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LITHOSTRATIGRAPHY AND BIOSTRATIGRAPHY OF THE FLORENTINE VALLEY FORMATION IN THE TIM SHEA AREA, SOUTHWEST TASMANIA

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(with three text figures)

ABSTRACT

STAIT, B. and LAURIE, J., 1980 (31 v): Lithostratigraphy and biostratigraphy of the Florentine Valley Formation in the Tim Shea area, southwest Tasmania. *Pap. Proc. R. Soc. Tasm.*, 114: 201-207. ISSN 0080-4703. Department of Geology, University of Tasmania, Australia.

The Florentine Valley Formation is defined. The Formation is subdivided into three members; the Churchill Sandstone Member, the Pontoon Hill Siltstone Member, and the Mt. Field Siltstone Member. Seven consecutive fossil assemblages based on brachiopods and trilobites can be recognised within the Florentine Valley Formation. International correlation of the assemblages in the Florentine Valley Formation is based on graptolites, that of the basal Karmberg Limestone on graptolites and conodonts. The Formation ranges in age from Early Tremadoc to Late Arenig.

INTRODUCTION

The Florentine Valley lies approximately 100 km west of Hobart. Access to the Valley is provided by the Gordon Road and by private logging roads owned and maintained by Australian Newsprint Mills (see fig. 1).

The Florentine Valley Formation outcrops on the eastern and southern sides of the Florentine Valley, along the eastern limb of the Florentine Synclinorium. The Florentine Valley Formation is best exposed in the southern end of the Valley along the Gordon Road, directly west of the Needles and along the Florentine Road at the Gap. A more detailed discussion of the geological setting can be found in Corbett and Banks (1974).

Lewis (1940) described within his Junee Series from the Tim Shea-Maydena area a fine-grained clastic sequence from which Kobayashi (1940) described a brachiopod, gastropod and trilobites. He assigned an Early Ordovician age to this fauna. The only previous description of the fauna from these beds was that of Etheridge (1904). Later Brown (1948) described a small brachiopod fauna from near Maydena and the Gap. To this she assigned an Early Ordovician age. Thomas (1960) and Quilty (1971) have illustrated graptolites from the Florentine Valley Formation. Faunal lists can also be found in Öpik (1951), Banks (1962) and Corbett (1963). Corbett and Banks (1974) described the lithostratigraphy of the Florentine Valley Formation in three sections (but did not establish formal members) and also established a preliminary biostratigraphy.

LITHOSTRATIGRAPHY

Banks (1962) formally raised the Florentine Valley Mudstone to the formational level. Corbett and Banks (1974) changed the name to the Florentine Valley Formation and defined it as "that formation of sandstone and siltstone with lesser limestone and chert which conformably overlies the Tim Shea Sandstone and Reeds Conglomerate and underlies the Gordon Limestone Sub-Group" (fig. 2). No type section was named and no boundaries were defined. Because no complete section of the Florentine Valley Formation exists it is necessary to define the base and the top of the Formation in different sections. Along the Gordon Road the top is faulted away and along the Florentine Road

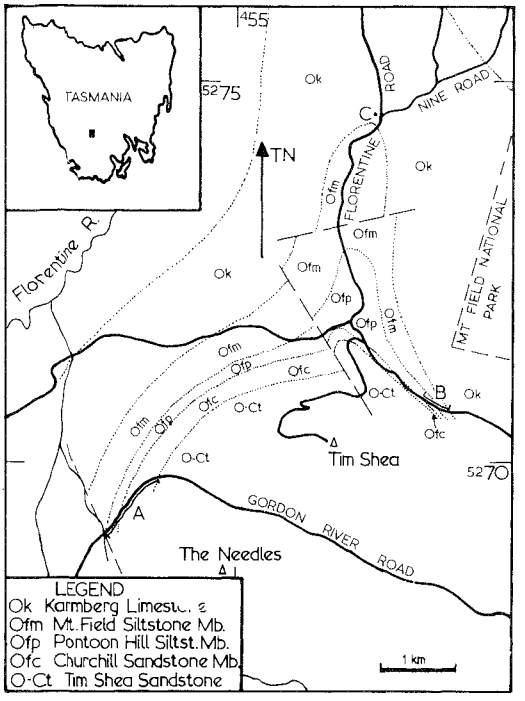

FIG. 1.- Map showing location of collected sections within the Florentine Valley.

the base does not outcrop.

The base of the formation is herein defined as occurring in a creek crossing the Gordon Road approximately 18 km from Maydena, just west of the Humboldt Divide, (State Grid. ref. Wedge 8112: 539698). This locality is on the western limb of the Tim Shea Anticline (see fig. 1). The base is chosen as the boundary between the coarse reddish sandstone typical of the Tim Shea Sandstone and the fine grey bioturbated sandstone above. The boundary is transitional. The top of the formation is defined as the base of the lowest lenticular body of limestone occurring in the cutting on the Florentine Road 150 metres east of the highest point on the road at the Gap (State Grid. ref. Wedge 8112:581707). The overlying formation is the Karmberg Limestone. This locality is on the eastern limb of the Tim Shea Anticline.

Corbett and Banks (1974) did not establish formal members, but following recent work by the authors it is now considered feasible to subdivide the Florentine Valley Formation into three members, as follows (fig. 3).

Churchill Sandstone Member (nov. (Nov.):- This is the basal member of the Florentine Valley Formation and occurs along the Gordon Road (State Grid. ref. Wedge 8112: Base 539698, top 535694). It consists of thickly-bedded, bioturbated grey sandstone containing rare gastropods, and is 75 m thick along the Gordon Road.

Pontoon Hill Siltstone Member (nov.):- This is the middle member of the Florentine Valley Formation, and is best exposed on the Gordon Road near the 12 mile post (19 km from Maydena), (State Grid. ref. Wedge 8112: Base 535694, top 529685). It consists of a basal white siltstone overlain by interbedded yellow siltstone and nodular siltstone, overlain in turn by dark grey calcareous siltstone and with interbedded yellow siltstone and nodular siltstone at the top. This member is 260 m thick along the Gordon Road and contains a diverse fauna of trilobites, brachiopods, gastropods, graptolites and ostracods.

Mt. Field Siltstone Member (nov.):- This is the uppermost member of the Florentine Valley Formation and is best exposed at the Gap. It consists of interbedded calc-siltstone, siliceous siltstone and fine siliceous sandstone overlain by finely bedded siltstone and is 55 m thick. It contains a diverse fauna of brachiopods, trilobites, gastropods, and graptolites. Underlying this member at the Gap are interbedded yellow siltstone and nodular siltstone of the Pontoon Hill Siltstone Member.

Corbett (1975) in describing the Upper Cambrian and Lower Ordovician sequences from the Denison Range, established the Denison Sub-Group, of which the uppermost formation is the Squirrel Creek Formation (fig. 2). Corbett (1975) divided the Squirrel

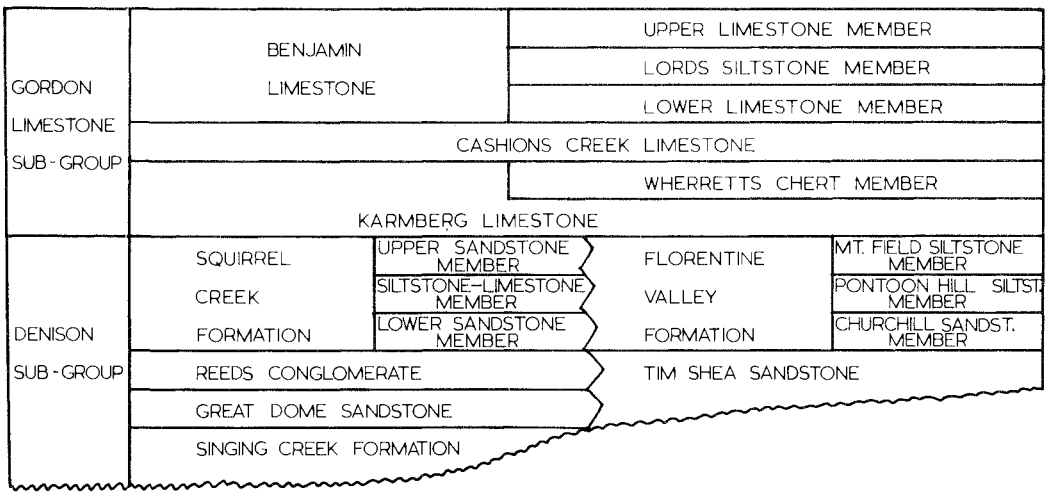

FIG. 2.- Denison Sub-Group and Gordon Limestone Sub-Group Stratigraphy (modified from Corbett and Banks 1974).

Creek Formation into three members: a Lower Sandstone Member overlain by a Siltstone-Limestone Member, of interbedded grey to yellow calcareous siltstone, fine sandstone and impure nodular limestone, and an Upper Sandstone Member. The two lower members are quite similar lithologically to the lower two members of the Florentine Valley Formation. The Upper Sandstone Member consists of grey-green and buff coloured quartoze and micaceous sandstone with inter-bedded siltstone with glauconite bands, and differs from the Mt. Field Siltstone Member of the Florentine Valley Formation in the predominance of sandstone, the presence of glauconite and in its much greater thickness.

From collections of fossils made by Corbett from the lower two members of the Squirrel Creek Formation it would appear that they are biostratigraphically equivalent to those of the Florentine Valley Formation.

BIOSTRATIGRAPHY

Recent work by the authors on the trilobites (Stait) and brachiopods (Laurie, in press), has made possible an initial biostratigraphic subdivision of the Florentine Valley Formation. Formal zones are not erected because of a reliance on only two sections which, to a large extent, do not overlap.

Within the formation can be recognised seven assemblages based on the ranges of

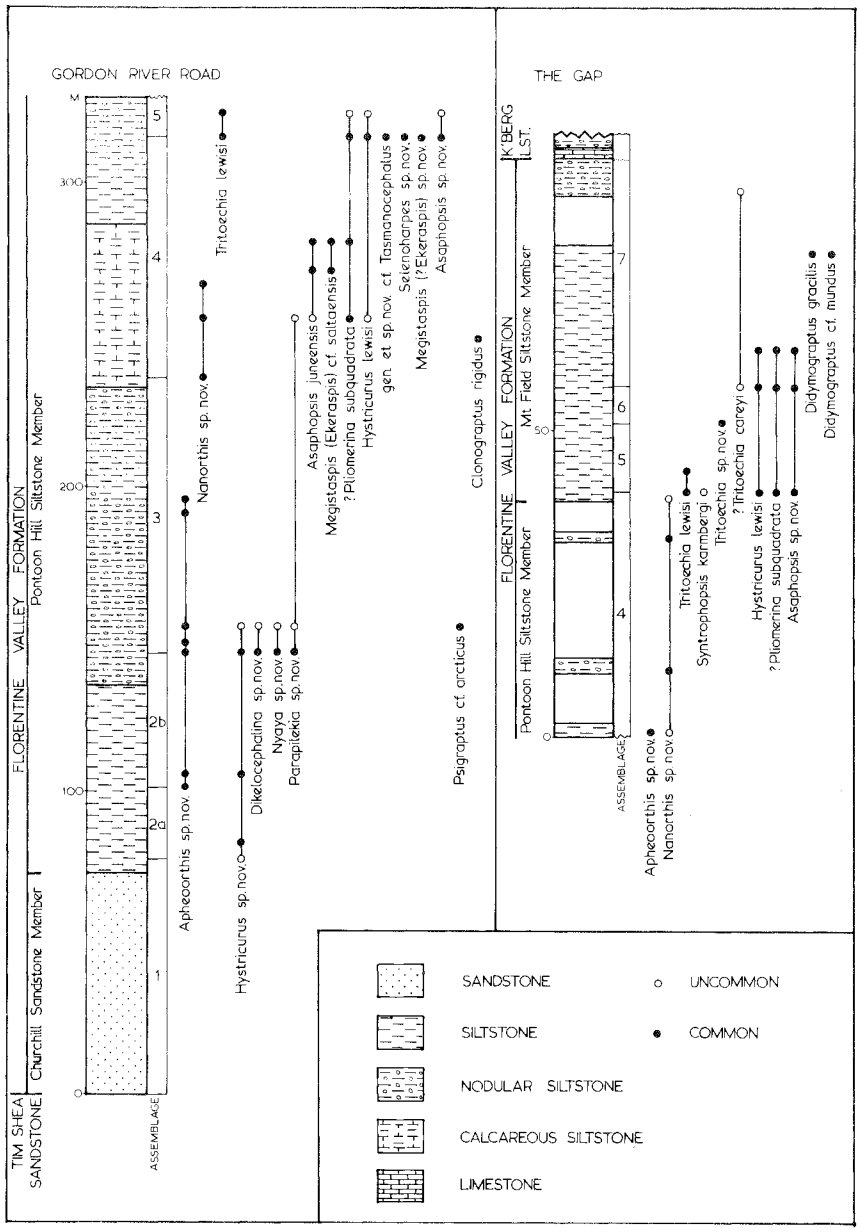

FIG. 3.- Stratigraphic sections of the Florentine Valley Formation showing the lithological units and the ranges of the faunal elements.

trilobites and brachiopod species (fig. 3). The two sections used to establish these assemblages are correlatable via assemblage 5 which occurs in both.

The assemblages are as follows:

Assemblage 1 :- *Lesueurilla* (identification, Dr. E. Yochelson pers. comm.)
Assemblage 2 :- *Hystricurus* sp. nov., *Westonia* sp., *Apheoorthis* sp. nov.
2a:- *Hystricurus* sp. nov., *Westonia* sp.
2b:- *Hystricurus* sp. nov., *Westonia* sp., *Apheoorthis* sp. nov.
Assemblage 3 :- *Hystricurus* sp. nov., *Parapilekia* sp. nov., *Dikelocephalina* sp. nov., *Nyaya* sp. nov., *Apheoorthis* sp. nov., *Psigraptus* cf. *arcticus* Jackson (identification, Dr. R.B. Rickards pers. comm.)
Assemblage 4 :- *Parapilekia* sp. nov., *?Pliomerina subquadrata* (Kobayashi), *Megistaspis (Ekeraspis)* cf. *saltaensis* (Kayser), *Asaphopsis juneensis* Kobayashi, *Hystricurus lewisi* (Kobayashi), *Nanorthis* sp. nov., *Clonograptus rigidus* (Hall).
Assemblage 5 :- *?Pliomerina subquadrata* (Kobayashi), *Megistaspis (Ekeraspis?)* sp. nov., *Selenoharpes* sp. nov., *Asaphopsis* sp. nov., gen. et sp. nov. (aff. *Tasmanocephalus*), *Hystricurus lewisi* (Kobayashi), *Tritoechia lewisi* Brown, *Syntrophopsis karmbergi* Brown.
Assemblage 6 :- *?Pliomerina subquadrata* (Kobayashi), *Hystricurus lewisi* (Kobayashi), *Asaphopsis* sp. nov., *Tritoechia* sp. nov. 1.
Assemblage 7 :- *?Pliomerina subquadrata* (Kobayashi), *Hystricurus lewisi* (Kobayashi), *Asaphopsis* sp. nov., *Tritoechia careyi* Brown, *Didymograptus gracilis*, *D.* cf. *mundus*, *Clonograptus* sp., *Tetragraptus* sp.

The UTGD catalogue members of the new species and genera can be found in Appendix 1, while the new classifications of specimens figured in Corbett and Banks can be found in Appendix 2.

The top of assemblage 7 fortunately coincides with the top of the Florentine Valley Formation. A diverse conodont fauna is found at the base of the Karmberg Limestone (Burrett and Stait, in prep.). Approximately five metres above this is a fauna containing *Leptella* sp. nov. This fauna correlates with the base of the Karmberg Limestone at Nine Road-Florentine Road junction (C. of fig. 1) which contains *Geragnostus* sp., *?Dimeropygiella* sp., aff. *Carolinites* sp., *Selenoharpes* sp., *Tasmanocephalus stephensi*, *Archaeorthis* sp. nov., *Tritoechia* sp. nov. 2, *Leptella* sp. nov.

Correlation of the Florentine Valley Formation is obtained from examination of assemblage 3 and upper assemblage 7 - lower Karmberg Limestone faunas. Assemblage 3 contains *Apheoorthis* and *Nyaya* which on the Siberian Platform occur in the Nyaika horizon (Sokolov and Tesakov, 1975). Rozova (1968) placed the Nyaika horizon at the base of the Ordovician, while Yadrenkina (1974) had the Khantaika horizon as the basal horizon with the Nyaika horizon above it. Assemblage 3 also contains *Psigraptus* cf. *arcticus* which occurs in Assemblage 3 of Cooper (1979) to which he assigned an age of Lancefieldian 1.5 (Early Tremadoc). The Florentine Valley Formation is approximately 100 m thick below this assemblage and the base may thus be Late Cambrian, although there is no faunal evidence to support this. Assemblage 4 contains *Clonograptus rigidus* which Cooper (1979) included in his Assemblage 4, to which he assigned a Lancefieldian 2 age (Late Tremadoc).

The upper part of assemblage 7 - lower Karmberg Limestone contains the graptolites *Didymograptus gracilis* (assemblage 7) and *Phyllograptus anna* and *P. ilicifolius* (lower Karmberg Limestone). The Karmberg Limestone graptolites indicate a correlation with the Upper *Didymograptus extensus* zone in the Skiddaw Group (Jackson, 1962), suggesting a Castlemanian age (Strachan 1972).

The conodonts from the base of the Karmberg Limestone are correlatable with the

Upper *Prioniodus (Oepikodus) evae* Zone (Dr. C. Burrett pers. comm.), which Lindström (1971) regarded as very Late Early Arenig (*Didymograptus nitidus* Zone).

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APPENDIX 1

University of Tasmania Geology Department catalogue numbers for the specimens of the genera and species mentioned in the text. This list is to enable checks on the assignments to be made before the taxonomic work appears.

Trilobites

Hystricurus sp. nov., U.T.G.D. 95972-76.
Parapilekia sp. nov., U.T.G.D. 95987-89.
Dikelocephalina sp. nov., U.T.G.D. 95977-82.
Nyaya sp. nov., U.T.G.D. 95983-86.
?Pliomerina subquadrata, U.T.G.D. 95992, 96000-05, 96028-29.
Megistaspis (Ekeraspis) cf. *saltaensis*, U.T.G.D. 95993-95.
Asaphopsis juneensis, U.T.G.D. 95991.
Megistaspis (Ekeraspis?) sp. nov., U.T.G.D. 96002-05, 96014-15.
Selenoharpes sp. nov., U.T.G.D. 96007-10.
Asaphopsis sp. nov., U.T.G.D. 96034-38, 96054.
gen. et sp. nov. (cf. *Tasmanocephalus*), U.T.G.D. 95999, 96021-27.
Hystricurus lewisi, U.T.G.D. 96039-44, 96052, 96073.

Brachiopods

Apheoorthis sp. nov., U.T.G.D. 97335-47.
Nanorthis sp. nov., U.T.G.D. 93748-63.
Tritoechia lewisi, U.T.G.D. 97366, 68, 71, 74-76, 80, 82, 84, 85.
Tritoechia sp. nov. 1, U.T.G.D. 97397-413.
Tritoechia sp. nov. 2, U.T.G.D. 97427-42.

APPENDIX 2

The assignments given to material figured in Corbett and Banks (1974) in the present study.

Trilobites

"Asaphopsis" juneensis - *Asaphopsis* sp. nov.
Hystricurus paragenulatus - *Hystricurus lewisi*.
Hystricurus sp. - *Hystricurus lewisi*.
"Asaphellus" lewisi - *Megistaspis (Ekeraspis?)* sp. nov.
Hystricurus cf. *paragenulatus* - *Hystricurus lewisi*
Cybelopsis sp. - *?Pliomerina subquadrata*

Brachiopods

Finkelnburgia cf. *bellatula* - *Apheoorthis* sp. nov.
Apheoorthis sp. -*Apheoorthis* sp. nov.
?Nanorthis - *Nanorthis* sp. nov.
Nanorthis cf. *hamburgensis* - *Nanorthis* sp. nov.
Nanorthis sp. - *Nanorthis* sp. nov.
Apheoorthis cf. *meeki* - *Apheoorthis* sp. nov.
Apheoorthis cf. *emmonsi* - *Apheoorthis* sp. nov.
?Tritoechia careyi - *Tritoechia* sp. indet.