1976/52. The Mt Read Volcanics sequence in the King River gorge below Crotty.

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Abstract

Three major volcanic-volcaniclastic sequences are recognisable in the King River gorge:

(1) A western sequence of quartz-feldspar porphyries (partly intrusive, partly extrusive), quartz-phyric pyroclastics, tuffaceous greywacke, Precambrian-derived sandstone (Miners Ridge-type), and shale; the sequence generally dips and faces south-east and is intruded by basaltic dykes near its eastern margin.

(2) A central sequence, which apparently conformably overlies the western sequence, and is dominated by massive, fine-grained, feldspar-porphyries which show ignimbritic features in places and also columnar jointing and micro-spherulitic textures, with associated minor bedded tuff-sediment units.

(3) An eastern sequence consisting dominantly of volcaniclastic conglomerate, but including minor quartz-feldspar-phyric volcanic rocks, which is faulted against the central sequence in the gorge but unconformably overlies it on the flanks of Mt Huxley. This sequence is faulted against Owen Conglomerate at the eastern margin of the area, but is apparently conformable and gradational with it on Mt Huxley.

A strong NNW to NW-trending cleavage, associated with SE-plunging minor folds, affects the volcanic sequence and is probably related to Tabberabberan cross-folds which also affect the Owen Conglomerate. This cleavage crenulates an earlier structure parallel to bedding in slate in one area.

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The King River gorge between Crotty [CP864289] and the Queen River junction [CP783317] provides an almost completely exposed cross-section through the Mt Read Volcanics, but has not previously been mapped. Excellent exposures of fresh rock are available on a flood-cut platform above the low summer level along much of the river, but detours must be made around cliffs in many places and the necessary crossings of the river can be hazardous even at low flows. The rock outcrops are polished and smooth, and become very slippery when wet.

The upper part of the gorge (from the Hydro-Electric Commission dam site near Crotty to just west of Mt Huxley) was traversed on a single day in March 1975, the 'retreat' being made via East Jukes Peak and the Jukes Proprietary track. The lower part of the gorge, from the old bridge on the Harris' Reward track to the big bend at the northernmost point of the gorge, was traversed in two days in March 1975 from a camp at the bridge. The central part of the gorge was reached via the Mt Lyell Company's Huxley Road and a recently cleared logging track from Miners Ridge to Diorite Creek. This creek flows into the King River via a series of spectacular waterfalls. This area was mapped in February 1976.

The physiography of the gorge is unusual in that there are no overlapping spurs, despite the variety of rock types traversed and the fact that the gorge cross-cuts the regional strike for much of its length. The gorge has a broad V-shaped section throughout its length, with a narrow flat bottom occupied by the river. The width of the gorge at the top is about 2.5 times the depth. The gorge is superimposed on a regional surface developed on the volcanics west of Mt Huxley at a height of 270-300 m, probably corresponding to the Henty Surface further west. A glacial origin for the gorge seems a distinct possibility.

The stratigraphy of the area may be summarised as follows:

Late Cambrian-Early Ordovician

Owen Conglomerate.

Cambrian-Late Precambrian (Mt Read Volcanics)

(1) Western sequence (east-facing) of quartz-feldspar porphyry intrusives and lavas, quartz-phyric pyroclastics, greywacke, sandstone, and shale, with minor basalt intrusions.

(2) Central rhyolite sequence.

(3) Eastern sequence of volcaniclastic conglomerate and quartz-phyric pyroclastics and possible lavas.

WESTERN SEQUENCE

A rather complex sequence of quartz-feldspar porphyries, pyroclastics, greywacke, sandstone and shale is exposed along the gorge between the Harris' Reward packbridge and Diorite Creek. The major distinction within the sequence is between the porphyries, which are at least partly intrusive, and the bedded sequences, which generally include various admixtures of tuff, sandstone and slate. A fairly distinctive quartz-rich sandstone sequence, probably equivalent to the Miners Ridge Sandstone which occurs along strike to the north, has been differentiated in the lower part of the gorge, and an attempt has been made to distinguish those units which are dominantly

pyroclastic from those which are dominantly sedimentary.

Bedding and facing have been obtained in a number of the bedded sequences and despite complications by minor folds, it is clear that the sequence, in general, dips and faces east. This is in agreement with the author's mapping further north, where the prominent Miners Ridge is composed of sandstone forming the east flank of an anticline, east of which the beds face and dip east to the contact with the central rhyolites. The uppermost part of the sequence in the gorge area is a sedimentary-pyroclastic unit which is well exposed in the gorge and in several sections of Diorite Creek. It is apparently concordant with the rhyolite sequence and dips and faces towards it. The rhyolite contact, however, is complicated by faulting, and appears to be offset by several NW-trending cross-faults. The basaltic rocks occur as small intrusive bodies near the top of the western sequence.

Quartz-feldspar porphyries

Massive, pink to greenish-grey porphyry, with large phenocrysts of quartz and feldspar, crops out at the Harris' Reward packbridge and at a number of places upstream of this to the rhyolite contact. The largest body appears to be that lying immediately east of the Miners Ridge sandstone correlate, with which it has a SW-trending contact. This body has cross-cutting contacts in places and contains xenoliths of slate, indicating that it is intrusive. The next outcrop east of this also contains xenoliths of slate, one of which is 5 m long by one metre wide and shows a spotted hornfels texture throughout. It is possible that the several slate units mapped in this area (fig. 1) are in fact large xenoliths, since xenoliths of this size have been noted within the porphyries in the Queenstown area. The porphyry outcrops east of this include massive units and also flow-banded and autobreccciated units, and both intrusive and extrusive types are probably represented. The porphyries show a strong penetrative cleavage in most areas. A large body, showing autobreccia texture in places, forms the waterfalls in Diorite Creek.

A thin section (75-423*) from the body at the packbridge shows abundant large rounded and embayed quartz phenocrysts and altered feldspar phenocrysts floating in a pink, cryptocrystalline glassy groundmass. Biotite crystals partly altered to carbonate and chlorite are also present. The feldspars show strong alteration to carbonate and sericite, and there is abundant fine carbonate through the groundmass. Pressure fringes of carbonate occur on some of the quartz phenocrysts. Scattered magnetite grains are also present.

Porphyries showing banding or autobreccia texture indicative of lava flows, or textures indicative of a pyroclastic origin, appear to grade into massive porphyry in some areas. Specimen 75-430 is from a flow-banded porphyry having pale and slightly darker bands averaging about 75 mm across. In thin section, there are abundant large embayed quartz phenocrysts, less common, smaller, and usually altered, feldspar phenocrysts, and scattered biotite phenocrysts, in a groundmass rich in small quartz crystals and murky material which is mainly sericitised feldspar and fine carbonate. Much of the fine sericite and carbonate forms an anastomosing web outlining what appears to be a secondary foliation superimposed on the primary banding which is apparent as crude alternations of finer and coarser groundmass in which quartz stringers, biotite flakes and some feldspar laths are aligned. The rock is probably a lava.

Some outcrops show ignimbritic texture, with abundant pale glassy blebs

*Specimen numbers refer to Department of Mines collection. Specimen localities are shown on Figure 1.

and fragments up to 10 cm long aligned to form a primary foliation. Specimen 75-427 from such a rock has abundant large embayed quartz phenocrysts, rare altered feldspar phenocrysts, and scattered altered biotite flakes, in a strongly foliated granular-looking groundmass. Abundant small rounded quartz and feldspar grains in the groundmass are surrounded by an anastomosing web of sericite forming a cleavage which crenulates some of the biotite flakes. Small angular shapes in the groundmass are suggestive of shards and there are several large sericite-chlorite masses with flame-like ends resembling fiamme. These form a crude lithological foliation parallel to the cleavage, but a surprising number of the biotite flakes are oriented perpendicular to this.

This ignimbritic rock appears to grade into fine- to medium-grained tuff (75-428) in which crystals and broken crystals of quartz, scarce feldspar and biotite are contained in a cleaved fine glassy matrix rich in sericite and carbonate.

At the big bend downstream of Diorite Creek, the porphyry shows an unusual swirly texture with lenses and patches of darker, finer-grained porphyry mixed with patches of coarse porphyry. In thin section (75-431), the finer material contains abundant broken and complete quartz and lesser feldspar crystals in a recrystallised and altered groundmass in which microcrystalline quartz-feldspar is cut by a web of secondary sericite-carbonate forming a strong cleavage.

Specimen 75-424 is from a unit of massive pink to grey crystal-vitric tuff about 200 m upstream of the packbridge. The rock contains scattered small rock fragments and shows considerable alteration in thin section, with quartz and very altered feldspar crystals and grains in a foliated matrix rich in sericite, carbonate and opaques (pyrite-hematite). Large flattened glassy sericite plates resembling fiamme suggest the rock could be an ignimbrite. The unit passes into bedded tuffs and slates just upstream. A similar grey massive crystal-vitric tuff (75-425) occurs about 100 m further upstream and consists of about equal quantities of quartz and altered feldspar crystals and altered glassy matrix. The presence of compressed and bent fiamme-like plates and shard-like shapes in the matrix again suggests a possible ignimbrite origin.

Sandstone-shale-tuff sequences

The tuffs described above grade into a greywacke-shale sequence about 400 m upstream of the packbridge. The tuffaceous greywacke beds range from 2-25 cm in thickness and the shale interbeds are up to 12 cm thick. Many of the greywacke beds show good grading, and many have sole marks and flame structures. Shale fragments occur in many beds and large grains of volcanic quartz are usually prominent. Some of the thicker beds grade into coarse agglomerate with abundant clasts of shale and volcanic rocks, and it is difficult to decide if such units are primary volcanic deposits or re-deposited material. Some thick units of dark pyritic slate also occur.

Approximately 600 m from the bridge, the tuffaceous greywacke sequence grades into a more siliceous sandstone sequence, with less prominent shale interbeds, resembling the Miners Ridge Sandstone of the south Queenstown area. The sandstone is well bedded, pale grey, fine- to medium-grained, and fairly micaceous. A few beds show grading, and some have convolute lamination at the top. The lack of coarse-grained material is characteristic. In thin section (75-426) the rock is moderately well sorted and consists dominantly of fine quartz grains, either in sutured contact or with interstitial fine mica flakes. Many of the quartz grains show slightly undulose extinction. Polycrystalline grains and a few quartz-schist grains indicate a Precambrian

origin. Embayed volcanic quartz grains are not present. Most of the mica appears to be muscovite-type, with some large flakes, but chlorite and biotite also occur. A few scattered brown and green tourmaline grains, with large overgrowths, suggest a metasedimentary source. Carbonate is common as irregular grains and small veins, and there are fairly numerous small opaques. The rock is distinctive in that it appears to be entirely of Precambrian origin, and constitutes one of the best marker horizons in the western sequence.

The Miners Ridge sandstone sequence is intruded along its eastern side by a massive quartz-feldspar porphyry body. Upstream of this, the few exposed sedimentary units consist mainly of dark siltstone and slate and are possibly large xenoliths within the porphyry.

A major sediment-tuff unit occurs at the top of the western sequence and is well exposed just upstream of Diorite Creek and in several places along Diorite Creek. It is underlain by a major quartz-feldspar porphyry body. This sequence as exposed on the north bank of the river consists of:

(1) Bedded agglomerate and tuff at the base, grading into:
(2) A well bedded tuffaceous sandstone-shale sequence, in which some of the coarser beds show grading, load casts and flame structures, and which becomes more shale-rich upwards.
(3) Massive, fine-grained, pale-coloured, glassy tuff, with scattered slate fragments and egg-like devitrification structures.
(4) Laminated cherty slate.
(5) Agglomerate-breccia with sharp basal contact, abundant quartz phenocrysts, and rock fragments of shale, quartz-porphyry and fine-grained volcanic rock in a greenish matrix, grading into a sequence of banded pink and green crystal tuff and fine agglomerate, with some thick graded beds and dark cherty shale interbeds.

The upper part of the sequence is faulted against rhyolite and tuff of the central sequence.

In thin section (75-433), the fine tuff of Unit 3 consists almost entirely of an altered and devitrified mass of glass shards, some of which preserve complete vesicles, with scattered small quartz and feldspar grains. Specimen 75-434 is a pinkish-green tuff from Unit 5 and consists of a jumble of feldspar and lesser quartz grains in a murky greenish matrix containing abundant fine chlorite. Large areas of the matrix have recrystallised to clear, very finely-crystalline feldspar (albite?), and the irregular invading boundaries of these chlorite-free areas have a sharp contact against the unaltered matrix. This texture is almost identical to that found in similar tuffs of the Comstock Formation (Tyndall Group) in the Queenstown area.

Another fairly complete section through this sequence is exposed in Diorite Creek above and below the third major waterfall (counted upstream from the King River). The base of the sequence is occupied by a large basalt dyke which is overlain by interbedded cherty slate and massive fine tuff, with some thick beds of coarse quartz-feldspar crystal tuff. Bedded tuff and shale overlies this, followed by an irregular basalt dyke, more laminated dark shale and pale fine tuff, another large basalt body (at the third waterfall), more shale and fine tuff, and finally bedded crystal tuff. The latter is faulted against massive porphyry to the west and apparently overlain (contact obscured) by rhyolitic rock to the east. A specimen of tuff (76-407) from near the top of the sequence has quartz and feldspar grains floating in an abundant glassy groundmass cut by a sericite-web foliation.

The sequence is again exposed upstream from the falls area in Diorite

Creek. A series of small SE-plunging folds in this area makes it difficult to determine the succession, but the typical massive pale fine tuffs, laminated slates, and crystal tuffs are present. A distinctive narrow basalt sill identical to one which occurs in the sequence further down Diorite Creek, was also observed. Two specimens (76-402, 403) of the pale massive tuff from this area again show it to be composed almost entirely of fine glass shards.

Basaltic intrusives

A number of irregular dykes and sills of basaltic rock occur in the upper part of the western sequence, particularly at the contact between the upper sedimentary unit and the underlying porphyry. Only the largest of these are shown on Figure 1. One such body intrudes quartz porphyry at the mouth of Diorite Creek, and is a dark grey, fine-grained, pyrite-rich rock which in thin section (75-432) shows almost complete alteration of all components (feldspar laths, pyroxene?, glassy mesostasis) to carbonate and chlorite. Fine pyrite grains occur abundantly throughout the rock.

Several large dykes occur in the sedimentary sequence in Diorite Creek in the vicinity of the third and fourth waterfalls. A specimen (76-404) from the body at the contact with quartz porphyry at the fourth waterfall is a greenish-grey, fine to medium-grained rock with small pyroxene phenocrysts. In thin section the rock has small fresh pyroxene phenocrysts and rare feldspar phenocrysts in a groundmass of intergrown feldspar and pyroxene. Relatively small amounts of epidote and chlorite occur as alteration products, and the rock is virtually free of opaques.

An unusual thin sill of basaltic rock, 30-50 cm thick, occurs within thin-bedded shale and fine tuff just downstream of the fourth waterfall. The upper and lower contacts are generally concordant with the bedding, but can be seen to be cross-cutting in detail. The rock is packed with small feldspar phenocrysts, but has narrow chilled margins. An identical sill in what appears to be the same part of the sedimentary sequence occurs in the upper part of Diorite Creek, and is probably the same unit.

CENTRAL RHYOLITE SEQUENCE

This sequence occupies the NW-trending part of the King River gorge immediately south-west of Mt Huxley, and has a width of about 2.5 km. The contact with the western sequence, although not actually exposed except where faulted, appears to be conformable. The contact with the eastern sequence is sub-vertical and appears to be a major fault. The sequence is dominated by massive fine-grained feldspar-phyric rocks (mainly lavas and ignimbrites) and lacks the prominent quartz phenocrysts so typical of the western and eastern sequences.

Bedded tuff-sediment units are rare in the sequence and there appear to be only four in the gorge section. The three westerly units dip and face to the south-east, concordant with the bedding in the western sequence. The easterly unit dips steeply west and although there was some suggestion of west-facing from deformational cusp structures, this could not be confirmed.

Feldspar porphyries

The typical rock type of the central sequence is a massive, pink to pale-coloured, fine-grained, dense rock with rare to abundant small feldspar phenocrysts. Such rocks form the main part of the volcanic sequence in the Jukes-Darwin range and are known to be mainly potash rhyolites. Many show a characteristic micro-spherulitic texture in thin section. Primary structures are rare, but well-developed columnar jointing plunging north-west at 22°

(indicating a flow surface dipping south-east at 68°) is developed just upstream of the western contact. Swirly flow texture in rocks carrying pumiceous fragments was noted in the middle part of the gorge, indicating an ignimbrite origin, but for the most part it is difficult to decide if the rocks are lava flows or welded ash flows.

Specimen 76-401 is from the northernmost outcrop mapped in Diorite Creek, near a faulted(?) contact with quartz porphyry, and is a pink to purplish, jointed rock with fairly numerous irregular amygdale-like bodies filled with soft white material. In thin section, these are composed of a mixture of calcite, siderite and sericite or talc. The rock has phenocrysts and glomerophenocrysts of feldspar in a finely-recrystallised groundmass of fine feldspar.

Specimen 76-405 from the slope east of Diorite Creek, near the base of the sequence, is a pinkish-green rock with prominent pink feldspars and small green chlorite flecks. In thin section the large feldspar are mainly glomerophenocrysts and are contained in a finely-crystalline feldspathic groundmass, with some fine chlorite, showing some development of fine spherulites. The larger chlorite patches are irregular in shape, and are intergrown with quartz in some cases. Specimen 76-406, from the same general area, is similar except that the groundmass is more obviously spherulitic and richer in quartz and contains a small amount of clinozoisite(?) associated with a few of the feldspar phenocrysts. Specimen 76-408, also from near the base of the sequence, is a feldspar-porphyry, but is probably an ash-flow tuff since the matrix contains shard-like bodies and fragments of glassy material resembling pumice.

Specimen 75-435, from near the faulted western contact in the King River, is a massive pink feldspar-porphyry with small patches of chlorite and a murky, finely-crystalline groundmass showing minor spherulite development. Specimen 75-436 is from the area of columnar jointing, and again is a massive, pink, fine-grained feldspar-porphyry in which the abundant finely recrystallised groundmass shows incipient spherulite or 'snowflake' development such as described in the Jukes Proprietary area (Corbett, 1976).

An unusual pale glassy rhyolite occurs immediately beneath the second sediment horizon from the western margin. The upper 5 m of this unit shows a pseudo-breccia texture in which irregular rounded patches or 'fragments' are contained in a slightly darker groundmass of similar composition. Thin sections show that the fragments (76-410) and matrix (76-411) both consist of feldspar-porphyry with a relatively coarsely recrystallised groundmass. Two sericite foliations are apparent in 76-410. In the uppermost 30 cm of the unit, this texture merges into a distinctive 'pseudo-amygdaloidal' texture in which abundant small, rounded, paler-coloured bodies up to one centimetre across are contained in a slightly darker matrix. The bodies are surrounded by a rim of greenish material and coalesce to form larger, irregular shapes which merge into the coarse 'breccia' texture downwards. In thin section (76-412) the bodies consist of groundmass material which has recrystallised to granophyric texture with a core of mosaic quartz which partially to completely replaces the earlier feldspathic groundmass in some cases. The rim material is fine sericite. The interstitial 'matrix' consists of coarsely recrystallised feldspathic groundmass material with a few feldspar phenocrysts. The textures probably represent crystallisation phenomena in an originally glassy rock which may have been either a welded ash-flow or a lava. The top of the flow has been eroded by the base of the overlying sediment horizon.

The sediment horizon is followed to the east by massive, pale grey rhyolite (76-413) in which feldspar phenocrysts and glomerophenocrysts float in a finely-recrystallised feldspar-quartz-sericite groundmass with scattered carbonate and opaques.

For some distance east of the third sediment horizon most of the feldspar porphyries contain small rock fragments and glassy blebs and commonly show swirly flow textures. They appear to be largely of pyroclastic origin. Specimen 76-414 contains abundant feldspar crystals and grains and pink feldspar-porphyry rock fragments, in a foliated granular matrix rich in sericitised glassy material. It is probably an ash-flow. Specimen 76-415 contains abundant greenish glassy blebs resembling fiamme which form a measurable eutaxitic foliation dipping steeply east. The ignimbritic nature of this rock is clear in thin section, where a few feldspar phenocrysts and a number of glassy fragments (some of which clearly preserve their flattened pumice texture) are contained in a swirly, finely recrystallised glassy groundmass with shard texture preserved in places. Specimen 76-416 is a green, feldspar-rich rock in which the glassy groundmass is very rich in shards and has irregular flattened chlorite plates (some of which surround feldspar crystals) which may represent pumice fragments. This rock is also probably an ignimbrite.

A variable sequence of glassy, fine-grained feldspar-porphyries occurs west of the upstream bedded unit. Specimen 75-422 is a pink, fine-grained rock rich in secondary quartz which appears to have replaced most of the original feldspar phenocrysts. Small pink spherulites showing radial and concentric structure occur abundantly through the finely crystalline groundmass. Spherulitic pink to grey rhyolite is the dominant rock type upstream of the bedded unit. Specimen 75-419 has scattered feldspar phenocrysts, some almost completely altered to sericite, and small primary quartz phenocrysts, in a groundmass composed largely of pink spherulites. The inner parts of many of the spherulites consist of intergrown fine feldspar and lesser quartz. The boundaries of the spherulites are less well defined in specimen 75-418, and the groundmass under crossed nichols has a fine granophyric texture. In specimen 75-417 the groundmass consists almost entirely of coalesced, poorly defined spherulites in which the graphically-grown quartz cores, previously described from the Mt Jukes area, are prominent. These massive pink rhyolites are continuously exposed in cliffs and creek sections between the river and the Jukes Proprietary adits on the north face of Mt Jukes.

Bedded sediment-tuff units

The westernmost bedded unit is exposed on the north bank of the river, in faulted contact with the upper sedimentary unit of the western sequence. It consists mainly of thin to thick-bedded, fine- to medium-grained tuffs conformably underlying massive rhyolite. Specimen 76-409 shows a thin (1.5 cm) bed of very fine faintly laminated glassy tuff between thicker beds of feldspar-rich crystal-vitric tuff. A single strong cleavage cuts steeply across the bedding.

The second bedded unit is about 10 m thick and consists of fine-grained cherty siltstone and tuffaceous sandstone beds. Some of the latter have erosional bases indicating east-facing. The sequence truncates the top of a pale glassy flow and is overlain by massive rhyolite.

The third bedded unit comprises several metres of laminated contorted slaty siltstone and fine sandstone at the base, followed by about 10 m of faintly-bedded pale glassy tuff with devitrification spots. Overlying this is massive greenish feldspar-rich tuff, passing into the ignimbritic porphyries described previously.

The upstream bedded unit is about 100 m thick. At the eastern margin is agglomerate containing abundant fragments of cherty, fine-grained material. This passes west into well-bedded to laminated, very fine-grained glassy tuff (75-420) with small deformational cup structures in places. West of this is agglomerate, followed by spherulitic glassy rock with much secondary quartz which could be either a tuff or a lava (75-421).

EASTERN SEQUENCE

The eastern sequence forms the gorge from south of Mt Huxley to the lower end of the Hydro-Electric Commission dam site near Crotty. The sequence consists predominantly of volcaniclastic conglomerate and conglomeratic sandstone, with minor volcanic rocks in the form of quartz-phyric tuffs and agglomerates and quartz-feldspar porphyries of unknown origin. The rocks are mostly strongly cleaved, so that bedding could not be observed in the gorge section, and boundaries between rock types could not be mapped. A similar volcaniclastic sequence is exposed on the eastern flanks of Mt Huxley, where a small amount of mapping has been done, and here it is possible to find bedding in many outcrops and to see the relationships with the underlying and overlying rocks more clearly.

The contact with the central rhyolite sequence is exposed on the south side of the gorge in the creek which drains the Jukes Proprietary area. It is sub-vertical and rather irregular, and appears to continue vertically for over 600 m to Proprietary Peak, where it corresponds to a fault which displaces the Owen Conglomerate. On the north-east flank of Mt Huxley, however, the contact with the rhyolite sequence appears to be sedimentary and unconformable. South-dipping volcaniclastic conglomerate and sandstone beds overlie chloritised and fractured rhyolite in which the only stratification observed dips steeply west. The eastern sequence in this area appears to be in the form of a rather shallow, folded layer lying roughly parallel to the slope, with the folds plunging south to south-east. Outcrops of feldspar-porphyry rock which also occur on the slope may represent anticlinal cores.

The contact with the Owen Conglomerate at the eastern end of the gorge is a fault dipping west at about 75°. The faulted contact east of Mt Huxley may be part of the same major structure. Basal Owen Conglomerate of the Mt Huxley mass occurs on the north bank of the river south of Mt Huxley, where the lowermost 3 m of the beds are partly volcaniclastic and overlie massive, cleaved volcaniclastic conglomerate. The beds dip south-west at about 40° and are faulted off on the western side. The contact with the Owen Conglomerate on the north-east side of Mt Huxley is apparently conformable and gradational, with purplish volcaniclastic sandstone passing into reddish siliceous sandstone with thin conglomerate bands.

The eastern part of the sequence in the gorge, for several hundred metres downstream of the dam site, consists of strongly cleaved purplish volcaniclastic cobble conglomerate, with most of the clasts somewhat flattened and drawn out along the cleavage. The clasts are rounded and consist mainly of quartz-feldspar porphyry and fine-grained rhyolite. Greenish-grey quartz-phyric agglomerate and tuff occur in the east-west section of the gorge, associated with volcaniclastic conglomerate containing shale fragments.

An old prospect adit (probably Jukes Consols) has been driven into a knob of pink quartz-feldspar porphyry on the south bank of the river near the contact with the central rhyolite sequence. The rock from the adit is a schistose, fractured, greenish-grey material carrying fairly abundant pyrite. Fresh rock from here (75-416) contains large embayed quartz phenocrysts and very altered feldspar phenocrysts in a murky groundmass which appears to consist largely of recrystallised quartz and feldspar and some glassy material. Limonitised pyrite grains and disseminated limonite are common. The rock is volcanic, but could be either tuff or lava.

It is possible that some of the volcaniclastic rock mapped as undifferentiated eastern sequence in this area is a direct equivalent of the 'Jukes Conglomerate' in the type area on the north face of Mt Jukes (Corbett, 1976). The upper part of the sequence which is conformable and apparently gradational

with the Owen Conglomerate on Mt Huxley, occupies the same stratigraphic position as the 'Jukes Conglomerate'. However, it has not been possible to differentiate this from the underlying, partly volcanic sequence, a problem also found in the Mt Jukes area. Mapping to the north of Mt Huxley, at the southern margin of Lyell 'A' Sheet, shows that the volcaniclastic sequence is not present in that area and hence it must wedge out against the faulted Owen Conglomerate contact.

OWEN CONGLOMERATE

This formation crops out continuously from the type area at Mt Owen to the upstream end of the King River gorge. It has not been examined in detail, but the nature of the sequence near the contacts with the volcanic rocks has been noted. In the gorge at the southern end of Mt Huxley, the lower part of the sequence consists mainly of pebble-cobble conglomerate with intercalated purple sandstone beds and lenses up to 30 cm thick and several sandstone units up to 5 m thick. On the east flank of Mt Huxley, the lower beds are mainly red sandstone and minor pebble conglomerate grading down to partly volcaniclastic sandstone.

The stratigraphy and structure of the conglomerate sequence at the Hydro-Electric Commission dam site have been described in some detail by Corbett (1964). A lower siliceous conglomerate member about 100 m thick occurs west of the major faulted contact on the south bank and is overlain by a pink cross-bedded sandstone member about 50 m thick, grading into a shale-sandstone member (60 m), followed by pink sandstone with worm tubes (54 m), and fine conglomerate with minor shale and 'greywacke' (>15 m). The lower conglomerate and overlying pink sandstone and shale-sandstone units probably correspond to those mapped on the ridge east of Mt Jukes (Corbett, 1976).

On the ridge east of Mt Huxley, the conglomerate beds dip west towards the faulted contact and comprise cobble-boulder conglomerate with pink sandstone lenses.

STRUCTURAL GEOLOGY

Bedding in the western sequence dips predominantly E-SE and faces east, and appears to form the eastern limb of an anticlinal structure. This structure probably corresponds to the Miners Ridge Anticline to the north. Dips are mainly to the south near the packbridge, suggesting that this area could be near the crest of the fold. A strong NNW-trending cleavage, generally dipping steeply east, affects the sequence and appears to be related to a series of SE-plunging minor folds. These are particularly well developed in parts of the Miners Ridge sandstone correlate and in the upper sedimentary sequence. The cleavage is strongly fanned in the cores of these folds and seems to be axial planar to them. Plunges of the folds vary from shallow to vertical. One outcrop of slate within the Miners Ridge sequence shows this cleavage crenulating an earlier cleavage parallel to bedding. The main cleavage clearly cross-cuts the major (Miners Ridge) anticlinal structure, which trends NNE, and is not related to it.

Few structural data were obtained in the more massive central rhyolite sequence. Dips and facings in the bedded units towards the western margin are to the south-east, concordant with those in the underlying sequence. Sub-vertical bedding in the easternmost bedded unit possibly faces west, suggesting that the overall structure of the sequence in the gorge could be a large syncline, but this requires further work for confirmation.

The structure of the eastern sequence in this area is very poorly known. Bedding readings in the Mt Huxley area suggest SE-plunging minor folds,

possibly superimposed on a broad anticlinal structure, the crest of which is preserved in the Owen Conglomerate along the east flank of Mt Huxley. A very strong NNW-trending cleavage affects this sequence.

Fold and fault structures are much easier to observe in the Owen Conglomerate, although a detailed analysis is beyond the scope of this project. The major structures, as can be observed elsewhere in the Jukes-Darwin area, are a series of NW-trending cross-folds and faults superimposed on a broad N-S anticline. On Mt Huxley, the Owen beds form a SE-plunging syncline, the axis of which runs along the south-western flank and crosses the river at about the position of the faulted Owen Conglomerate-eastern sequence contact south of Mt Huxley. A corresponding anticline axis is apparent on the upper east flank of Mt Huxley and probably continues into the faulted crestal zone at the Hydro-Electric Commission dam site.

A complex series of SE-plunging minor folds affects the Owen Conglomerate sequence at the dam site (Corbett, 1964). The folds have wavelengths of 1 to 15 m, and plunges range from 20-70°. It seems likely that these folds are of the same generation as the NW-SE folds which affect the volcanic sequences, and that the folding and major cleavage development are Tabberabberan features.

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TASMANIA DEPARTMENT OF MINES

GEOLOGY OF KING RIVER GORGE

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5 cm

0 500 1000 1500 2000 metres

0 500 1000 1500 2000 yards

QUATERNARY

Boulder moraine and scree.

EARLY ORDOVICIAN – CAMBRIAN – ?LATE PRECAMBRIAN

Owen Conglomerate – undifferentiated siliceous conglomerate, sandstone, minor shale.

EASTERN SEQUENCE

Undifferentiated volcaniclastic conglomerate and sandstone with quartz-feldspar-phyric volcanic rocks.

CENTRAL SEQUENCE

Massive, pink to pale-coloured feldspar-porphyry, with minor bedded tuff-sandstone-shale units.

WESTERN SEQUENCE

Basaltic dyke.

Massive quartz-feldspar porphyry (mainly intrusive).

Quartz-feldspar porphyries showing banding or breccia textures indicating extrusive origin.

Interbedded greywacke, shale and quartz-feldspar-phyric tuff

Miners Ridge-type quartz sandstone and interbedded mudstone.

Geological boundary observed or accurate.

Geological boundary approximate.

Fault observed or accurate.

Fault approximate.

Fold axis.

20 Plunge of minor fold.

Bedding, facing unknown, facing known.

Primary foliation in volcanic rock.

Plunge of columnar jointing.

Cleavage.

Prospect.

76-413 Location of specimen number referred to in text.

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FIGURE 1.

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