PAPERS AND PROCEEDINGS OF THE ROYAL SOCIETY OF TASMANIA, VOLUME 94

LOWER PALAEOZOIC UNCONFORMITIES IN SOUTH-WESTERN TASMANIA

By

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*Lyell-E.Z. Explorations**

(With 2 text figures).

INTRODUCTION

Recent geological work in south-west Tasmania on a regional scale has allowed the compilation of existing information regarding Lower Palaeozoic unconformities, namely the description of new localities and in some cases the amplification and extension of previously described exposures.

Carey and Banks (1954, p. 245) provide a review of information to 1954 and their classification of unconformities has been adopted in this paper. These are repeated here (op. cit. p. 264):

Tyennan Unconformity.—The Tyennan Unconformity may be defined as an angular discordance between pre-Dundas rocks below and the Junee Group above as revealed on the south-eastern slope of Tim Shea, at the head of Tyenna Valley. Stratigraphically it may be considered as the erosional surface in pre-Dundas rocks on which the Junee Group was deposited. The orogenic movements occurring within the span of time represented by this unconformity is referred to as the Tyennan Orogeny. This time is a minimum of that during which the Dundas Group was deposited (at least lower Upper Cambrian to upper Middle Cambrian, Opik, 1951*a*, 1951*b*). The base of the Junee Group (Owen type Conglomerate) indicates a Lower Canadian age (Opik, 1951*a*) so that the Tyennan Orogeny must precede this.

Stichtan Unconformity.—The Stichtan Unconformity has been defined as the angular discordance between the Carbine Group below and the Dundas Group above as revealed on the western flank of the Sticht Range and its southern continuation to a point east of Lake Dora in the West Coast Range. Stratigraphically the Stichtan Unconformity may be considered as the erosional surface on which the Dundas Group was deposited. It is an expression of orogenic movement of pre-upper Middle Cambrian age, followed by a period of erosion or non-deposition prior to the deposition of the Dundas Group. This movement is referred to as the Stichtan Movement of the Tyennan Orogeny.

I would suggest one minor modification to this definition by Carey and Banks in the substitution of "Precambrian" for "Carbine Group" at the beginning of the paragraph above. At the present time the term Carbine Group as a division of the Precambrian has never been sufficiently well defined to allow its use beyond the type area at Dundas.

Jukesian Unconformity.—The Jukesian Unconformity has been defined as the angular discordance between the Dundas Group below and the Junee Group above, as revealed at the northern end of Mt. Jukes, south of Queenstown. Stratigraphically this unconformity may be considered as the erosional surface of the Dundas Group on which the Junee Group was deposited. From the tectonic viewpoint it may be considered as the expression of an orogenic movement of post-lower Upper Cambrian but pre-Lower Ordovician age. This movement is referred to as the Jukesian Movement of the Tyennan Orogeny. Hills (1914, pp. 45) was the first to give a detailed description of an unconformity between the Junee and Dundas Groups. In the Mt. Sorell and Mt. Jukes area he describes an angular and a metamorphic discordance between the two groups and the presence of a basal breccia dervide from the underlying Dundas Group. Unfortunately the section described by Hills at the north end of Mt. Jukes (p. 45) and taken by Carey and Banks as their type locality for the Jukesian Unconformity is not an unconformity but a metamorphic contact (Bradley, 1954, p. 206 and Solomon, 1957, p. 35). There is no doubt that a tectonic break exists at the top of the Dundas Group in this area and the author would suggest the South Darwin peak as the type locality for this unconformity. Here the regional trend in the Dundas Group is north-south with a steep dip of 80 degrees to the west; it contains the Darwin Granite and associated magnetite-hematite mineralisation. The overlying beds consist of a thickness of Jukes Breccia containing angular particles up to 12 inches in length of the underlying Dundas Group, granite and magnetite-hematite, as originaliy described by Hills (1914, p. 43). This Breccia grades upwards into a more normal siliceous chocolate coloured pebble Owen Conglomerate. This well bedded Conglomerate is folded into a shallow syncline which plunges to the south at approximately 20 degrees with dips of up to 25 degrees on the east and west limbs. Thus in this area there is a structural discordance between the Dundas Group and Owen Conglomerate, with an intervening period of granite emplacement, hematite-magnetite mineralisation and erosion to form the basal Jukes Breccia.

Throughout, I have found it difficult not to use the terms pre-Dundas Group and Precambrian synonymously although it is realised that the oldest fossils so far found in the Dundas Group have only been dated as upper Middle Cambrian (Opik, 1951*a*).

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UNCONFORMITY BETWEEN JUNEE GROUP AND PRE-DUNDAS GROUP ROCKS

a. **Andrew River Area** (Mather, 1953, p. 15)

In this area the Dundas Group is absent and rocks correlated with the Owen Conglomerate, which is overlain by the Gordon Limestone, rest directly on the Precambrian (Fincham Group, see Table I). The actual contact between the Owen Conglomerate and the Fincham Group has only been observed in one stream section. In this section coarse grained Owen Conglomerate overlies a pinkish coloured quartz schist of the Fincham Group. The rocks on either side of the boundary have comparable attitudes. Along the regional strike to the north-west at about 1200 feet distant part of the base of the Owen Conglomerate is exposed. It consists of a coarse grained breccia conglomerate which contains angular and rounded fragments of quartz and white micaceous quartzite up to nine inches in size. The particles of micaceous quartzite are considered by Mather to have been derived from the underlying Fincham Group and to indicate erosional unconformity. Mather also considered the marked decrease in the stratigraphic thickness of the Fincham Group as it is traced along strike to the south-east to be due at least in part to erosion which took place between the late Precambrian and the deposition of the Owen Conglomerate (Lower Ordovician). The apparent conformity as expressed by the similar attitudes of the two is considered to be due to the shallow dip of the Precambrian in this area at the time of the deposition of the Owen Conglomerate. This would suggest broad folding of the Fincham Group prior to the deposition of the Owen Conglomerate; later folding has produced the present steep attitude of these sediments.

b. **Mt. Fincham Area** (McLeod, 1955, p. 13)

Similar conditions apply here as in the Andrew River area. The actual contact betwen the Owen Conglomerate and the Fincham Group was only seen in one place. Here breccias and conglomerates striking 100° and dipping 50° to the south occur within twelve inches of a purple quartzite of the Fincham Group whose strike varies from 090 to 120° with a dip of 70 to 80° to the south. At a number of other places rocks on either side of the contact were farther apart and the evidence for a structural unconformity between the Owen Conglomerate and Precambrian is less conclusive owing to the variable dips which occur in the latter.

A correlate of the Jukes Breccia was seen, occurring as half a dozen loose blocks which contained a predominance of rock particles up to three inchs in size but with some to six inches. The fragments include massive and schistose quartzites, micaceous schistose quartzites, and some reddish massive quartzite.

McLeod concludes that usually the strike of the Owen Conglomerate and older rocks is similar and that the unconformity is shown by a steeper dip of about 20 degrees in the latter rock. He suggests (p. 14) that part of the Owen Conglomerate was deposited around a hill or island of quartzites in the Lower Ordivician topography.

TABLE I.

Lower Palaeozoic Stratigraphy

Gordon Limestone Florentine Valley Mudstone Caroline Creek Sandstone Owen Conglomerate Jukes Breccia	JUNEE GROUP
	DUNDAS GROUP

Precambrian Stratigraphy—Frenchman's Cap Area

(after McLeod, 1955 and Spry, 1957)

Groups	*Grade of Metamorphism*
Fincham Group	Chlorite zone
Franklin Group	Garnet zone
Mary Group	Chlorite zone
Joyce Group	Garnet zone

c. **Elliott Range**

The Tyennan unconformity at the north end of Elliott Range was originally described by Carey and Banks (1954, p. 255). The unconformity is well exposed in a near vertical cliff section and consists of well bedded white quartzites and pebble conglomerates (Owen Conglomerate) which overlie Precambrian siliceous schists.

d. **Sprent River**

The exposures north and south of Sprent River indicate a broad anticlinal structure with a central portion of metaquartzites and siliceous schists and margins of quartz pebble conglomerate and sandstones which have been correlated with the Owen Conglomerate. The latter sediments form the prominent cuesta of Sprent Ridge which is immediately to the north of the Sprent River. On the western margin the strike of the Precambrian and Owen Conglomerate is comparable but with the suggestion of a steeper dip in the former sediments. On the eastern margin the Owen Conglomerate trends nearly north-south with the Precambrian horizons trending east-west. The overall structure can be best explained by an anticline in existence prior to the deposition of the Conglomerate with refolding after their deposition about an axis some one to two miles to the west of the previous one.

The above descriptions allow the establishment of an unconformity between the Junee Group and pre-Dundas Group rocks for a distance of 35 miles, from the north end of the Engineer Range (Mt. Madge) southwards to Mt. Lewis.

e. **Warnes Lookout** (Wells, 1955, p. 5)

The Owen Conglomerate has an irregular boundary with the underlying schists. The contact itself is not clearly visible and the possibility of a faulted

contact cannot be entirely discounted, especially on the western margin of this outlier of Conglomerate. However, on the eastern margin Wells states the existence of a breccia which contains angular fragments up to eight inches in length which he possibly correlates with the Jukes Breccia. Photogeological interpretation would place faults along the northern, western and southern margins of the outlier but the eastern contact with the underlying rocks is irregular in outline.

On this basis a Tyennan unconformity can be inferred at Warnes Lookout.

f. **Loddon River—Calder Pass**

Ward (1909, p. 50) described an unconformity in the Loddon River valley. The upper group of sediments, Ward's "pebbly conglomerate beds" and "tubicolar sandstone", are now known to be part of the Junee Group which rests directly upon the quartz mica schists of the area. Ward evidently noted this unconformity in more than one location for he writes:

> "The several members of this sedimentary series (Junee Group as above—author) rest directly upon the quartz-mica schists in every case which was observed, and there is a marked unconformity at the junction with the foliated rocks".

Later in this same report Ward (p. 34) describes the same unconformity further to the south, at Calder Pass. He writes:

> "The northern branch of the pass follows the line of junction between the tubicolar sandstone and the mica schists which constitute the eastern foothills of the Frenchman's Cap".

Finucane and Blake (1933) also recognised this unconformity from the South Loddon River where the basal members of their Silurian rocks could be seen resting unconformably on the Precambrian schists. At the base of these younger rocks they describe the presence of a coarse breccia-conglomerate which consists of "angular and rounded pebbles of quartz and quartzitic schist set in a highly siliceous ground mass; the schist pebbles are identical with the quartzitic schists of the Precambrian rocks and have doubtless been derived from them".

Wells (1955, p. 5) in discussing the geology of the Calder Pass describes "white silicified conglomerate containing pebbles of quartz of the order of one cm. diameter", which underlies the tubicolar sandstone. Although he did not examine the base of this Owen type conglomerate he considers it likely that an unconformity exists between these sediments (Junee Group) and the Precambrian rocks of the area.

A compilation of the work of Ward, Finucane and Blake, and Wells and using this as a basis of photogeological interpretation of the area has outlined a basin of 20 square miles of Palaeozoic rocks which rest directly on Precambrian, situated between the Loddon River and Calder Pass. Its north and south extremities appear to be primarily in faulted relationship with the Precambrian but the eastern and western edges of the basin would be the localities to seek the unconformity. It is the western edge which is described by Ward and Finucane and Blake.

g. **Bubbs Hills (16 miles east of Queenstown)**

Gould (1860, p. 12) was the first to be aware of the unconformity between the "Lower Palaeozoic rocks" and "metamorphic schists" in this general area.

Carey and Banks (1954, p. 255) infer an unconformable relationship between the Junee Group and pre-Dundas strata at Bubbs Hill. Recent mapping supports these previous observations (and those of Ward, 1908, p. 35 and map facing p. 44) of flat lying Gordon Limestone (capped by white Crotty Quartzite) which probably lies directly on contorted and steeply dipping Precambrian schists. Mapping approximately two miles to the north-east of Bubbs Hill established the presence of white fossiliferous quartzites (these were correlated with Crotty Quartzite on lithological grounds) which appear to directly overlie the Precambrian schists of the area. The Precambrian and Junee Group rocks both trend east-west but the former dip to the north at 60 to 80 degrees whilst the latter have a flatter dip, usually less than 45 degrees to the north. Thus although no actual erosion surface was exposed a Tyennan Unconformity can be said to exist, with some confidence.

h. **Mt. Arrowsmith** (Carey and Banks 1954, p. 257; Ward 1908, p. 37, and 1909, p. 32)

Two exposures of an unconformity between Owen type conglomerate and Precambrian siliceous schists were described by Ward (1908, 1909) on the summit of Mount Arrowsmith.

> "On the north-western portion of the summit of Mount Arrowsmith, and 1600 feet above the Franklin River Bridge, there is left an undenuded portion of a sedimentary basin, the full extent of which is not now clear. The strata consist of bedded shales, sandstones, and fine grained conglomerate which dip at an angle of five degrees to the west. The sandstone contains some imperfectly preserved impressions of brachiopods, which are probably of Silurian age. At this place the area covered by the sediments is very small, and fills a hollow in the hard quartzitic schist, to the endurance of which it owes its preservation. The rest of the summit of Mount Arrowsmith is wholly of the white foliated quartz schist".

Later on the same page Ward describes another unconformity on the east side of Mount Arrowsmith.

> "A low hill on the northern side of the Linda Track proved to be composed of medium-grained quartzite. In all respects this quartzite resembles very closely the reddish quartzite which is associated with the West Coast conglomerate. The dip is north-westerly, at an angle of 40 degrees. This formation rests upon a floor of quartzite schists . . .".

In the report for 1909 (p. 32) Ward describes this latter occurrence as resting unconformably upon the Precambrian schists.

i. **North End of Denison Range** (Carey and Banks, 1954, p. 257; Twelvetrees, 1908, p. 30)

Twelvetrees (1908) walked from the Rasselas Valley, with its occurrence of sediments of the Junee Group, westwards into the north end of the Denison Range, to Lake Curly, and beyond.

> "About a mile west of this the schist country is entered. The general strike of the strata now alters. Previously it was west of north (in the Rasselas Valley—author); now it is east of north, and this was a stable character as far west as we went. There is thus a strong unconformity between the Precambrian and the Cambrian strata".

Twelvetrees travelled as far west as the Prince of Wales Range. The Cambrian strata are now known to consist of the Owen type conglomerate, Gordon Limestone and the younger, Eldon Group, rocks of the Rasselas Valley and general Florentine River area.

> "At the junction of the systems . . . is a . . . breccia of large, angular stones of quartz and quartz schists, which is situated between the upper members of the schist and the basal sandstones of the conglomerate series".

This breccia corresponds to the Jukes Breccia. Approximately five miles to the north of Twelvetrees east-west traverse on the south side of the lower Gell River valley, a marked structural discordance is apparent between the Junee Group and underlying Precambrian schists. The structures are quite clear on the aerial photographs. The Owen type conglomerate (apparently now thinner than to the south) and overlying Gordon Limestone swing from a general strike of 345 degrees in the Rasselas Valley to 285 degrees in the Gell River Valley. The general dip to the north-east is maintained at both localities. The Gell River here marks the northern end of the Denison Range; at this northern termination the Precambrian schists of the Range maintain their regional strike of 020 to 030 degrees and plunge beneath the 285 degree trend of the overlying Junee Group.

j. **Tim Shea** (Carey and Banks, 1954, p. 252; Twelvetrees, 1908, p. 27 and 1909, p. 27)

Carey and Banks describe the unconformity which exists at Tim Shea between Owen type conglomerate and underlying Stephens Dolomite. The crest of Tim Shea is composed of Owen type conglomerate and quartzite which strike north-east and dip to the north-west at a shallow angle of about 15 degrees. The underlying Dolomite strikes north-west and dips at a steep angle to the north-east (70 to 80 degrees). Between the two a conglomerate exists which consists of particles of the underlying Dolomite.

This is the type locality for a Tyennan Unconformity.

The map on page 249 of Carey and Banks shows that the direction of folding in the Precambrian here is nearly N.N.W. whilst that in the overlying Junee Group is N.N.E. to north.

k. **Mt. Hopetoun** (Carey and Banks, 1954, p. 261; Stephenson, 1954, p. 151)

Mt. Hopetoun is six miles north-east of Federation Peak. The unconformity described by Stephenson at Mt. Hopetoun and correlated by Carey and Banks as possibly Tyennan is now most suspect. Recent photogeological work and regional considerations make it highly probable that the siliceous pebble conglomerate described by Stephenson is a Precambrian unit and not an Owen-type conglomerate of Ordovician age. This unconformity between conglomerate and underlying schist would then be placed within the Precambrian.

l. **Wedge River Valley** (Carey and Banks, 1954, p. 261 and Twelvetrees, 1909, p. 29)

On the basis of a regional compilation and photogeological interpretation of the general Adamsfield area the unconformity in the Wedge River Valley, provisionally correlated as Tyennan by Carey and Banks, is suspect. The determination of this point must await a more adequate definition of the age and structure of the sediments of the area between the Ragged and Junction Ranges (Denison Plain).

UNCONFORMITY BETWEEN DUNDAS GROUP AND PRE-DUNDAS GROUP ROCKS

a. Point Hibbs-Macquarie Harbour

The relationship in this area is complicated by the major faulting which is strongly suspected to be present along the contact of the two and by a belt of ultra-basic rocks which occurs along this eastern boundary from Point Hibbs to Macquarie Harbour. However, between Birch and Point Hibbs the direction of folding in the Dundas Group is N.W.-S.E. whilst immediately to the west of this in the Precambrian the regional strike and direction of folding is N.N.E. On this basis an unconformity between the two can be inferred.

b. Adamsfield

At Adamsfield the occurrence of the serpentinite and overlying shales and conglomerate which consists entirely of particles derived from the serpentinite has been described by Carey and Banks (1954, p. 26). These sediments in turn are overlain by Owen type conglomerate. The age of these shales has recently been determined by Opik (pers. comm. M. R. Banks, 1959) who suggests that these rocks could be middle Uper Cambrian, thus placing the underlying unconformity as Stichtan. This exposure is approximately one mile east of the post office at Adamsfield, immediately north of the track. The base of the Palaeozoic/original top of the ultrabasic is also exceptionally well exposed at approximately one mile to the north of the former locality, on the south side of Hopper Creek.

The dating of these sediments has had the important corollary of placing the intrusion of the associated ultrabasic as being older than previously thought and as taking place prior to or during the deposition of the Dundas Group.

c. **Rocky Boat Harbour-Prion Bay** (Blake, 1938 and Banks, 1959)

Banks (1959) gave the first description of a probable Stichtan Unconformity in this area. The tough, grey dolomite with a trend of 010 degrees and an almost vertical dip is unconformably overlain by a sequence of polymictic conglomerates with minor siltstone and sandstone beds. Among other rock types the conglomerate contains particles of the underlying dolomite, and serpentinite. This sequence is in turn overlain by Owen type conglomerate. These rocks above the dolomite trend north-easterly and dip at angles of less than 45 degrees.

The dating of a similar unusual rock assemblage at the base or below the Junee Group at Adamsfield (page 106) as probably middle Upper Cambrian makes it probable that the assemblage here is also of a similar age. If this is correct the unconformity can be related to a Stichtan Unconformity.

UNCONFORMITY BETWEEN JUNEE AND DUNDAS GROUPS

Usually in S.W. Tasmania the contact between the Owen Conglomerate and underlying Dundas Group has been complicated by major faults. Thus whilst structural discordances between the two may be apparent (e.g. at the D'Aguilar range) this could as well be due to faulting as to an unconformity, or a combination of the two.

a. **Mt. Jukes, Mt. Darwin, Mt. Sorell**

As already described on page 1, Hills (1914, p. 43) was the first to describe in detail a Jukesian Unconformity. His work has been largely confirmed by later workers as Bradley (1954, 1956) and Solomon (1957).

b. **Adam River**

Nye (1929, p. 10) inferred an unconformable relationship between the Owen type conglomerate of the Ragged Range and the underlying sediments exposed in the Adam River which were described by him as Cambrian in age. On lithological and structural grounds these latter sediments can be tentatively correlated with the Dundas Group. This correlation is supported by the recent dating of the sediments underlying the Owen type conglomerate at Sawback Range at Adamsfield as probably middle Upper Cambrian in age.

The conglomerate of the Ragged Range has a regional trend of 195 degrees and a dip of 45 to the east. The underlying sediments exposed in the Adam River below the falls are interbedded red and brown mudstone, light green and purple shales with red, cream and light-green coloured chert bands which trend 150 degrees and dip at 60 degrees to the east. On this basis an unconformity could be inferred between the two types of sediments but their actual contact at the Adam Falls is considered to be a faulted one.

c. **Prion Bay; Rocky Boat Harbour and Prettys Point**

Banks (1959) inferred an unconformity between the north-east trending Caroline Creek sandstone on the east side of Prettys Point and a south-east trending sequence of serpentinous conglomerates, sandstones and claystones further to the west. Elsewhere on the east side of Prion Bay these latter sediments underlie Owen type conglomerate. These serpentinous conglomerates, &c., resemble those at Adamsfield further to the north, as already described above. These former sediments at Adamsfield have been dated as probably middle Upper Cambrian thus making it possible that the same unusual rock assemblage at Rocky Boat Harbour is also Upper Cambrian.

Owing to the thickness of the bush in this area the critical area which is the coast line immediately to the west of Prettys Point could not be reached. A photogeological interpretation of this area indicates that the angular relationship described above is clear-cut and the possibility of it being due to a sharp swing in strike is considered to be remote.

PALAEOGRAPHIC IMPLICATIONS

The implications of the three types of unconformity have already been outlined by Carey and Banks (1954, p. 265).

It is clear that the areas containing a Jukesian Unconformity received Dundas Group sedimentation, followed by Jukesian Movement, erosion and deposition of sediments of the Junee Group. The deposition of this Group began with the Jukes Breccia and coarse grained Owen conglomerate type of sedimentation as seen in the West Coast Range and the Sawback and Ragged Ranges at Adamsfield. It is most probable that progressively younger formations of the Owen type conglomerate overlapped the older which would be a corollary of a transgressive early Ordovician sea. It is to be noted that the transgressive sea would make the basal breccia-conglomerate of the Junee Group (Jukes Breccia-Conglomerate) transgressive in time, that is the correlate of the Jukes Breccia at Warnes Lookout and similar areas would probably be younger than the corresponding rock type at, say, Mt. Jukes or Mt. Darwin. As the sea transgressed, the land area between the two main basins of deposition at Adamsfield and on the West Coast would finally be completely reduced and either submerged or aproaching a peneplain. Sedimentation continued with deposition of the Caroline Creek Sandstone and the Gordon Limestone.

The structural discordances illustrated by the Stichtan Unconformity described above demonstrates that the pre-Dundas Group rocks were folded prior to the deposition of this Group. This direction of folding would appear to have been largely north-south although it is difficult to remove the effects of later orogenic movements from the pre-Dundas Group rocks in the absence of detailed structural studies. Later folding (post Lower Ordovician) was either approximately parallel to the existing axes (as at Sprent River) or discordant to it, as at the Tim Shea and Gell River localities.

A major problem is whether sediments of the Dundas Group were ever deposited on areas showing a Tyennan Unconformity. Sedimentation in the Dundas Group apears to thin rapidly towards these areas but two interpretations are possible. Either the Tyennan areas received a cover of Dundas sedimentation which was stripped off in the

ensuing Jukesian Movement to completely expose the underlying pre-Dundas rocks, or the Tyennan areas were emergent during this period. In my opinion a choice cannot yet be made between either alternative. A thin cover of Dundas sedimentation could have been deposited on the Tyennan areas—the thinning of these sediments towards the Tyennan areas could just as well be due to an erosional effect of the Jukesian Movement as a deposition thinning; there is no conclusive evidence yet available on this point.

References

BANKS, M. R., 1956.—The Dundas Group (Middle and Upper Cambrian Series) and its Correlates in Tasmania. *XXth Int. Geol. Congress, Cambrian Symposium.*

————, 1957.—Stratigraphy of Tasmanian Limestone. *Tas. Dept. of Mines. Geol. Surv. Min. Res. No.* 10.

————, 1959.—Preliminary Summary of the Geology near Rocky Boat Harbour, Southern Tasmania. *Unpublished Report to Lyell-E.Z. Explorations, Queenstown, Tasmania.*

BLAKE, F., 1936.—District between Jane River and Prince of Wales Range. *Tas. Dept. of Mines Unpublished Report.*

————, 1937.—Report on Geological Reconnaissance of Surveyor and Prince of Wales Range. *Tas. Dept. of Mines Unpublished Report.*

BRADLEY, J., 1954.—Geology of the West Coast Range of Tasmania. *Proc. Roy. Soc. Tas.*, Vol. 88, pp. 193-240.

CAREY, S. W. AND BANKS, M. R., 1954.—Lower Palaeozoic Unconformities in Tasmania. *Pap.* N *Proc. Roy. Soc. Tasm.*, 1954, p. 245.

FINUCANE, K. J. AND BLAKE, F., 1933.—Country between West Coast Road and Jane River. *Tas. Dept. of Mines Unpublished Report.*

GOULD, C., 1860.—Report on the Exploration of the Western Country. *Leg. Council Paper No.* 6, *Tasmania.*

HILLS, C. L., 1914.—The Jukes Darwin Mining Field. *Tas. Dept. Mines. Geol. Surv. Bulletin, No.* 16.

MATHER, R. P., 1955.—Geological Report on 10 Kiloyard Sheet 3778, The Andrew River Area. *Unpublished Report of H.E.C., Tasmania.*

MCLEOD, I. R., 1955.—The Geology of the Mt. Fincham Area, Map Square 3780. *Unpublished Report of H.E.C., Tasmania.*

NYE, P. B., 1929.—The Osmiridium Deposits of the Adamsfield District. *Tas. Dept. of Mines Geol. Surv. Bulletin No.* 39.

OPIK, A. A., 1951*a*.—Notes on the Stratigraphy and Palaeontology of Cambrian, Ordovician and Silurian Rocks in Tasmania. *Bur. Min. Res. Geol. & Geophy. Rec.* 8, 1951-55.

————, 1951*b*.—Cambrian Fossils from Leven Gorge, Northern Tas. *Bur. Min. Res. Geol. & Geophy. Rec.* 1951-59.

————, 1959.—In letter from M. R. Banks, Geology Dept., University of Tasmania, to G. F. Hudspeth, Mt. Lyell Mining & Railway Co. Ltd., Queenstown, Tasmania.

SOLOMON, M., 1957.—Geology of the West Coast Range from Mt. Sedgwick to South Darwin. Unpublished Report to Mt. Lyell Mining & Railway Co. Limited, Queenstown, Tasmania.

SPRY, A. M., 1957.—Precambrian Rocks of Tasmania, Part II, Mount Mary Area. *Proc. Roy. Soc. Tasm.*, Vol. 91. p. 95.

STEPHENSON, J., 1954.—An unconformity in South-West Tasmania. *Proc. Roy. Soc. Tasm.*, Vol. 88, pp. 151-152.

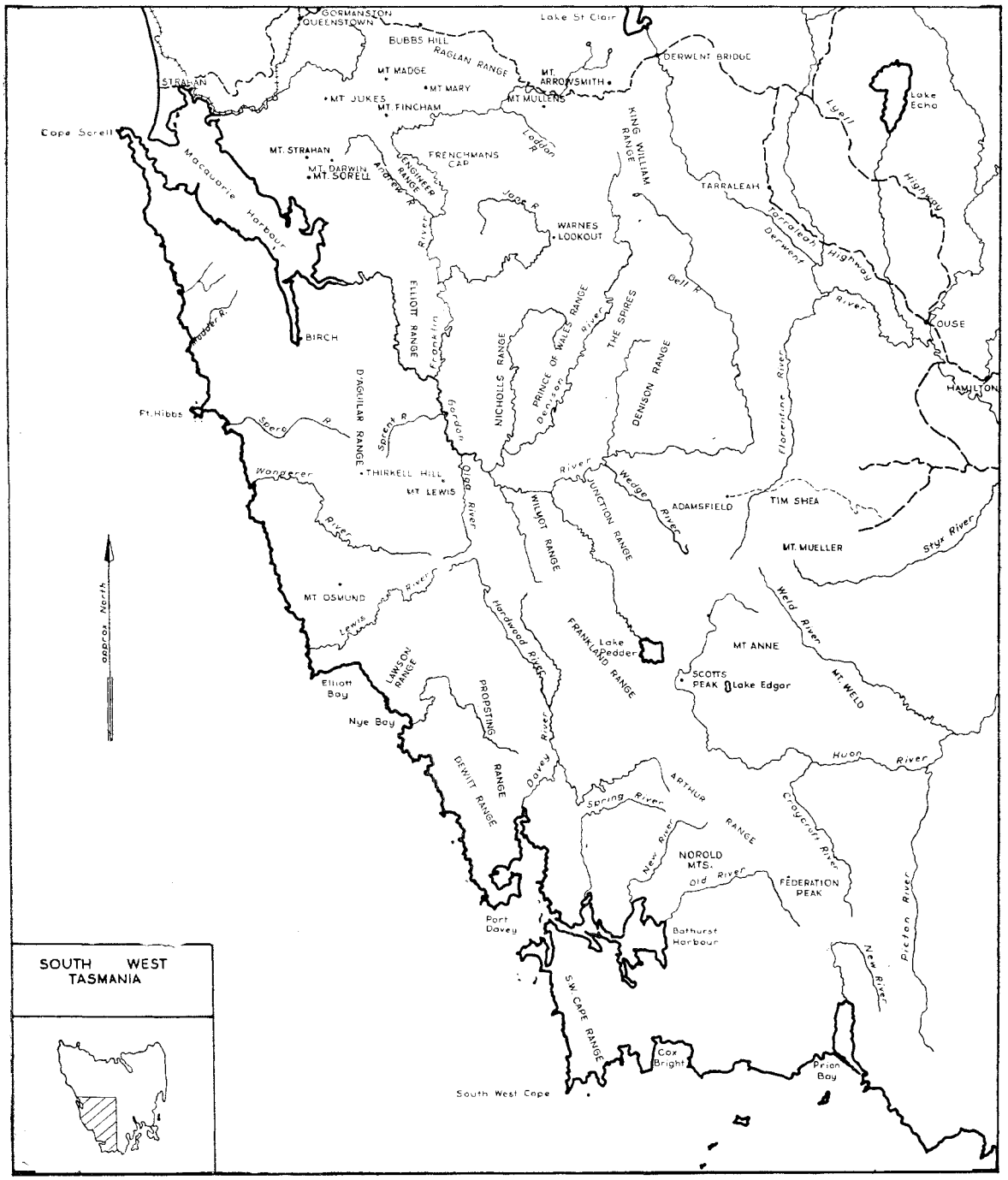
TWELVETREES, W. H., 1908.—*Tas. Dept. Lands & Surveys Annual Report*, 1907-1908, pp. 28-32.

————, 1909.—*Tas. Dept. Lands & Surveys Annual Report*, 1908-1909, pp. 25-31.

WARD, L. K., 1908.—*Tas. Dept. Lands & Surveys Annual Report*, 1907-1908, pp. 33-39.

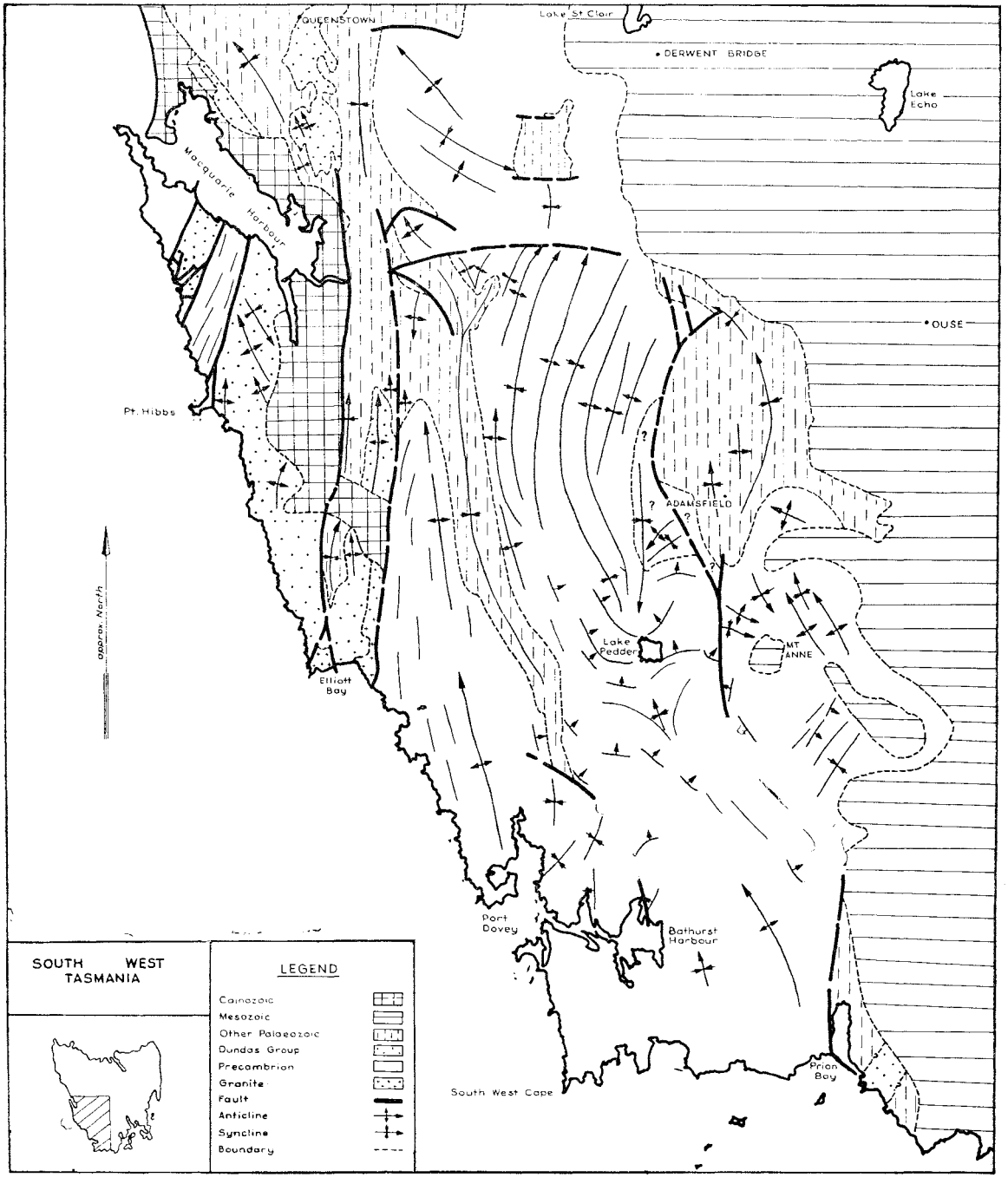
————, 1909.—*Tas. Dept. Lands & Surveys Annual Report*, 1908-1909, pp. 31-35.

WELLS, B., 1955.—Report on the Geology of Map Square 3978 and parts of adjoining squares 3878 and 4078. *Unpublished Report of H.E.C., Tasmania.*



Scale: 16 miles to 1 inch.

FIGURE 1.—Location Plan of S.W. Tasmania.



Scale: 16 miles to 1 inch.

FIGURE 2.—General Geology of S. W. Tasmania.