutchburia*, *Merismopteria*, *Deltopecten* and *Etheripecten*, the gastropods

*Keeneia* and *Peruwispira*, various microfossils such as *Calcitornella* and *Ammodiscus*, the bryozoa *Fenestella* and *Stenopora*, and diagnostic species of the brachiopods *Neospirifer*, *Martiniopsis*, *Pseudosyrinx*, *Schuchertella* and *Strophalosia*. The faunas of the Glencoe and Billop Formations allow a confident correlation with the Erratic Zone and Darlington Limestone on Maria Island and the main part of the Bundella Mudstone in southern Tasmania. These faunas, although still of early Permian (Sakmarian) age, are significantly younger than those of the Spreyton Beds at Latrobe and the Kansas Creek Beds of the Fisher River area. It is evident therefore that conditions suitable for the establishment and proliferation of shallow water benthonic faunas as represented in rock type associations of "Golden Valley Group" facies varied in time from place to place.

The Liffey Sandstone, which is 26-36.6 m (85-120 ft) thick, is generally considered to be of non-marine origin, and provides an invaluable field marked horizon throughout N. Tasmania both topographically and lithologically. At Poatina it comprises coarse-grained, well-sorted, cross-bedded quartz sandstone with lesser carbonaceous shale and coaly partings. These characters are typical almost everywhere. At Poatina, Beaconsfield and the Fisher River area its summit is marked by about a metre of darker-coloured worm-cast sandstone. Poorly-preserved specimens of the Gondwanan plants *Glossopteris* and *Gangamopteris* occur at Poatina, but the best material has been obtained from the Mersey Coal Measures which occupy the same stratigraphical position at Latrobe.

The Poatina Group (Bravo and Pike 1969) marks a return to marine sedimentation, and comprises four distinct formations which have a total thickness of about 87 m (285 ft). The Meander Mudstone which is about 61 m (200 ft) thick, and consists of thin - to medium - bedded alternations of mudstone, siltstone and fine sandstone, is followed by two units of coarsely-conglomeratic and thicker-bedded sandstone, the Dabool and Garcia Formations respectively, separated by about 6 m (20 ft) of thin-bedded bryozoal shale which is the Weston Mudstone. At Poatina, the Meander and Garcia Formations are poorly-fossiliferous and no diagnostic faunas have been recovered. The Dabool-Weston association, however, is richly-fossiliferous. Brachiopods are overwhelmingly dominant in terms of numbers of individuals and include the spiriferids *Neospirifer* (compound rib bundles), *Sulciplica* (simple ribs), *Martiniopsis* (smooth, with pitted micro-ornament), and *Fusispirifer* (bundled ribs, very long hinge line); the small terebratulids

(lamp shells) *Gilledia* and *Fletcherithyris*; and the spinose strophomenids *Terrakea* and *Wyndhamia*. Bivalve clams such as *Vacunella*, *Myonia* and *Astartila*, together with the scallops *Deltopecten*, *Etheripecten* and *Streblopteria*, are much less common. Even rarer are the gastropods *Keeneia* and *Peruwispira*, the solitary coral *Euryphyllum*, the conulariid *Paraconularia*, and vertebrate remains. The bryozoa *Fenestella* and *Stenopora* are abundant in the Weston Mudstone. In detail, the faunas of the Dabool-Weston association allow a confident correlation with Malbina A (Fauna III B - III C of Dickins, 1964) of the Hobart area.

In the Fisher River area the Meander Mudstone is also richly-fossiliferous and yields faunas similar in character and of the same age as the Dabool-Weston association at Poatina. This fauna there rests directly on the Liffey Sandstone and has profound stratigraphical implications. The Liffey Sandstone has not been precisely dated but everywhere in N. Tasmania it is underlain by deposits which yield rich Early Permian (Allandale or Sakmarian) faunas. At Golden Valley, Early Permian Stage 2 microfloras occur throughout the Quamby Mudstone and Golden Valley Group (Dr. R. Helby pers. comm.) and thus support the macrofossil evidence. In the Hobart area and Maria Island, non-marine sequences (Faulkner Group) which are generally considered to be the lithological correlates of the Liffey Group, are also underlain by early Permian (Sakmarian) faunas. They are immediately succeeded, however, by rich Fauna II (U. Sakmarian - L. Artinskian) assemblages (Runnegar, 1969). Inferentially therefore, the Liffey Group is not younger than early Fauna II. The simplest interpretation of these factors is to postulate a significant hiatus at the base of the Poatina Group. This hiatus is probably widespread in Tasmania.

The Bogan Gap Group (Bravo and Pike 1969) comprises about 200 m (660 ft) of monotonous and unfossiliferous mudstone and siltstone (the Springmount, Drys and Eden Formations), separated by two thin, but distinctive units of sandstone (Palmer Formation) and quartz conglomerate (Blackwood Formation). On broad lithological and stratigraphic grounds the Bogan Gap Group has been correlated with the Ferntree Group of southern Tasmania.

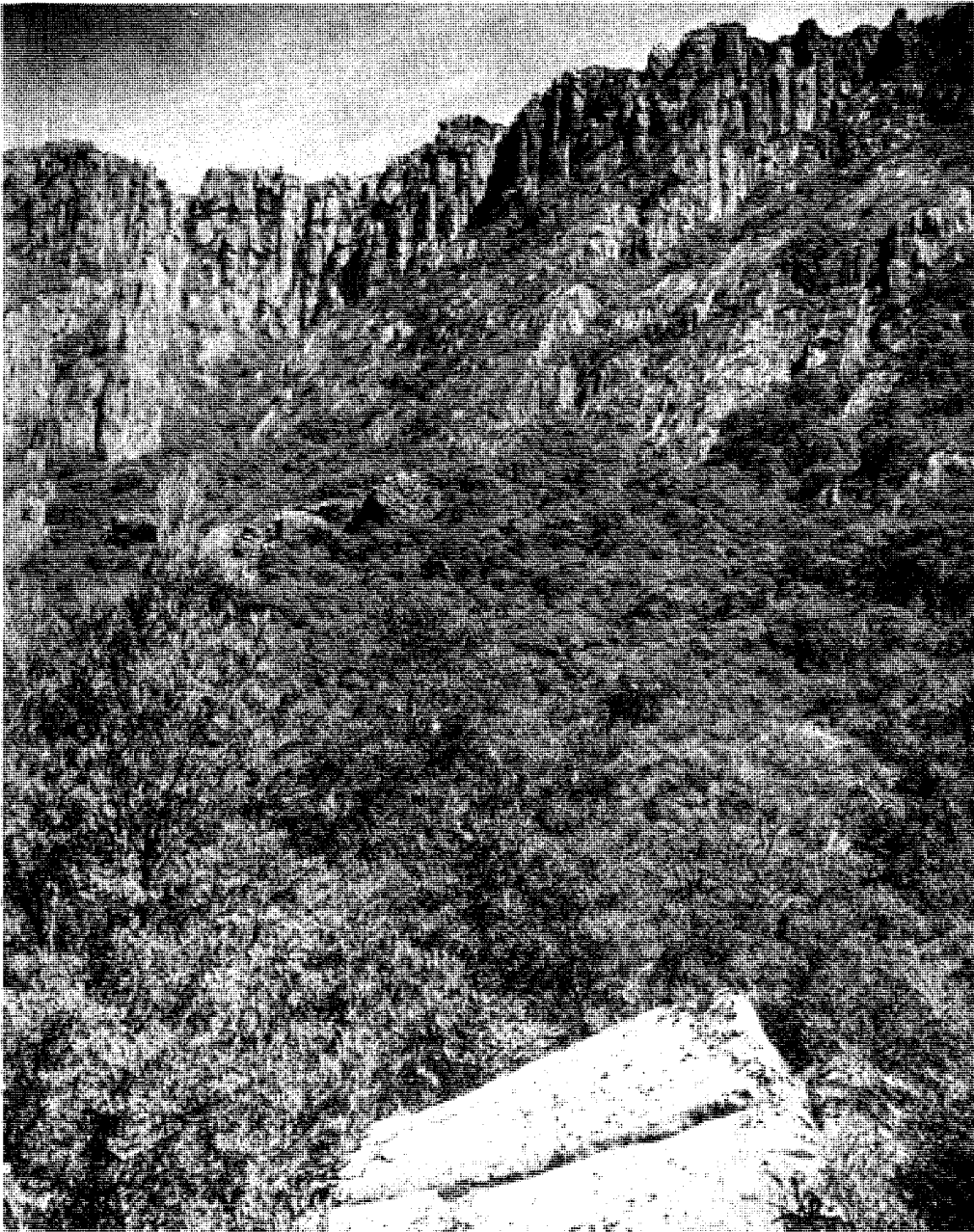
The Jackey Shale, which has been correlated with the Cygnet Coal Measures in southern Tasmania, marks a return to non-marine sedimentation. Like the Cygnet Coal Measures, the Jackey Shale yields Upper Permian floras and microfloras, but recent drilling in the type area of the Cygnet Coal Measures indicates that both are perhaps better placed within the upper parts of the Parmeener Supergroup on general lithological considerations.

Overall the faunal and floral affinities of the lower parts of the Parmeener Supergroup are wholly with the *Eurydesma-Glossopteris* cold-water realm. This Gondwanan provincialism is probably more marked in Tasmania than anywhere in Australia, if not the world. Faunal diversity is low and no trace of warmer-water Tethyan forms such as reef-building corals, fusulinids and goniatites are present. Faunal diversity increases slightly upwards, but several genera of brachiopods, bivalves and gastropods which occur abundantly in the Sydney and Bowen Basins, are either rare or absent in Tasmania. This, coupled with the continued persistence of *Eurydesma*, *Deltopecten* and *Keeneia* at much higher horizons than in Queensland and W. Australia, probably indicates the continued influence of cold-water conditions throughout much of the Permian Period in Tasmania.

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## PLATE 2



The scarp face at Projection Bluff showing Jurassic dolerite with columnar jointing, scree of dolerite blocks supporting a dwarf microphyll-lichen rain forest; *Nothofagus cunninghamii* (myrtle or beech) in the foreground.

Photograph by courtesy of Botany Department,  
University of Tasmania.