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PROGRESS REPORT ON REGIONAL GEOLOGICAL SURVEY OF THE PORT DAVEY—COX BIGHT AREA

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Introduction

The Regional Geological Survey of the Port Davey-Cox Bight Area started in October, 1954, and has proceeded to the present date. The boundaries of the area were defined by the then Director of Mines, Mr. W. H. Williams as follows:—

> " Starting from New River Lagoon along the South Coast to South West Cape and thence north along the West Coast through Port Davey up to 43° 7′ 30″ latitude south and thence along the above parallel to Arthur Ranges, just below Mt. Hayes and then along the western parts of the Arthur Ranges via New River to New River Lagoon, the point of commencement, a total area of approximately 850 square miles."

At present the south-west part of the area, approximately 230 square miles in extent, bounded as follows, has been more or less completed:—

Starting from Port Davey proceeding along the Channel to East Bathurst Harbour, along Moulter Cove, Ray River, Cox Bight-Red Point, thence along the South Coast to South West Cape and then north along the West Coast to Port Davey, the point of commencement.

The area is divided into 11 map squares each 10,000 yards square.

To facilitate the Regional Geological Survey of the Port Davey-Cox Bight area, maps on the scales of 20 chains to the inch and of one mile to the inch have been produced. These have been prepared by the Drafting Section of Mines and are based on aerial photographs and information obtained from old surveys and from surveys done by Robinson in June, 1955.

As geological surveys and mineral investigations continue, new topographical maps of the remaining area will be produced.

Access

Access within the Port Davey-Cox Bight area is limited to waterways, tracks and occasionally to landing strips on the beaches.

Port Davey, Bathurst Channel, Bathrust Harbour-Melaleuca Inlet, Long Bay and Moulter Cove are the main waterways navigable for all fishing craft. Port Davey is navigable for all ocean-going vessels. The Mines Department establishment on Melaleuca Inlet and King's leases on Moth Creek can be reached by fishing craft through Port Davey, the Channel, Bathurst Harbour and Melaleuca Inlet.

Inland areas can be reached from Bathurst Harbour by rivers, inlets, and by tracks cut by T. B. Moore and A. Marsden in the early part of this century.

At present the only track in regular use is the eight mile track connecting Cox Bight with Melaleuca Inlet.

In the year 1955, by arrangement with the Government, D. King started building an airstrip at Moth Creek. This should be completed by the end of 1957.

Topography

The main drainage of the northern part of the south-western area under review is effected by the four rivers, namely the Davey River, Spring River, North River and the Old River, all flowing to the south. The southern part of the area is in part drained by three smaller streams, Melaleuca Creek, Moth Creek, and Ray River, which flow in a northerly direction. With the exception of Davey River and Spring River, all these streams enter Bathurst Harbour. Davey River empties into Payne Bay and Spring River into Spring Bay, an offshoot of Bathurst Channel.

The extreme south of the area is drained by streams flowing south to enter the sea. Of these, the most important is Louisa River which enters the sea at Louisa Bay on the south coast.

With regard to the land forms, the chief features of the south west area are the South-West Cape Ranges (2600 ft.), New Harbour Range (1680 ft.), Bathurst Range (2600 ft.), Ray Range (2800 ft.), Spero Range (2000 ft.), its northern prolongation—the Norold Mountains (3000 ft.)—and the Iron Bound Range (4000 ft.). In the north-western part of the area are the Mt. Rugby Range (2520 ft.), Mt. Berry Range (2132 ft.) and De Witt Range (2800 ft.).

Most of the plain-like country in the area is confined to the areas adjacent to the rivers and to Bathurst Harbour. Coastal plains occur in the vicinity of Cox Bight, New Harbour and Louisa Bay.

The topography has been modified to a certain extent by the "Pleistocene" glaciation. Evidence of glaciation can be seen at the Norold Mountains with their glacial debris. Widely scattered "conglomerate" is the most obvious relic of this glaciation. The land forms do not show any rejuvenation as is the case, for example, in the Zeehan-Rosebery district, but just the reverse—there is evidence in many places that the land has actually subsided in recent geological times.

Vegetation

Vegetation in general shows a direct relationship to the rock types. The quartz and quartzites outcropping over the major part of the south-west are barren, except for a few valleys and gullies which are timbered with mixed eucalypt types almost always associated with Bauera scrub. The "fluvioglacial" plains support only button grass. In the schists, shales, sandstones and softer type of conglomerate zones, we find the typical west coast rain forest with its myrtles, eucalypts, leatherwood, occasional blackwood and wattle. Generally the west, south and north of the area are barren. Major vegetation is confined to the eastern parts of the area.

Mineral Occurrences.—In the Port Davey-Bathurst Harbour-Cox Bight area.

Within the boundaries of the area under investigation the only mineral occurring in commercial quantities is tin. The recently discovered wolfram at Buoy Creek may become an economic proposition but requires further investigation.

Tin occurs as cassiterite in the alluvials and fluvioglacials of the three main tin fields, namely the Cox Bight, the Ray River and the Moth Creek. These tin fields have been described previously by former Government Geologists: W. H. Twelvetrees, "Report on Cox Bight Tin Field", dated 5th December, 1906; P. B. Nye, "Report on Cox Bight Tin Field", dated 2nd February, 1927; A. McKintosh-Reid, "Report on Cox Bight Tin Field", dated 22nd May, 1928; and by M. Z. Stefanski, "Report on Tin Deposits of the South-West", dated 22nd July, 1957.

During recent geological investigations at Cox Bight the writer noticed tin, associated with quartz and quartz mica veins, in three different formations, i.e., in the schists, quartzitic sandstones and quartzitic schists, as well as in the granites. As the Cox Bight, Moth Creek and Ray River tin fields have already been well described by the previous writers, it is not proposed to re-describe them in full in this report.

Sphalerite, antimony and galena are found in small quantities, in association with tin, in quartz veins and veinlets exposed over distances of 60 to 70 feet in the workings of D. King at Moth Creek.

Pyrites, not in situ, is found along the beach approximately a quarter of a mile south of Kandall Creek on the eastern shore of Hannant Inlet. Smoky quartz occurs in the same area. Pyrites is also found in the black schists from upper Window Pane Creek and in small veins in the schists and quartz veins of the Black Bluff (East Cox Bight) schist formation.

Copper pyrites occurs in black schists along the eastern shore of Bathurst Harbour Island Bay on Fairytale Head. It is a small deposit of no economic value.

Tin, in small quantities, has been found along the plains on both sides of Melaleuca Inlet, up to Bathurst Harbour's southern shores. It has been found also in association with small amounts of molybdenite in a creek at Wilson Bight.

Wolfram was recently discovered by the author close to the confluence of Billi Archi Creek and Buoy Creek and in the adjoining hills. The wolfram occurs over an area approximately three-quarters of a mile long and nearly a quarter of a mile wide in quartz veins occurring in quartzites interbedded with thin greenish schists trending north north-east. Further investigation is necessary to assess the value of this wolfram deposit.

Molybdenite has been found as thin veinlets and specks in minute quantities in the quartz veins of the granites at Cox Bight.

Stratigraphy

South-West Tasmania is built chiefly of probable Precambrian and Cambrian (?) rocks. These systems have been divided into several groups, but there is often some overlap of the stratigraphic formations that comprise these groups. The unfossiliferous Precambrian rocks are the metamorphosed and deformed siliceous and aluminous sediments outcropping over the major part of the south-west. They underlie disconformably the sandstone conglomerates along the Channel and South Bathurst Harbour.

Lithology and structures have been taken into consideration in correlation of the various stratigraphical formations. The groups will be discussed in order from oldest to youngest.

1. Red Point Group

This is defined as that group of schists, quartzites, schistose sandstones, hornblende-zoisite schists and black schists outcropping between Red Point and Contact Bay. It is divided into three formations: the Red Point, East Cox Bight and Ketchem Bay Formations.

(a) **The Red Point Formation.**—Proceeding westwards from Red Point there are approximately 2000 feet of quartz-mica-garnet with almandine-schists intruded by hornblende-zoisite schists. The lower limit of the formation is not known. The schists with garnets up to quarter inch in size are interbedded with lenses of greyish-yellow quartzites. These rocks are typical products of medium grade metamorphism. In some places (e.g., Red Point itself) they have been discoloured reddish or yellowish by weathering of biotite, which released oxides of iron.

(b) **East Cox Bight Formation.**—Higher stratigraphically and westwards geographically, the lustrous, coarse, mica-garnet formation passes into the East Cox Bight Formation of medium grained quartz-mica-biotite-garnet schists, interbedded with lenses of schistose sandstone and quartzites. In weathered and decomposed rocks, the smaller garnets are often limonitised. This formation is of the order of 300-400 feet thick and passes into—

(c) **Ketchem Bay Formation** of dark greenish-grey and black schists (mica-biotite and graphite schists and phyllites) 200-300 feet thick. At Contact Bay this formation passes conformably into the so-called **Quartzite-Argillite Formation** (Contact Bay-Bridge Point) of Contact-Zebra Bay. Approximately half a mile north-north-west of Black Bluff, the Ketchem Bay Formation passes through grey and light-grey mica-sericite schists into the " Quartzite-Argillite " Formation.

The Red Point (Contact Bay) Group could be correlated lithologically with the middle and upper parts of Spry's Joyce Group and the lower and middle parts of his Franklin Group.

Rocks similar to the East Cox Bight Formation have been found and reported from Elphinstone to Earl Point (Port Davey). The same formation is well exposed from Black Bluff to Boat Harbour where it has a thickness of several hundred feet.

The Ketchem Bay Formation is recognised immediately west of Black Bluff and Boat Harbour. It has been traced along the N.N.E. trending ridge from Black Bluff through Buoy Creek to Upper Lenna Creek, where there are biotite, muscovite and cordierite schists and then in Cascade and Ambrose Creeks, where the schists contain chiastolite. Similar rocks are known from the central north-eastern part of Moulter Cove, north of Fulton Bay, Dixon Bay, along the south-western entrance to Horseshoe Inlet, from Wilson Bight, Ketchem Bay and Hidden Bay.

The abovementioned rocks are probably lateral variants of one another as their stratigraphical relationship to the overlying rocks is almost constant.

2. Wilson Bight Group

This group consists of two lithologically different rocks, namely phyllites and schists, from the Ketchem Bay Formation of the Red Point Group and mica-sericite schists, slates, argillaceous sandstones, shaly sandstones, phyllites, quartzitic schists and quartzites (light-yellow colored) from the Contact Bay-Bridge Point Formation of the Wilson Bight Group, and quartzitic schists and quartzites of the South-West Cape Ranges Formation.

The Contact Bay-Bridge Point Formation has been called by the writer a **Quartzite-Argillite Formation** on account of its lithological composition. The thickness of the formation is 700-800 feet. The immediately overlying quartzites, sugary quartzites and massive quartzites range in thickness from a few feet to over 400 feet.

This Contact Bay-Bridge Point Formation and the South-West Cape Ranges Formation of the Wilson Bight Group could probably be correlated, on lithological grounds only, with the upper part of the Franklin Group and with the whole of Spry's Mary Group. The middle and upper formations of the Wilson Bight Group show only low grade metamorphism and much less deformation.

The lower part of the Contact Bay-Bridge Point Formation consists usually of light coloured quartz schists, light to dark-grey, fine-grained, soft, lustrous phyllites, with strong cleavage, generally parallel to bedding which is rather poorly developed. The phyllites are often crenulated with white quartz lenses along the cleavage. It is very likely that the quartz schists have been formed by silicification of phyllites, as they are not persistent and disappear rapidly along the strike. There is a possibility that some of the massive quartzites and quartz schists may have resulted from silicification.

There are also argillaceous sandstones and quartzites interbedded with slaty phyllites and thin beds of mica-sericite schists. Sandstones are chiefly micaceous and in some places show ripple marking.

A porphyritic dolerite (hornblende lamprophyre) intruded the Ketchem Bay Formation of the Red Point Group and also the Contact Bay-Bridge Point Formation of the Wilson Bight Group.

The South-West Cape Ranges Formation consists chiefly of fine-grained, massive, well-bedded quartzites and quartzitic schists. The quartzites often show cross-bedding and ripple marks. Some massive quartzites are nearly 100% quartz with a little muscovite and iron ore. These are very little contorted.

3. The Varvoid Bay Group

This group is represented by lithologically similar formations from two different places, the Finger Peninsula-Clyte Bay area and the South Bathurst-Varvoid Bay area.

The South Bathurst-Varvoid Bay rocks are faulted slightly across the strike on the eastern side, and lie disconformably over the Contact Bay-Bridge Point Formation on its western side. This formation consists of grey to ash-grey slaty shales with mud cracks, interbedded probably disconformably with argillaceous sandstones and conglomerates towards the top of the formation. It is strongly folded into tight synclines and anticlines, with steep easterly dips and southerly plunge under the overlying sandstones and conglomerates. The slaty shales here resemble varvoids because of their very fine stratification.

There is a similar formation in the Finger Peninsula-Clyte Bay area. Here the argillaceous rocks containing a little more arenaceous material and some pebbles (up to one inch in diameter) have been found in the slaty shales, suggesting glaciation during that period. Here again the upper horizon is interbedded with coarse conglomeratic sandstones and conglomerates in places disconformable with the slaty shales.

This group of rocks could probably be correlated with the King Island-Zeehan and South Australian tillites. It is probably the stratigraphic equivalent of the Archer Creek Siltstone (Cowrie). Stratigraphically, the base of the group may be placed towards the top of the Wilson Bight Group, Contact Bay-Bridge Point Formation, or at the base of South-West Cape Ranges Formation, as it overlies the Contact Bay-Bridge Point rocks.

4. Fairy Tale Head Group

This group is divided into the lower Beattie Formation and the upper Fairy Tale Head Formation. The Beattie Formation of Fairy Tale Head and Mt. Beattie consists of sandstone-conglomerates very often with stretched pebbles. The Fairy Tale Head Formation of Balmoral Hill, Mt. Rugby, Berry, and north-western parts of Fairy Tale Head consists mostly of coarse conglomerates often forming breccia conglomerates.

In some places these conglomerates are soft but elsewhere they are well silicified and hard. Softer argillaceous conglomerates occur north of Balmoral Hill and east of Mt. Beattie. The harder silicified conglomerates occur at Balmoral Hill and between Horn Peninsula and Dixon Bay and have more regular strikes than the softer ones. The whole series of sandstone-conglomerates and coarse conglomerates plunges in general to the north-west and so, "eo ipso" thickens in that direction. Mt. Rugby, Mt. Berry, and Mt. Misery, north of the Channel and Mt. Beattie and Balmoral Hill, south of the Channel are built of conglomerates.

Summary of Stratigraphy

The rocks of Port Davey-Bathurst Harbour, South-West Cape and Cox Bight area range in age from probable Precambrian through Cambrian to Devonian (?) and include both sedimentary and igneous rocks. Four distinct groups of sedimentary rocks with two or possibly more disconformities have been recognised:—

1. The Red Point Group.
2. The Wilson Bight Group.
3. The Varvoid Bay Group.
4. The Fairy Tale Head Group.

Other sediments occurring in the area are:—

5. Pleistocene fluvio-glacials.
6. Recent alluvial and aeolian deposits.

1. The oldest Precambrian rocks are represented by the Red Point (Contact Bay) Group, with its three formations. These rocks consist of impure sandstones and shales regionally metamorphosed

to a medium grade. Outcrops occur of two probable basic igneous intrusions metamorphosed to hornblende-zoisite schists intruded into the Red Point Formation and the East Cox Bight Formation. One intrusion crops out at two places between Red Point and Contact Bay and the other is found as boulders and pebbles on both sides of Eric Point. The basic metamorphosed rocks found on both sides of Eric Point are more or less hybridised by granitic intrusions and probably by siliceous sediments. Here, they intruded the East Cox Bight Formation and probably the lower part of the Ketchem Bay Formation.

The East Cox Bight Formation has small intercalations of quartzites and schistose sandstones. It is supposed that a weak orogeny occurred towards the end of the deposition of the Ketchem Bay Formation, as the overlying rocks are less folded and crumpled than the underlying. A minor unconformity is suspected between the Ketchem Bay Formation and the Contact Bay-Bridge Point Formation.

2. The Wilson Bight Group consists of the Ketchem Bay Formation of the previous group, the Contact Bay-Bridge Point Formation, and the South-West Cape Ranges Formation. The Contact Bay-Bridge Point Formation is called by the writer the Quartzite-Argillite Formation, as it consists of phyllitic shales, slaty shales interbedded with bands of quartzite, and micaceous quartzitic schists interbedded occasionally with thin mica-sericite and chlorite schists.

This formation usually expresses itself physiographically as foothills of mountains, as hills and as undulating plains.

Along the East and West Cox Bight beaches, there are pebbles and boulders of porphyritic dolerite (called by Twelvetrees and by Everard hornblende lamprophyre) intruded into the Quartzite Argillite Formation.

On the eastern part of the Melaleuca Peninsula there is a small outcrop of sheared felspar porphyry intruded into the Contact Bay-Bridge Point Formation. By analogy with similar rocks from the West Coast this intrusion is probably of Cambrian age. The Contact Bay—Bridge Point Formation passes into the South-West Cape Ranges Formation of quartz-schists, micaceous quartzites and massive quartzites. The boundaries are very difficult to recognise as very often the mica-sericite schists and phyllitic schists pass along the strike into silicified rocks, forming siliceous phyllites and micaceous quartzites, often finely banded (giving a slaty appearance). The South-West Cape Ranges Formation builds the highest mountain ranges on the South-West of Tasmania. It is the most siliceous and probably the most silicified formation of rocks in this district. Both upper formations of the Wilson Bight Group are mountain building, and are well recognised as a distinct group of rocks in the relief of the country. They cover most of the South-West of the Island.

The South-West Cape Ranges Formation is overlain here by a few dispersed patches of conglomerate, right at the top of the mountains. Further investigation is needed to explain their stratigraphic position and origin.

It is interesting to note that there are many rock formations and, in particular the South-West Cape Ranges Formation, which have been partly or totally silicified over considerable areas, as well as over appreciable vertical distance. There is a probability that the thick cover of conglomerate preserved still in patches over the South-West Cape Ranges supplied silica downwards.

3. Varvoid Bay Group (South Bathurst Harbour). The so-called varvoid or varved shales, slaty shales, interbedded with argillaceous sandstones, sandstones and conglomerates in the higher stratigraphic horizons, overlie disconformably the Argillite-Quartzite Formation at Varvoid Bay, between Moulter Cove outlet and Horn Peninsula. This formation is tightly folded with steep easterly dips and plunges southwards under the sandstone conglomerates. There are well preserved mud cracks and ripple marks in it.

A similar formation occurs on the southern side of the Channel Narrows, opposite Ila Bay at Clyte Bay and Finger Bay. Here the upper part of the formation is interbedded with slaty shale, argillaceous sandstones and sandstone-conglomerates. A few pebbles have been found in the slaty shales and argillaceous sandstones, and sandstone-conglomerates. A few pebbles have been found in the slaty shales and argillaceous sandstones, suggesting a glacial period (Tillite).

4. Fairy Tale Head Group is represented by sandstone conglomerates overlying the quartzites and quartzitic schists of the South-West Cape Ranges Formation and the schists of the Ketchem Bay Formation at Fairy Tale Head Peninsula, at Fulton Hill and Mt. Beattie. These rocks are folded into synclines and anticlines. They are overlain disconformably by coarse breccia conglomerates and conglomerates forming hills and mountains, like Mt. Rugby, Mt. Berry, Mt. Misery and Balmoral Hill. As the sandstone conglomerate and coarse conglomerates plunge in general to the north-west, so they " eo ipso " thicken in that direction. Since the conglomerates are lithologically similar to the Owen Conglomerate, it is possible that they may be of the same age. As yet, no other sedimentary rocks except diluvials and alluvials are known from this district.

5. Pleistocene Fluvio-Glacials. Gravels and boulders forming terraces of different levels are known from the north-eastern part of Cox Bight. They form the plains between Cox Bight, New Harbour and Bathurst Harbour, they form the Ray River Valley, Horseshoe Valley, and the valley east of Hannant Inlet and also smaller terraces like that at Falls Creek, Window Pane Creek and many other unnamed localities as marked on the geological maps. The thickness of the terraces ranges from a few inches to as much as 45 feet. The age of the fluvio-glacials is regarded as Pleistocene.

6. Recent deposits consist of alluvial gravels, sands along the courses of the streams and rivers, and sand dunes of aeolian origin along parts of the west and south coasts, some occurring at a height of 900 feet above sea level (e.g., east of Window Pane Bay).

Igneous Rocks

(a) Sequence of Igneous Rocks

System	Formation
Devonian	Cox Bight Granite
Cambrian?	South-West Cape Granite
Upper Precambrian?	Feldspar Porphyry
Middle Upper Precambrian?	Porphyritic Dolerite (Hornblende Lamprophyre)
Middle Precambrian?	Hornblende-Zoisite Schists

(b) Granites

There are two kinds of granite occurring in the district. One of these is that known for a long time from Cox Bight. It is a medium-grained palingenetic granite containing quartz, felspar (plagioclase and othoclase) and biotite. The periphery of the granite is soft due to weathering and possibly also to the circulation of mineralising solutions. Granitic apophyses intrude the quartz schists on the western side of Eric Peninsula. Veins of quartz and greisen carrying molybdenite and tin have been found. It is possible that this granite is intrusive into quartzites, quartzitic schist and blackish-grey schists and it may be of Devonian age.

The other "palingenetic" granite occurs on South-West Cape Peninsula. The intrusive nature of this granite into schists and schistose quartzites has been proved by the author's recent investigations. It is a very coarse granite of pegmatitic nature, containing quartz, felspars, biotite and muscovite. Muscovite is particularly prominent close to the contact with the schistose rocks. This granite resembles the Heemskirk Granite of the Zeehan district. The South-West Cape granite contains nodules of tourmaline and veins of quartz. Even far from the contact there can be seen in this granite partly digested and undigested schists (green, black and grey schists) as inclusions of neighbouring rocks. It is rather interesting to follow the contact with the schistose rocks. Where the granite flowed over the schistose rocks there are no widespread silicification or mineralisation effects at all, but where the granite underlies the above rocks a classical example of silicification can be observed for a short distance only from the granite, and pyritisation and other forms of mineralisation can be observed for a much greater distance from the contact.

Further, it is interesting to note that the granite contains all the main joint patterns observed in the adjoining Quartzite-Argillite Formation, and this suggests that the intrusion occurred prior to the last orogenies. As the Quartzite-Argillite Formation is the youngest formation intruded by the granite, it is difficult to state the age of this granite, but a Devonian age is assumed. The granite extends northwards to Rocky Point and probably under the shallow sea to Port Davey and further, as granitic rocks have been found attached to the kelp at Window Pane Beach and further north at the Two-Mile Beach.

No tin mineralisation has been found so far in the immediate vicinity of this granite.

(c) Porphyritic Dolerites (Hornblende-Lamprophyre).

Some boulders of porphyritic dolerites are to be found on the western side of Eric Point, but no outcrop has been found as yet. It is very likely that they intruded into the Quartzite-Argillite Formation. W. H. Twelvetrees and G. Everard both described the intrusives as hornblende-lamprophyre and Twelvetrees suggested that they were of Devonian age. It is, however, probable that the age of the intrusion was Lower Cambrian.

(d) Felspar Porphyry

Some sheared felspar porphyry a few feet wide has been found on the eastern side of Melaleuca Peninsula, interbedded with the sandstones. A Cambrian age for the above rocks is suggested.

Geological Structures

Folds in the region are well defined on a regional basis.

The Red Point and Wilson Bight Groups are isoclinally folded. The synclines of the South-West Cape Ranges show westerly dips; in the two major anticlines (New Harbour-Melaleuca and New Harbour-Cox Bight-Black Bay) the dips are west and east; and in the synclines of New Harbour and Bathurst Harbour Ranges the prevailing dips are westerly. Most formations show tight recumbent isoclinal folds and crenulations. It is characteristic of the south-west that the synclines form the major ranges and the anticlines the major valleys and plains. The oldest rocks (Red Point Group) occur as cores of the folds, whilst the Wilson Bight Group usually forms the flanks.

There are two major sub-surface elevations, probably cores of old mountain ranges trending north-east. The first one starts from Open Bay and goes through Canyon Creek, upper Melaleuca Creek, south of Moth Creek Tin Field, along the middle and upper reaches of Passage Creek and then along Fault Creek through Ray River and continues north-east; the second one starts from Window Pane Bay, goes through the south-western part of Window Pane Creek, through Upper Alexander Creek, then through Lagoon Creek and Moulters Cove and continues to the north-east. These two sub-surface elevations disturb horizontally as well as vertically the regularity of the north-north-western trend of the major synclinal and anticlinal axes (west of the line through Cox Bight, Moth Creek and Melaleuca Inlet) and the north-north-easterly trend of the synclinal and anticlinal axes east of the above line. On both sides of the sub-surface elevations there are underground depressions which cause the synclinal basins to extend laterally (eastwards in the South-West Cape Range).

Only the massive quartzites of the Wilson Bight Group lack the cleavage which is developed usually parallel to the bedding of quartz schists, mica schists, mica quartzites, phyllites and slaty shales.

There are different kinds of lineations developed in the area and these may be divided into two genetic groups—the older or general lineations and the younger or superficial lineations. The fine crenulation in phyllites, slaty shales, and mica schists, ribbing in quartzites, parallelism of hornblende laths in hornblende-zoisite schists and of muscovite flakes in mica quartzite are quite constant in direction throughout the area. In general this lineation is parallel to the axes of the isoclinal folds.

Cross-bedding and ripple marks are prominent features of the Wilson Bight Group. In some cases it is rather difficult to ascertain whether the ripple marks are of sedimentary or tectonic origin. The massive quartzites show distinct corrugations where the ripple marks have been parallel to the lineation direction. All the Pre-cambrian rocks here are much faulted and several distinct sets of faults are present. In the majority of cases the displacement cannot be determined as the stratigraphic sequence is not known. Most faults seen in the field have been recognised first on the air photos. The most difficult to prove are the strike faults which show no displacement in plan. They could be proven if the detailed stratigraphy was known. These faults appear to be quite common in the Precambrian rocks. The minor structures such as contortion, drag dip, slickensides and crush breccias are often only of limited use in proving the presence of faults because the rocks, especially the oldest ones (Red Point Group), are so contorted that additional contortion and drag in a fault zone is difficult to recognise with certainty. Fault breccias usually occur along the small faults in quartzites. In general, major faults cannot be observed as there is no outstanding contortion, drag, slickensiding or brecciation associated with them. Strike faults often separate beds dipping at different angles in opposite directions or in the same direction, and so give the impression of an unconformity. Only the more important faults are described below.

There are two patterns of major faults in the south-west. One type of fault is that more or less parallel to the previously mentioned underground elevations and depressions. These faults are the oldest and deepest. They are seldom well exposed in the younger formations and if easily recognisable they are usually found to be more recent continuations of older faults. These were the main faults which conducted mineralising solutions upwards in this area. One of the major faults of this nature is the South-West Cape, New Harbour, Moulter Creek Fault trending north-east. This fault is poorly exposed and its existence is mainly inferred from the courses of the local creeks. The next most important fault is that passing through Window Pane Creek, Alexander Creek, Melaleuca Lagoon Creek, and through an unnamed inlet to Moulters Cove, south-east of Ray River.

The other set of faults is younger and more superficial and often runs parallel to the strike of the main cleavage. Further attention should be concentrated on the places where the two kinds of faults cross each other in favourable rock formations as such regions were possibly more liable to mineralisation.

Sequence of Geological Events

As the Cambro-Ordovician(?) (varvoid slaty shales, sandstone conglomerate) and the Wilson Bight Group of this area are folded and the Precambrian rocks are similarly folded, but to a higher degree, and as there is no evidence of a strong unconformity in the sequence, it is probable that the major part of the folding was Tyennan and Tabberabberan. The earliest sediments during Precambrian times were here under considerable load and were first subjected to horizontal forces acting in a couple, which resulted in an overthrust to the south-east and underthrust to the north-west. This produced folded and mildly metamorphosed beds, with schistosity parallel to the bedding and with regional lineations. It is suggested that a mild orogeny occurred at the end of deposition of the Ketchem Bay Formation, as the underlying rocks are more contorted and folded than the overlying rocks of the next group.

Little can be said at this stage of the investigation about the age of the two types of faults described above, except that the older faults have been renewed several times during succeeding orogenies and the younger ones have been produced probably during the latest orogenies (Tyennan and Tabberabberan).

Correlations

The Red Point Group, comprising the lower part of the Wilson Bight Group, could be correlated on lithological grounds with parts of Spry's Joyce and Franklin Groups.

In this district there are basic intrusions, namely the hornblende-zoisite schists, corresponding probably to the amphibolite schists in the Joyce and Franklin Groups. It is evident that the Red Point Group corresponds only to the middle and upper parts of Spry's, Joyce Group and probably to the lower part of his Franklin Group up to the Raglan Quartzite. For reasons to be discussed later, the author considers that this is probably equivalent to the lower part of Spry's Mary Group and to the middle part of the Wilson Bight Group (Quartzite-Argillite Formation). The Joyce Group and part of the Franklin Group are better developed than the Red Point Group. As regards Spry's Mary Group, it is probable that this could be correlated with the middle and upper parts of the Wilson Bight Group. Here again it is obvious that the Wilson Bight Group is better developed than the Mary Group. The Wilson Bight Group occupies major areas in the south-west. The Mary Group apparently lacks, to a certain extent, the middle part of the Wilson Bight Group (Quartzite-Argillite Formation) which is well developed in the Cox Bight, Bathurst Harbour and Port Davey districts.

The dolerite intruding the Franklin Group Garnet Schist along Bradshaw timber track are related to the Cooee Dolerite intruding the Cave Quartzite, Bluff Quartzite and the slate and quartzite at Rocky Cape. These Rocky Cape formations probably correspond to the Contact Bay-Bridge Point Formation of the Wilson Bight Group (Spry's Mary Group). It is possible that the Cooee Dolerite is related to the Cox Bight porphyritic dolerite (hornblende lamprophyre) intruded into the Quartzite-Argillite Formation and considered by Twelvetrees to be probably of Lower Devonian age. On the eastern side of Melaleuca Peninsula there is a felspar-porphyry intrusion. As this felspar-porphyry is similar to that at Queenstown and Rosebery, the age of intrusion could possibly be Cambrian.

When Spry's Precambrian sequence of the Mt. Mary area is compared with the Precambrian stratigraphy of the south-west (230 square miles) it is rather interesting to note that so many formations can be correlated on lithological grounds alone. In general, the lithology of metamorphic rocks remains constant over a wide area and the expected lithological similarity between the Mt. Mary and the South-West formations does, in fact, exist. It is rather strange that rocks showing low grade metamorphism should be between medium grade metamorphic rocks, e.g., the Mary Group, which lies between the lithologically similar Joyce and Franklin Groups. The basic rocks intruding the Joyce and Franklin Groups are similar and the two groups show more or less the same degree of metamorphism. There are no basic intrusions similar to those in the Joyce and Franklin Groups in the Mary Group, which has been placed above the Joyce and below the Franklin Group. Taking into consideration the above facts and the similarity of the formations of the South-West and the Mt. Mary area, I would like to suggest that Spry's stratigraphy be revised by placing the Franklin Group as part of the Joyce and Mary Groups, as shown in my stratigraphic table.

STRATIGRAPHY OF SOUTH WEST TASMANIA

SYSTEM PERIOD	NAMES OF LOCALITIES OF SIMILAR FORMATIONS & SUBFORMATIONS	NAMES OF FORMATIONS & SUBFORMATIONS	GROUPS	IGNEOUS INTRUSIONS & OROGENIES	LITHOLOGY	CORRELATION
RECENT					GRAVELS & SAND	
PLEISTOCENE					BOULDERS GRAVELS & SAND	
DEVONIAN	SOUTH WEST CAPE GRANITE	COXS BIGHT GRANITE		INTRUSIVE GRANITES TABBERABBERAN OROGENY	BIOTITE MUSCOVITE GRANITE (COX BT) BIOTITE TOURMALINE COARSE GRANITE (S W CAPE)	HEEMSKIRK GRANITE (EXCLUDING ADAMELLITE GRANITE)
ORDOVICIAN	OWEN	OWEN CONGLOMERATE				
CAMBRIAN ?	BALMORAL-RUGBY-FAIRYTALE HD MT BERRY DISCONFORMITY	FAIRYTALE HD COARSE CONGLOMERATE & BRECCIA-CONGLOMERATE FORMATION	FAIRYTALE HD GROUP	TYENNAN OROGENY	CONGLOMERATE COARSE CONGLOMERATE BRECCIA CONGLOMERATE	OWEN CONGLOMERATE ? JUKES BRECCIA ?
?	IOLA-BEATTIE & FAIRYTALE HEAD. FULTON HILL DISCONFORMITY	BEATTIE-SANDSTONE-SHALE-CONGLOMERATE FORMATION			SANDSTONE-SHALE-CONGLOMERATE DISCONFORMITY	
LOWER CAMBRIAN ?	VARVIOD BAY & CLYTE BAY DISCONFORMITY	VARVIOD BAY FORMATION	VARVOID BAY GROUP		SLATES. SHALES. SLATY SHALES, ARGILLACEOUS SANDSTONE DISCONFORMITY ?	COWRIE SILTSTONE ?
	NEW HARBOUR RANGE, BATHURST & SWCAPE RANGES ETC	SWCAPE RANGE FORMATION QUARTZITIC SCHISTS. QUARTZITES. MASSIVE QUARTZITES & QUARTZITIC CONGLOMERATES?	WILSON BIGHT GROUP	FELSPAR PORPHYRY INTRUSION	QUARTZITIC-MICA SCHISTS. QUARTZITES & MASSIVE QUARTZITES	A. SPRY'S COOEE PT DOLERITE?
UPPER PRE-CAMBRIAN?	NEW HARBOUR, HANNANT INLET, SCHOONER COVE, FOREST LAGOON DIXON BAY	CONTACT BAY BRIDGE PT FORMATION (ARGILLITE-QUARTZITE FORMATION) MUSCOVITE SERICITE SCHISTS, SLATES, QUARTZITES & SANDSTONES & SHALES (SLATY)		INTRUSIVE COX BIGHT PORPHYRITIC DOLERITE (LAMPROPHIRE)	MICA-SERICITE SCHISTS, PHYLLITES. SLATES. QUARTZITIC SANDSTONES, QUARTZITES & SHALES	ADELAIDE SYSTEM? RUPERT BEDS-DONALDSON BEDS? ROCKY CAPE QUARTZITES & SLATES INTERVIEW BEDS-CORINNA BEDS BURNIE QUARTZITES & SLATES FORMATION? = ARGILLITE QUARTZITE FORMATION } MARY GROUP
	HORSESHOE INLET EAST KETCHEM BAY MOULTER COVE SCHOONER COVE ETC PROBABLE MINOR UNCONFORMITY?	HORSESHOE INLET MICA-SERICITE SCHISTS	KETCHEM BAY FORMATION		DARK GREY, ASH GREY, GREENISH GREY, QUARTZ-MICA SERICITE & CHLORITIC SCHISTS (LUSTROUS)	FRANKLIN GROUP?
MIDDLE UPPER PRE-CAMBRIAN?	UPPER LENNA CK UMBOSE & FALLS CKS. BUOY CK. CONTACT BAY, EAST WILSON BIGHT, KETCHEM BAY	UPPER LENNA CK SUBFORMATION BIOTITE CHIASTOLITE SCHISTS BUOY CK SUBFORMATION. MUSOVITE BIOTITE-GRAPHITE SCHISTS	RED POINT GROUP	MILD OROGENY?	GREENISH QUARTZMICA-BIOTITE (CHLORITE) CHIASTOLITE SCHISTS. BLACK BIOTITE-GRAPHITE & CORDIERITE SCHISTS	A. SPRY'S AMPHIBOLITE INTRUSIONS INTO JOYCE & FRANKLIN GROUPS BAROSSIAN SERIES?
LOWER UPPER PRE-CAMBRIAN?	BLACK BLUFF TO EAST COX BIGHT & ¼ MILE EAST CONTACT BAY	BLACK BLUFF SUBFORMATION QUARTZ MICA BIOTITE SCHIST	EAST COX BIGHT FORMATION	INTRUSIVE HORNBLENDE-ZOIZITE SCHISTS	GARNETIFEROUS QUARTZ-MUSCOVITE & GRAPHITE SCHISTS SCHISTOSE SANDSTONES & QUARTZITES	JOYCE GROUP
UPPER MIDDLE PRE-CAMBRIAN?	ELPHINSTONE POINT	ELPHINSTONE POINT MICA GARNET GRAPHITE SCHISTS SUBFORMATION			GARNETIFEROUS MICA-BIOTITE-GRAPHITE SCHISTS	
	RED POINT	RED POINT FORMATION COARSE-GARNET-MICA SCHISTS	RED POINT FORMATION		GARNETIFEROUS QUARTZ MICA SCHISTS WITH ALMANDINE & GREY YELLOWISH INTERBEDDED QUARTZITES (GARNETS UP TO ¼" IN DIA)	

DEPT. OF MINES

1516-92

Plate 27

Comparing Spry's Joyce, Franklin and Mary Groups with the Red Point and Wilson Bight Groups of the South-West, it is obvious that the Franklin and especially the Joyce Group have their lower formations better exposed and developed than is the case with the Red Point Group, which has only its upper formations exposed and even these are poorly developed. On the other hand, the Mary Group seems to be less developed than the corresponding Contact Bay-Bridge Point and South-West Cape Ranges Formations of the Wilson Bight Group, which have much greater horizontal and vertical extent.

The Varvoid Bay Group is rather unique. At present its stratigraphical position is still not well determined. This group of rocks overlies disconformably the Contact Bay-Bridge Point Formation and it is also possible that it may overlie the South-West Cape Ranges Formation. As this formation has pebbles embedded in its slaty shales it suggests a glacial period and it could possibly be correlated with the Cowrie Siltstone. The Varvoid Bay Group passes upwards into the sandstone-conglomerates and breccia conglomerates of the Fairy Tale Head Group.

The Fairy Tale Head coarse breccia conglomerates resemble lithologically the Jukes Breccia, and the conglomerates resemble the Owen Conglomerate. Too little has been done so far to allow correlation of the two above formations on lithological grounds only. It is probable that the breccia conglomerates are of Upper Precambrian or Lower Cambrian age.

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APPENDIX

by G. EVERARD

SPECIMENS COLLECTED AT PORT DAVEY

No. 5 East Melaleuca Peninsula, Bathurst Harbour

Greenish-grey leucocratic or mesocratic rock. White euhedral phenocrysts of felspar up to 3 mm. long are plentiful, also anhedral dark-green crystals and aggregates of ferromagnesian mineral. The texture is porphyritic, and the rock is somewhat sheared.

In thin section texture has been almost obliterated by alteration. The groundmass is a fine grained quartzo-felspathic mosaic in which the felspar has been completely altered to sericitic aggregates.

The felspar of the phenocrysts has been altered in the same way, so that only the outline of the original crystals is preserved.

The dark-green aggregates consist of chlorite, but here alteration is incomplete, and occasional stronger birefringence and pleochroism indicate uralite. The acicular habit of many of these aggregates suggests that the original mineral was hornblende, and there is some evidence of ophitic texture in the unaltered rock.

The rock is a sheared felspar porphyry.

No. 9 Elphinstone Point

Dark-greenish schistose rock with porphyroblasts.

In thin section the schistose texture is very marked, the oriented minerals being white mica, biotite and a black opaque substance that may be graphite. Lenticular aggregates of minute magnetite crystals are aligned with the platy minerals.

Porphyroblasts consist of quartz and garnet. The garnet is pale-pink and typically cracked and shattered. It may be surrounded by quartz to form a lenticular aggregate.

Quartz also occurs in lenses that may be cracked, but the whole lens extinguishes simultaneously. Dark inclusions in the quartz are lineally arranged, and these lineations may be at an angle to the direction of orientation of the platy minerals in the rock, thus showing that the quartz crystals have been rotated. The garnet crystals also show signs of rotation. Plications occur in the laminations of the rock, which may be the foci of development of porphyroblasts,

The rock was a carbonaceous shale which has undergone intense thermo-dynamic metamorphism to a garnetiferous graphitic mica schist.

SPECIMENS COLLECTED AT COX BIGHT

In general the series consists of siliceous and aluminous sediments, such as impure sandstones and shales, &c., that have been regionally metamorphosed. Nos. 11, 15 18, and 19 are the basic igneous rocks forming part of the metamorphosed series; No. 1 is an igneous rock which intruded the series after metamorphism. There is some evidence of silicification in quartz veins and minute quartz stringers in some specimens.

No. 1 South-east beach, west of Eric Point, opposite Cox Bight Camp

Medium grained grey rock with felspar phenocrysts up to 10 mm. across. A few irregular masses of quartz of similar size are visible together with dark needles of hornblende.

In thin section the groundmass has panidiomorphic texture and consists of minute needles and wisps of hornblende in a mass of felspar crystals. The felspar crystals are of two kinds, some lathlike with lamellar twinning identified with andesine, others stumpy with simple or no twinning and zoned so that the extinction angle gradually increases from the periphery to the centre.

Phenocrysts are of hornblende and felspar, the latter so altered to opaque material that further identification fails.

The rock is hornblende lamprophyre.

No. 2 Boat Harbour, East Bay, Cox Bight, metamorphosed contact along fault

Fine grained white quartzite. An effect of fine bedding is given by thin bands of sericite, which show crumpling and are not actually continuous. A little biotite is also present. The quartz is completely recrystallised and there are small short quartz veins (say a centimetre long and a millimetre wide) that cut across the lineation and suggest silicification.

The rock is a metamorphosed arenaceous sediment.

No. 3 Scrub Point, Cox Bight. R 2/892

Finely banded fine grained, pale-greyish quartzite. The bands are apparently flat and continuous.

In thin section the rock is seen to consist of fine bands of sericite and graphite separating coarser bands of interlocking angular quartz grains. The quartz grains may be separated by thin interstitial layers of muscovite or muscovite and graphite. Many quartz grains seem to have grown by the peripheral crystallisation of additional silica.

Extreme crushing and mylonisation followed by recrystallisation is indicated by the flat banding. The rock was originally a siliceous sediment with some clayey and organic matter.

No. 4 Interbedded with black schists, Boat Harbour, Cox Bight

Weathered pale-greenish or brownish rock with abundant mica and lenses of quartz.

In thin section quartz is more abundant than would appear in hand specimen. The rock is strongly sheared and plates of mica wrap themselves around lenses consisting of grains of recrystallised quartz. Both muscovite and biotite are present, the latter somewhat altered to chlorite.

The rock is a quartz-mica schist and has resulted from the dynamo-thermal metamorphism of an aluminous and arenaceous sediment.

No. 5 East Beach, Cox Bight

Pale-grey, fine grained quartzite, very similar to No. 3; but graphite is comparatively rare, and although the rock is finely banded in a similar way, it is more massive and less apt to cleave along the bands. Jointing is more conspicuous in hand specimen than with No. 3.

The rock is of similar origin to No. 3 but contains less organic and possibly more clayey material.

No. 6 Travers Creek, Cox Bight

Very fine grained pale-grey foliated rock, with fine banding.

The rock consists of quartz and muscovite, together with a little biotite slightly iron-stained and rarely altered to chlorite. It contains micro-augen of recrystallised quartz grains.

The rock is a fine grained mica schist, developed by dynamo-thermal metamorphism from a fine grained aluminous sediment containing a few sand grains.

No. 7 Scrub Point, East Bay, Cox Bight

Another variant of the rock formation represented by specimens 3 and 5. In this example muscovite is almost as plentiful as quartz and renders the rock soft and friable on weathering. Fine white clay must have been present in considerable amount in the original siliceous sediment.

No. 8 Miceaceous Sandstone in Black Schist, Boat Harbour, Cox Bight

Pale-greyish quartz mica schist. The mica is either colourless or somewhat reddish-brown and pleochroic.

In thin section the rock is seen to contain about equal amounts of quartz and mica.

The specimen probably represents a variant of the rock of which Nos. 3, 5 and 7 are facies. However, the specimen is much weathered and mega structures are difficult to see in hand specimen.

No. 9 Scrub Point

Grey schistose rock. In hand specimen the rock consists of elongated lenses of quartz 1 mm. or more in thickness, between masses of mica.

In thin section the quartz lenses are seen to consist of masses of minute grains of quartz. However, some small lenses are flattened single crystals. Some albite occurs particularly associated with mica, as rounded grains showing cleavage and twinning. The muscovite plates are bent and folded on a minute scale. A few very small flakes of graphite occur in the masses of mica plates and give a dark colour to the rock.

The specimen is a quartz-mica schist. It illustrates dynamothermal metamorphism of a sediment containing about equal amounts of argillaceous and arenaceous material.

No. 10 Fault Zone, East Cox Bight

Pale greenish-grey foliated rock but stained brown with iron oxides.

In thin section the rock has a schistose structure with lenses of quartz mosaic and lenses consisting of single crystals of albite, wrapped round by muscovite mica, usually stained brown with iron oxides, together with a little biotite and chlorite.

The rock is an albite schist, and has resulted from the metamorphism of siliceous and aluminous sediments.

No. 11 Cox Bight on route to Camp

Medium to fine grained greenish-grey rock with euhedral pink garnets about 1 mm. across. The rock is somewhat sheared.

Thin section shows porphyroblasts of garnet and zoisite in a fine grained granular ground mass of zoisite and hornblende. Quartz tends to be associated with garnet, and some garnets are associated with biotite. Possibly the garnet has been altered to chlorite and the biotite formed from chlorite, by further metamorphism.

The rock is a fine grained garnetiferous zoisite-hornblende schist formed by the metamorphism of a basic igneous rock, and hybridised by siliceous sediments.

No. 12 Stinking Bay, East Cox Bight

The rock is a fine grained white quartzite with fine grey bands.

Besides quartz the specimen contains white mica and a little graphite, the alignment of which gives the finely banded appearance. This banding is due to metamorphic action rather than original bedding. The rock has been developed from a siltstone containing some organic and carbonaceous material.

No. 13 East Cox Bight Range

Quartz sericite schist and quartzites.

These rocks are examples of the development of different types of rock from almost identical sediments under metamorphism. They contain quartz and sericite in about the same proportions but in specimen 1 the laminae are crumpled whereas in specimen 2 they are almost planar. Specimen 3 is a coarser grained rock

No. 15 Beach near mouth of Lagoon Creek Inlet, Cox Bight West

This specimen is similar to No. 11, but has been weathered and exhibits shearing to a greater extent.

No. 16 North of Cox Creek

The rock is a quartzite containing pyrite and arsenopyrite. There is a little pale-yellow staining on the rock, but this seems to be due to oxides of arsenic.

No.17 Black Bluff

Greyish rock with shining flakes of muscovite, lenses of quartz, and black laminae of graphite. The specimen is covered with small holes whence crystals have been weathered out, iron oxides sometimes remaining.

In thin section the texture is typically schistose and tightly folded on a minute scale. Muscovite stained with iron oxides and darkened by laminae of graphite is the most prominent mineral and encloses lenses of recrystallised quartz grains. Neither ilmenite nor rutile were observed.

Judging from their shape, the small holes filled with opaque limonite enclosing occasional minute grains of quartz must have contained crystals of garnet.

No. 18 Basic dyke, South-East of Contact Bay.

Schistose greyish-green rock, with white patches up to 5 mm. long which appear to be weathered crystals of felspar. Green crystals of amphibole showing lustrous cleavage faces, are of about the same size and render the rock rather coarse grained.

In thin section the texture is xenoblastic. The large felspar crystals are weathered to opacity; but smaller irregular crystals and grains are quite fresh. Hornblende appears in laths and irregular distorted crystals pleochroic in green to brown. There is a little garnet in irregular grains and zoisite or clinozoisite is fairly common.

The rock is a hornblende-zoisite schist, and is probably a metamorphosed basic igneous rock.

No. 19 Basic dyke halfway between Contact Bay and Red Point

Medium to coarse grained greyish-green schistose rock, containing bladed crystals of hornblende.

In thin section a poikiloblastic texture is shown, with large crystals of hornblende containing inclusions of zoisite, epidote, felspar and garnet. Veins of zoisite or clinozoisite cut through the large crystals of hornblende, otherwise the texture is a confused granoblastic aggregate. Garnet is xenoblastic.

The rock is a garnetiferous hornblende zoisite schist and has probably originated as a basic igneous rock.

No. 21 Red Point

The rock is a garnetiferous mica schist. It has been much weathered and discoloured. Both muscovite and biotite are present, but biotite has suffered alteration in weathering, releasing oxides of iron. These when mixed with clayey and micaceous material in the weathered rock result in a reddish powder. The rock itself is probably the result of dynamo-thermal metamorphism of iron-bearing sediments, such as an impure ferruginous sandstone.

No. 22 Red Point, West

Mica schist containing almandine. No magnetite was found.

No. 23 Scrub Point

White finely banded quartzite. White mica appears on flat cleavage planes forming the top and bottom of the specimen, and the banding results from a small amount of white mica in the quartzite itself, aligned under directed pressure.

No. 24 Ray River tin workings

Quartz vein in quartzite mineralised with iron pyrites. The pyrite has been oxidised in places leaving brown limonite, but in most instances the pyrite has been completely weathered out leaving negative cubes and boxworks of silica.

No. 25 Upper Lenna Creek

Dark-grey banded rock, with crumpled bands, showing mica and quartz.

In thin section the rock shows foliation and crenulation. Lighter coloured bands consist of recrystallised quartz. The grains are angular, slightly elongated and aligned. Darker bands consist of biotite, muscovite and cordierite.

The rock is a schist which has been regionally metamorphosed, with development of foliation and recrystallisation, possibly followed by contact metamorphism and development of cordierite.

No. 26 Upper Lenna Creek

Dark-grey foliated and banded rock.

In thin section the specimen shows schistose structure with biotite and muscovite in a groundmass of recrystallised quartz. The banded appearance is due to graphite, and in the black bands are rounded crystals of chiastolite with graphitic inclusions.

The rock has been formed by metamorphism of an arenaceous rock, with carbonaceous and aluminous material included in it.

The rock is a graphitic schist.

No. 27 Umbrose Creek, North-East of Ray River

Two weathered and iron-stained specimens, apparently of rocks represented by specimens 28 and 28a.

No. 28 Umbrose Creek

Sheared, foliated greenish banded rock.

In thin section the specimen has a groundmass of fine grained recrystallised quartz, with aligned masses of bent plates of muscovite and biotite, partly altered to chlorite and stained with iron oxides. Rectangular somewhat rounded crystals of chiastolite up to ¼ mm. across are plentiful. Some graphite is also present within the mica plates.

The rock is a chiastolite schist.

No. 28a Umbrose Creek

Similar to No. 28, but without chiastolite.

Unnumbered Specimen Locality: East of South-East Bathurst Harbour.

White quartzite with a great number of fairly evenly spaced holes up to 1 cm. long. They are placed so that the longest and shortest directions are the same for each hole. When the rock is cut through some holes are seen to be still completely filled with a fine granular material somewhat darker than the rest of the rock.

In thin section the rock has the structure of a sheared quartzite. There is a fine grained groundmass of quartz grains in which are porphyroblasts of quartz all oriented the same way as the holes. Where these holes still contain material it is of the same texture as the rest of the rock; but contains in addition dark carbonaceous material. These carbonaceous masses are softer and more susceptible to weathering than the rest of the rock.

SPECIMENS COLLECTED AT PORT DAVEY

For further descriptions of specimens from Port Davey see Report on page 73.