TASMANIA DEPARTMENT OF MINES

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GEOLOGICAL SURVEY EXPLANATORY REPORT

GEOLOGICAL ATLAS 1:250 000 SERIES

SHEET No. SK-55/3

BURNIE

by E. WILLIAMS, B.Sc.(Hons.), Ph.D.
and N.J. TURNER, B.Sc.(Hons.).

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PREFACE

This explanatory report gives a brief outline of the area of the Burnie 1:250,000 sheet. This sheet is the first of a new series of geological maps which it is hoped will provide complete coverage of the State within the next few years.

The geological information is derived from both departmental and external sources.

The list of selected references at the end of the report will serve as a guide to the more important geological publications which deal with the area.

J.G. SYMONS, Director of Mines

PHYSIOGRAPHY

Coastal plains are developed where marine platforms have emerged and, at some localities, have been enlarged seaward by coastal deposition. Elsewhere hills and mountains extend from near the coast and rise to heights of more than 1 500 m.

In the south-east of the Burnie Sheet a mountain plateau is bounded to the north and west by mountain ridges, the trends of which reflect those of the folded pre-Parmeener Super-Group rocks.

The south-eastern plateau, which has an average height of 1 220 m, consists of flat-lying sedimentary beds of the Parmeener Super-Group, into which dolerite sills have been intruded. Dolerite caps the plateau and forms scarps. Both fault-line scarps and exhumed fault scarps occur. However, the scarp face of the south-eastern plateau is not associated with faulting.

Many of the larger rivers radiate from the south-east and have cut gorges through the mountain ridges upon which they were superimposed. Other rivers run parallel to the mountain ridges and have developed wide valley plains.

Most of the present landscape has been formed by river erosion and weathering. In the south-east, however, much of the landscape has been inherited from Pleistocene glaciation and periglacial processes.

PRECAMBRIAN ROCKS

Rocks of late Precambrian age occur in three regions which are separated by belts of rocks of Cambrian and younger age.

In the south-east of the Sheet is a region of the Tyennan nucleus, which extends from the south-west coast of Tasmania. The rocks of this region have been grouped into quartzite-phyllite and quartzite-schist assemblages (Gee, R.D. *et al.*, 1970). The purity of the quartzite layers and the occasionally preserved sedimentary features indicate that the metamorphic rocks were derived from successions of interbedded siltstone and orthoquartzite. Regional metamorphism reached a maximum grade in the upper greenschist facies before the first of two widespread phases of folding, and a later, relatively minor metamorphism reached a lower greenschist facies peak prior to the second fold phase. Strong regional transposition occurred during the second deformation producing steeply dipping layers striking east-south-easterly parallel to the margins of the nucleus. The periods of regional metamorphism and the two widespread phases of deformation are attributed to the Frenchman Orogeny of Upper Proterozoic age (Spry, A.H., *in* Spry and Banks, 1962, p. 107-126). Another region of Precambrian metamorphic rocks termed the Forth nucleus (Burns, 1965) occurs north of the Tyennan nucleus. Rock-types of both nuclei are similar with the exception of structurally transposed quartzite, schist and conglomerate sequences at Goat Island, near Ulverstone [DQ 3043]. Two phases of metamorphism with accompanying folding have been inferred in the Forth nucleus and attributed to the Frenchman Orogeny.

At a number of localities on the western margin of the Forth nucleus a comparatively unmetamorphosed quartzwacke turbidite sequence has been thrust on to the metamorphic rocks. The quartzwacke succession has been correlated with similar rocks some 5 km to the west underlying the eastern margin of the Rocky Cape region (Gee, 1971). The Rocky Cape region is the westerly portion of the Sheet underlain by Precambrian rocks. Along the north coast the quartzwacke turbidite sequence within the Rocky Cape region contains occasional spilite horizons and is some 5 000 m thick. Similar rocks occur in the upper Pieman River area [CP5580] (Spry, 1964), and at Mt Bischoff [CQ7713] where they contain a dolomite layer that is host to epigenetic cassiterite-pyrrhotite mineralisation.

Bounding the quartzwacke turbidite succession to the west is a belt of metamorphic rocks 8 to 15 km in width extending from near Wynyard [CQ9362] at the north coast to the south-west. This belt, which has been termed the Arthur lineament (Gee, 1969), consists of pelitic schist and amphibolite that reach metamorphic grades of middle greenschist facies near Wynyard (Gee, 1971; Gee and Gulline, in press), and in the Arthur River [CQ6742] (McNeil, 1961; Longman and Matthews, 1962). The western boundary of the metamorphic belt is reported to be gradational at both these localities. At Savage River [CQ5005], magnetite-pyrite lenses, which are being mined, occur in amphibolite within the belt (Urquhart, 1966).

In the north of the Rocky Cape region and to the west of the Arthur lineament occur comparatively unmetamorphosed laminated mudstone, with occasional pyrite-rich horizons, and orthoquartzite sequences of super-mature, pure quartz sands. Although these orthoquartzite-mudstone sequences, which attain a thickness of 5 800 m at Sisters Hills [CQ7570] underlie much of the region west of the Arthur lineament, other types of Precambrian successions occur. These exceptional successions include a greywacke turbidite sequence in the Arthur River [CQ5352] (McNeil, 1961), a unit of basaltic lava and tuff around Corinna [DP4187] (Spry, 1964), and a conglomerate horizon at Rupert Point [CP2588] on the West Coast (Gee *et al.*, 1969). A dolomite formation, which extends from Smithton [CQ4277] to 17 km south of the Arthur River, is believed to be the youngest Precambrian unit of the Rocky Cape region, and has been quarried for agricultural use around Smithton. This dolomite horizon transgresses underlying beds at the Arthur River, and further to the south-west a possible correlate of it is considered to rest unconformably on basaltic rocks [CQ4090] (Spry, 1964). East of Smithton, at the Black River [CQ5676], the dolomite beds conformably follow a quartzite-conglomerate formation which unconformably overlies beds of the widespread orthoquartzite-mudstone sequences.

The deformations of the Precambrian rocks of the Rocky Cape region are attributed to the Penguin Orogeny of Upper Proterozoic age, which is believed to be younger than the Frenchman Orogeny responsible for the deformation of the rocks of the Tyennan and Forth nuclei (Spry, 1964; Gee, 1971). The age of the Penguin Orogeny is considered to be about 700 million years on the basis of a K-Ar analysis of probably syn-tectonic sodic dolerite at Cooee [DQ0755] (Richards, J.R. *in* Spry and Banks, 1962, p.256; Gee, 1971). Sodic dolerite occurs as north-east trending dykes on either side of the Arthur lineament, within which there are metamorphosed equivalents. During the Penguin Orogeny up to five phases of deformation affected the rocks on the north coast (Gee, 1971). Folds of all the deformation phases trend north-easterly and are nearly coaxial. The folds of one phase often occur in zones which are spatially segregated from the fold zones of other phases. Folds of the orthoquartzite-mudstone sequences are occasionally of concentric style with a vergence to the east and are associated with high angle thrusts. At the north coast the quartzwacke turbidite successions east of the Arthur lineament are intensely deformed with folds overturned to the east. The Arthur lineament is parallel to the fold trends in the Rocky Cape region and is considered to be the result of shearing and associated metamorphism caused by eastward movement of the western orthoquartzite-mudstone units during the Orogeny.

CAMBRIAN SYSTEM

In the south the Precambrian quartzwacke succession of the upper Pieman River is apparently conformably followed to the east by an unfossiliferous orthoquartzite group [CQ6377]. Most of the deformation of the quartzwacke beds resulted from the Penguin Orogeny (Spry, 1964). However, structures in the orthoquartzite group and known Cambrian sequences further east are considered to have resulted from probable Cambrian and later movements. The orthoquartzite group is therefore believed to be the oldest unit of the probable Cambrian in this area (Williams *et al.*, in press), and its base is the western margin of the Cambrian belt, separating the Tyennan nucleus from the Rocky Cape region. This meridional belt, within which is the site of the Dundas Trough, bifurcates in the Black Bluff area [DQ1210] with one arm, the Dial Range Trough, continuing north to the coast, and the other arm, the Fossey Mountain Trough, following the northern edge of the Tyennan nucleus.

The unfossiliferous orthoquartzite group of the upper Pieman River (Taylor, 1954) is about 300 m thick and consists of coarse-grained massive quartzite beds associated with laminated fine-grained quartzite. Although this unit wedges out some 4 km north of the Pieman River it appears to be followed conformably by 2 450 m of unfossiliferous fine-grained mudstone characteristically deep red in colour with green horizons (Taylor, 1954). To the north [CP7795] this mudstone sequence passes laterally into unfossiliferous turbidite successions which at some localities include conglomerate and limestone (Barton *et al.*, 1966). The unfossiliferous Lower Cambrian immediately north of Mt Bischoff [CQ7717] consists of greywacke sequences containing thick horizons of chert-breccia and abundant volcanic rocks with a thin limestone bed and concordant intrusive bodies of dolerite and gabbro (Groves *et al.*, 1973). The volcanic rocks consist of dominantly spilitic lava flows with pillow structures. West of Mt Bischoff in the Mt Cleveland area [CQ6410] where epigenetic cassiterite-sulphide replacement deposits are mined, unfossiliferous red and green mudstone occurs with beds of chert, greywacke and dolomitic layers (Cox and Glasson, 1972). The southern boundary between the unfossiliferous probable Lower Cambrian sequences and the Precambrian rocks at Mt Bischoff is a fault, which probably developed during deposition of the Cambrian beds. The faulted northern and western boundaries of the Mt Bischoff Precambrian beds are occupied by an elongate strip of ultramafic and mafic rocks generally associated with basic lavas and agglomerate [CQ7212] (Groves and Solomon, 1964; Groves *et al.*, 1973).

At Bald Hill [CQ6012], near Mt Cleveland, an ultramafic mass is probably faulted into unfossiliferous Lower Cambrian rocks. The ultramafic rocks, which are noted for osmiridium recovered from related alluvial deposits, are associated with tonalite, trondhjemite and dolerite intrusions (Rubenach, 1973). An ultramafic-mafic complex also occurs in the upper Pieman River area [CP7072] where it appears between the unfossiliferous red mudstone sequence and younger fossiliferous beds (Taylor, 1954). These fossiliferous beds are of mudstone, greywacke and conglomerate which comprise a sequence 1 830 m in thickness. The beds have yielded a Middle to lower Upper Cambrian marine fauna (Öpik, A.A. *in* Taylor, 1954). A similar marine fauna of late Middle Cambrian age has been described from a sandstone-mudstone series in the Que River [CP9196] (Gee, C.E. *et al.*, 1970). Included within the sedimentary sequence of the Que River are pyroclastic rocks which are associated with overlying acid volcanic rocks that extend east to the Tyennan nucleus and south to join the Mt Read Volcanics of western Tasmania (Solomon, 1965; Barton *et al.*, 1966; Williams *et al.*, in press). The silver-lead ore bodies at Tullah [CP8579] and massive pyrite-chalcopyrite lenses at Chester [CP7981] are examples of economic deposits associated with the Mt Read Volcanics occurring in the Burnie Sheet.

The Dundas Trough of Western Tasmania continues north and appears to join the Dial Range Trough, which is represented by a Cambrian belt separating the Forth nucleus from the Rocky Cape region, and the Fossey Mountain Trough, which occurs between the Tyennan nucleus and the Precambrian regions immediately to the north.

In the Dial Range Trough (Burns, 1965) impersistence of Cambrian rock units indicates that they accumulated in an active tectonic environment. The oldest unit consists of massive, intermediate to acid volcanic rocks which are at least 300 m thick. The volcanic rocks are followed by a dominantly mudstone sequence, up to 1 050 m thick, which contains turbidite layers of conglomerate and greywacke, tuff beds and occasional lava horizons. This mudstone sequence has yielded a Middle Cambrian marine fauna (Öpik, A.A. *in* Burns, 1965). A thick tongue of up to 850 m of chert is believed to follow unconformably. Conformably overlying the chert is spilite with pillow lava, which has a maximum development of 460 m. Some 240 m of mudstone follows containing a Middle through to Upper Cambrian marine fauna (Palmer, A.R. *in* Burns, 1965). Cambrian deposition closed with the accumulation of megabreccia in the Dial Range Trough. The megabreccia, which consists of large slabs of various lithologies in a matrix of greywacke conglomerate and sandstone, appears to have been formed by gravity down-sliding of large masses of semi-indurated material from tectonically unstable flanks of the trough.

In the east-south-easterly directed Fossey Mountain Trough (Jennings, in press), at the northern margin of the Tyennan nucleus some 3 660 m of a complex pile of greywacke turbidite sequences, volcanic rocks, and chert accumulated in an actively developing basin. The chert and spilite formations of the Dial Range Trough extend into this region and are considered to be the lowest members of the exposed Cambrian. The chert is associated with basic to intermediate volcanic rocks, which are believed to be local and interfinger laterally with marginal lenticular bodies of breccia with minor shale intercalations. Some 820 m of sedimentary sequences follow and include quartzwacke conglomerate, greywacke and argillaceous chert. This sedimentary sequence represents a period of deposition between the extrusion of mainly basic to intermediate volcanic rocks below and younger acid volcanic rocks which consist of hundreds of metres of soda-rhyolite, keratophyre, and tuff with minor greywacke intercalations. The sedimentary sequence has yielded a marine fauna of Upper Cambrian age (Öpik, A.A. *in* Jennings, in press).

At the northern margin of the Precambrian Tyennan nucleus adjacent to the unconformity with the Lower Palaeozoic Fossey Mountain Trough occur three small plutons of very variable granitic composition [DP2397, DP2797, DP3594] (Jennings, 1963). Isotopic age determinations indicate emplacement of the granite bodies probably occurred during the late Cambrian (McDougall and Leggo, 1965).

Cambrian rocks crop out along 30 km of coastline near Smithton [CQ4277] and extend 50 km south into the Rocky Cape region where they are surrounded by Precambrian rocks. About 1 520 m of siltstone, greywacke and pillowed spilitic lava, associated with pyroclastic rocks occur in the Cambrian trough (Gulline, 1959). An upper Middle Cambrian marine fauna has been obtained from siltstone above a conformable contact with mixtite overlying dolomite beds of possible Precambrian age (Öpik, A.A. *in* Spry and Banks, 1962, p.134).

During Cambrian times sediment and volcanic material accumulated in troughs between Precambrian regions. The common occurrence of detritus of earlier Cambrian rocks in later Cambrian beds indicates deformation accompanied deposition. Two periods of deformation are recognised in the Dial Range Trough. The earlier movement is of Middle Cambrian age whereas the late movement commenced in lower Upper Cambrian times with the formation of megabreccia. Folds resulting from Cambrian deformation have considerable wavelength. Towards the close of Cambrian times faulting caused uplift of large areas of Precambrian terrain.

The result of the Cambrian movements within the Fossey Mountain and Dial Range Troughs and in the region of the Dundas Trough on the Burnie Sheet, is the transgression of Cambrian formations by the basal coarse siliceous beds of the correlates of the Junee Group.

JUNEE GROUP CORRELATES (ORDOVICIAN SYSTEM)

The lower sequences of the Junee Group correlates consist of predominantly siliceous clastic rocks which unconformably overlie Cambrian and Precambrian rocks. In the Dial Range [DQ1740] (Burns, 1965) the basal beds of the group may be represented by up to 9 m of purple mudstone with a high proportion of detrital hematite. At the top of the basal mudstone occur bands of conglomerate identical with the overlying unstratified terrestrial conglomerate which is between 215 m and 550 m thick. The pebbles of the conglomerate are of quartzite and chert which are of local derivation. The greater part of the thick conglomerate consists of fans which indicate a transportation direction to the south-west. The conglomerate is overlain by and interfingers with littoral marine, pink quartz sandstone which in some localities is some 245 m in thickness.

The siliceous clastic rocks which probably range in age from Upper Cambrian to Lower Ordovician, extend from the Dial Range on to the sites of the Fossey Mountain Trough (Jennings, in press) and the Dundas Trough. In the Fossey Mountains [DQ2907] the lowest unit is a lenticular body of dominantly pink recrystallised quartz conglomerate. The quartzite fragments of this terrestrial deposit are sub-rounded and are embedded in a fine-grained siliceous matrix. The common pink colouration is due to finely divided hematite disseminated throughout the rock. The bottommost few metres of the basal beds often reflect the composition of the underlying rock. The conglomerate locally attains a thickness of 270 m but it thins and is overstepped at some localities by marine quartz sandstone interbedded with some mudstone and conglomerate beds. The sandstone sequence, which may be up to 240 m thick, commonly exhibits tubicular casts of worm burrows, and abundant marine fossils of Lower Ordovician age occur at some localities.

The siliceous beds are followed conformably by a limestone sequence which attains a thickness of some 915 m at Gunns Plains [DQ1930]. The limestone is usually fairly pure and massive. Current bedding and stylolitic structures are not uncommon. Abundant marine fossils of Middle and Upper Ordovician age have been recovered (Banks, M.R. *in* Spry and Banks, 1962, p. 170-174). The limestone is extensively quarried at Railton [DQ5122] for use in cement manufacture.

ELDON GROUP CORRELATES (SILURIAN AND LOWER DEVONIAN SYSTEMS)

The correlates of the Eldon Group usually follow Ordovician successions with conformity and are best represented in the Burnie Sheet in the Huskisson River [CP7080] (Taylor, 1954) where the marine sandstone and mudstone formations are almost identical with those in the Zeehan area of western Tasmania (Gill and Banks, 1950; Gill, E.D. *in* Spry and Banks, 1962, p. 177-182). The lowest unit consists of 490 m of cross-bedded quartz sandstone beds which have yielded a shelly fauna. Mudstone, about 240 m in thickness, follows. This is overlain by 600 m of poorly fossiliferous, ripple-marked sandstone and an unfossiliferous, green, thinly bedded, fine-grained shale 210 m thick. Following are 490 m of highly fossiliferous sandstone which is succeeded by the topmost unit of 430 m of interlayered silicified sandstone and shale. The beds of the Huskisson River area are of shallow water origin, and have yielded marine fossils of Lower Silurian through to Lower Devonian age.

EUGENANA BEDS (MIDDLE DEVONIAN SYSTEM)

At Eugenana [DQ4235] quarrying has exposed undisturbed terrestrial cavern fillings in folded Ordovician limestone (Burns, 1964). Blocks of the tectonically distorted enclosing rock occur within the spelean deposits, which contain spores of upper Middle Devonian age (Balme, 1960). The rocks of the Ordovician limestone at Eugenana and those of the Eldon Group correlates following the limestone conformably, were deformed before the deposition of the Eugenana Beds. The period of deformation, which occurred after Lower Devonian and before upper Middle Devonian time, is very widespread and is known as the Tabberabberan Orogeny.

TABBERABBERAN OROGENY

The Precambrian rocks of the Rocky Cape region were insignificantly affected by the Tabberabberan Orogeny, and the northern area of the Tyennan nucleus may have acted as a rigid body in modifying the Tabberabberan deformation of the surrounding rocks.

Earlier Cambrian folds were exaggerated by the Tabberabberan Orogeny, which includes two main phases of folding. The first phase of movement caused north trending folds in the Dundas and Dial Range Troughs, and north-easterly trending folds in the Fossey Mountain Trough. The early phase folds are usually shallowly plunging, symmetrical, open folds with wavelengths of up to 10 km. In the Dial Range Trough west dipping thrusts associated with these early folds (Burns, 1965) indicate that the structures resulted from transportation from the west.

The second main phase of deformation formed north-west trending folds, which in the Fossey Mountain and Dial Range Troughs are due to movement from the north-east. In the Fossey Mountain Trough these second phase folds interfere with and modify the trends of the larger earlier Tabberabberan folds. These later north-west trending folds show consistent asymmetry with axial surfaces dipping to the north-east and associated breakthrusts usually also dipping to the north-east (Jennings, in press).

UPPER DEVONIAN AND LOWER CARBONIFEROUS GRANITE OCCURRENCES

The most important period of the emplacement of granitic rocks was from Late Devonian to Early Carboniferous (McDougall and Leggo, 1965). The discordant Meredith Granite [CP6095] is the largest granitic body. It is composed predominantly of adamellite and has a narrow contact aureole (Groves, *et al.*, 1973). Adamellite is also the predominant rock type of the Housetop Granite [DQ1030], whereas potassic granite as well as adamellite are the main rock types emplaced at the mouth of the Pieman River [CP2790]. The rocks of Granite Tor [CP9580] are of muscovite-biotite granite.

The silver-lead mineralisation at Magnet Mine [CQ7011], the cassiterite-pyrrhotite ore-bodies of Cleveland [CQ6507], Mt Lindsay [CP6083] and Mt Bischoff [CQ7713], and the cassiterite-quartz veins at Balfour [CQ2530] are believed to be associated with granite emplacement. In the Moina area [DQ 2207] tin-tungsten-bismuth and silver-lead deposits are related to the nearby small Devonian granite body.

PARMEENER SUPER-GROUP

(UPPER CARBONIFEROUS-PERMIAN-TRIASSIC SYSTEMS)

Following the emplacement of Upper Devonian and Lower Carboniferous granite there was prolonged erosion, which ended with the accumulation of glacial, glacio-marine and freshwater sequences. The beds of the Parmeener Super-Group (Banks, 1973) are generally flat-lying, resting with a profound unconformity on folded older rocks. The more resistant monadnocks of pre-Parmeener Super-Group rocks may have stood out above sea level up to the time of the earliest widespread deposition of freshwater sediment but eventually the whole area was submerged.

The oldest unit, which is observed to rest unconformably on Precambrian rocks in the Arthur River [CQ6841] and at the coast near Wynyard [CQ9959], consists of up to 490 m of a predominantly tillite sequence with irregular lenses of granule conglomerate and horizons of laminite. At Wynyard [CQ9362] these rocks are quarried for use in brick-making. The laminite layers have yielded arthropod trails, *Rhacopteris*-like plant remains and spores of Upper Carboniferous age (Gulline, 1967; Gee and Gulline, in press; Plumstead, E. pers. comm.). Tillite forms a lesser proportion of the lower beds along the coast at Wynyard, and pebbly mudstone is more abundant (Gee, 1971; Gee and Gulline, in press). In the Arthur River region the tillite succession is followed by 135 m of siltstone which include horizons of oil shale rich in *Tasmanites*. Overlying these beds is a freshwater sequence which is represented throughout the whole region and consists of coarse carbonaceous sandstone with coal seams.

The maximum thickness of the beds deposited before the freshwater sequence in the Bonneys Tier area [DQ4632] is 152 m. Tillite is present in the lowest horizons which are followed by unfossiliferous pyritic mudstone with sparse pebbles, Tasmanite oil shale and pebbly mudstone with a marine fauna. Tillite is not present in the lower marine sequences in areas of basement highs at Barn Bluff [DP1080] (Gee and Burns, 1968), Devonport [DQ4641] (Burns, 1965) and in the western region of the Western Tiers [DP4095] (Jennings, 1963). Around Devonport a persistent layer of sandy conglomerate occurs at the base and this is followed by beds ranging in thickness from 45 m to 167 m of interlayered mudstone, pebbly sandstone and siltstone, with some layers of Tasmanite oil shale, which have been exploited. A number of beds are rich in marine fossils. At Western Bluff [DP4095] basal conglomerate and pebbly siltstone are overlain by more than 60 m of richly fossiliferous marine limestone, siltstone and sandstone containing erratics.

The coal measures of the upper Flowerdale River area [CQ7648] extend eastward. In the Spreyton area [DQ4536] (Burns, 1965), this horizon is represented by some 36 m of flaggy bedded sandstone which includes a coal-bearing mudstone layer. Along the face of the Western Bluff (Jennings, 1963) the basement rises to the level of this freshwater sequence, which is here some 27 m thick and consists of clean, well-sorted sandstone with some carbonaceous material. Coal seams have been exploited in the upper Flowerdale River area and around Spreyton.

The coal measures are followed by a glacio-marine sequence of Permian age. Dropstones are common throughout. In the upper Flowerdale River area (Gee and Gulline, in press) only 215 m of these beds remain and consist of poorly sorted pebbly sandstone and siltstone with marine fossils. At Bonneys Tier the upper Permian glacio-marine sequence is represented by 180 m of pebbly siltstone (Jennings, in press) of which the lower 60 m carry abundant marine fossils. At Western Bluff (Jennings, 1963) this glacio-marine horizon attains a thickness of about 260 m, and consists of sandstone and mudstone, the lower layers of which are rich in marine fossils.

Overlying the upper glacio-marine sequence at Western Bluff (Jennings, 1963) is a freshwater horizon of some 30 m in thickness and consisting of well sorted sandstone with carbonaceous mudstone and coal beds. The carbonaceous beds, although Permian in age, comprise the lowermost formation of the Upper Parmeener Super-Group (Forsyth *et al.*, in press); they are followed by up to 335 m of cross-bedded quartz sandstone interlayered with feldspathic sandstone and mudstone. No fossils have been found in this dominantly sandstone sequence although it is regarded as of Triassic age.

JURASSIC DOLERITE

Dolerite sills of Jurassic age occur disturbing the strata of the Parmeener Super-Group. Those appearing near the base of the Permian sequences are thin and lens-shaped, whereas the sills at higher stratigraphical levels are thicker and more continuous. The sill which forms part of Western Bluff and the south-eastern plateau was intruded into the Upper Parmeener Super-Group and is between 180 m and 300 m thick (Jennings, 1963). Dolerite is commonly quarried and crushed for road metal.

TERTIARY SYSTEM

Throughout the region there are large faults of pre-Tertiary age with north-westerly and west-north-westerly trends. The faulting together with extensive pre-Pertiary erosion has resulted everywhere in a marked sedimentational hiatus between Tertiary beds and the underlying rocks.

Small areas of Tertiary marine beds occur near the coast around the north-western region from Temma (CQ0633] to Wynyard [CQ9362]. Where they are present the marine layers are usually the lowest exposed Tertiary deposits extending at some localities to below present day sea-level. Around Marrawah [CQ0667] Tertiary limestone has yielded marine fossils of Upper Oligocene-Lower Miocene age (Banks *in* Spry and Banks, 1962, p. 233-236). Marine limestone has also been noted in the Montagu River 19 km west of Smithton [CQ4277]. The easternmost occurrence of marine beds on the mainland of Tasmania is near Wynyard where they consist of about 24 m of sandstone and sandy limestone which overstep older Tertiary basalt to rest unconformably on Permian strata. The beds near Wynyard are abundantly fossiliferous and the fauna recovered suggests a Lower Miocene age (Quilty, 1966).

Near Wynyard the marine beds are overlain by thin lacustrine clays and terrestrial quartz sands and gravels which are up to 60 m thick. The gravels have been extensively quarried in the Flowerdale-Calder area [CQ8555]. Basalt follows and in some localities attains thicknesses of more than 360 m (Gee, 1971; Gee and Gulline, in press). The basalt occurrences, a number of which have been exploited for road stone, are remnants of once extensive flows which formed lava plains. A volcanic centre, consisting of crinanite, occurs at Table Cape [CQ9366], and it is similar to the Nut at Stanley [CQ 5786]. Reconstruction of the pre-basalt topography shows considerable relief resulting, around Devonport [DQ4641], in no continuity of the layers of sediment between the deep leads (Burns, 1965). However, in post-basalt times terrestrial gravel and sand, which may be of Late Tertiary age, blanketed much of the country and remnants of these deposits are not uncommon.

QUATERNARY SYSTEM

The effects of Pleistocene glaciation are notable in the south-east of the Burnie Sheet. The region possesses erosional forms inherited from both montane and plateau-type glaciation (Derbyshire, 1968). In the Cradle Mountain [DP1384] area are fine examples of cirques, over-ridden cirques, rock basins and glacial troughs. The lakes on the Precambrian basement in this area range from those occupying small hollows gouged out by a plateau ice-sheet to larger lakes up to 60 m deep (*e.g.* Dove Lake [DP1387]), which occur in cirques and over-ridden cirques.

Pleistocene till covers much of the south-eastern plateau and the adjoining valleys and ranges. The surficial till is usually thin, unconsolidated and bouldery, with the larger fragments commonly of dolerite. An older consolidated grey till occurs at the Rowallan dam site [DP3579] on the Mersey River (Paterson, 1965), and till of a similar nature has been noted in the Arm River [DP2979] (Derbyshire, 1968). Erratic boulders have been recorded near Lake Lea [DQ1003] and on the Middlesex Plains [DQ1000] well beyond the limits of glacial till.

Glacio-fluvial deposits of unconsolidated, stratified silt and gravel are present in the Mersey River [DP3584], the Mackintosh River [CP9085] and the upper Pieman River [CP7677]. Glacio-lacustrine deposits occur in valleys throughout the glaciated region, and usually consist of rhythmically graded beds. About 28 m of rhythmite have been described in the Forth River [DP 2893] (Paterson, 1965).

Holocene deposits include extensive scree and talus formations which are developed on the northern slopes of the Western Tiers and around the margins of basalt plateaux, and basalt and dolerite capped hills throughout the region. Alluvial sand and silt are common in sections of the major rivers. Sand and gravel cover large areas near the coast and notable areas of sand dunes occur at the west coast and near Stanley [CQ5686]. On the coastal plains near Wynyard [CQ9362] up to 15 m of lagoonal sand, clay and gravel have accumulated, and evidence of the recession of the sea locally is seen in the beach deposits raised some 15 m above mean sea level at Sisters Beach [CQ7969].

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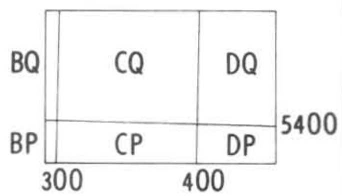

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