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REPORT No. .

SHELLY ORDOVICIAN STRATA AT THE BELUBULA RIVER NEAR CANOWINDRA, N.S.W.

by

A.A. ÖPIK.

Records No. 1951/22.

CHELLY ORDOVICIAN STRATA AT THE BELUBULA RIVER

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"At 2 o'clock we arrived at Limestone Creek, passing through a beautiful picturesque country of low hills and fine valleys, well watered."

"The limestone, which is the first that has hitherto been discovered in Australia, abounds in the valley where we halted." (Oxley, "Journal of two Expeditions in Australia in 1917 and 1818". The discoverer was Deputy Surveyor of Lands G.W. Evans; the date was June, 1815, acc. Carne and Jones, 1919. This is the limestone which is described in this report and so it is shown that the first limestone discovered in Australia is of Ordovician age).

INTRODUCTION

The Ordovician age of the limestone at the Belubula River was recognized by the present writer from fossils collected by Mr. N. C. Stevens, University of Sydney (see letter to Chief Geologist from A. A. Opik, 27th October, 1950, file 17 AAO/1). As suggested by A.A. Opik, Mr. Stevens published a note upon this discovery in the Australian Journal of Science, 1950.

Though, in the opinion of A. A. Opik, the first collection examined was completely convincing, Mr. Stevens approached the Chief Geologist, Dr. N. H. Fisher, early in 1951 for further support in the field. It was then decided that A. A. Opik, being responsible for the age-determination of the fossils from the Belubula River, Cliefden Caves area, would accompany Mr. Stevens on a field excursion to collect more evidence for the age of the limestones and to look for an occurrence of Silurian fossils in the same area.

A. A. Opik, accompanied by J. J. Veevers, examined the area in the field with Mr. Stevens from 28th February to 3rd March, inclusive. A good collection of various fossils was made. The collection is held in the Bureau of Mineral Resources, Canberra. Mr. Stevens has already mapped the area,

and during the excursion he produced a large amount of field observations, and demonstrated several localities and outcrops of contacts from which the Middle Ordovician age of the Belubula River Limestone is evident by virtue of superposition. The limestone is covered conformably by Upper Ordovician graptolite-bearing rocks, which also contain some of the shelly fossils observed in the limestone itself.

Position, Access, Maps. The area visited is situated on the Belubula River, 13 to 14 miles east of Canowindra, N.S.W., within the boundaries of Boonderoo (Mr. Dunhill) and Kalimnah (Mr. Smith) Stations. It can be reached from Mandurama a gate with the number 26 indicates the beginning of the road leading north to Boonderoo, along Limestone Creek. Some other roads are also present as is indicated on the military 1-mile map, Sheet Canowindra. Carne and Jones (1919, pp. 177-178) have described the limestones of the area, and the limestones visited in the Parish of Malongulli are shown in the south-east portion of the map ("Plan showing the Limestone Deposits south of Cargo").

Some previous references. J. E. Carne and L. J. Jones (1919) give the age of these limestones as Silurian, and use the name Belubula Limestone Belt for them. The limestone at Limestone Creek, one mile north of the Canowindra - Mandurama road, is correctly considered to be the continuation of the "Belubula Limestone".

Trickett (1909) regards the age of the limestone as Upper Silurian, mentions the names of six fossils, and gives a sketch of the "Fossil Hill". The "fertile flat" in Trickett's description is referred to below as "The Large Flat".

W. R. Browne (in David, 1950, p.198) mentions Silurian limestones south-west of Cargo containing "a faunal assemblage which is unique for the State, including as it does Lophospira, Hormotoma (?), Naticopsis and Lituites". Most probably it represents the Belubula Limestone.

N. C. Stevens (1950) calls the Belubula Limestone of Carne and Jones the Cliefden Caves Limestone, and refers to a work of Pittman (1900) and the latter's opinion that some of the andesitic lavas of the area are Ordovician.

DESCRIPTION OF THE ORDOVICIAN SEQUENCE

(In ascending order)

1. As pointed out by N.C.Stevens (1950), the oldest rocks are andesitic lavas. Both amygdaloidal and porphyritic textures are represented, as well as tuffs. Tuffaceous bands are also present at the base of the next higher (sedimentary) part of the section. The contact of the sediments against the basic igneous rocks is completely conformable, and can be observed in outcrops at "Fossil Hill" and Davy's Creek crossing. In both places the igneous rocks are overlain by exactly the same fossiliferous horizon, the distance between the localities being about 1.5 miles.

2. Above the igneous member are flaggy and shaly limestones full of large shells of a brachiopod which seems to be a new genus of Trimerellacea. Superficially the rock looks very like a Silurian Pentamerus limestone. Brachiopods, bryozoans, and four genera of corals (including Tetradium), are

abundant. "Fossil Hill" at the Large Flat consists of these beds, which are over 100 feet thick. A suitable name for this member, which is an excellent marker horizon, could be "Davy's Creek Limestone".

3. The Davy's Creek Limestone passes upwards without a break into well-bedded, extremely fossiliferous limestones, which may be called the "Large Flat Limestone". It is nearly 200 feet thick. The best outcrops are the hills and their slopes and cliffs along the eastern side of The Large Flat.

Amongst the fossils collected, the following forms could be identified:-

TRILOBITAE	- Asaphidae (two forms), Pliomeridae, Encrinurella, Lichas, Trinucleus, Remopleuridea;
BRACHIOPODA	- Rhynchotrema, Orthidae (two genera), Syntrophiidae (one genus), Camerella, Spanadonta Rafinesquina, Protozyga, and a new genus (perhap new family also);
GASTROPODA	- Lophospira, Hormotoma, Raphistomina, Raphistoma, Maclurites, Phragmolites, and some other bellerophontids;
OSTRACODA	- 4 genera;
BRYOZOA	- Pachydictya, Phinidictya, two or three genera of Trepostomata;
NAUTILOIDEA	- several coiled and straight forms;
CORALS	- Heliolitida, Streptelasma, and some unidentified forms.

4. Above the Large Flat Limestone lie thick, bedded, hard limestones, easily distinguishable from the underlying beds by their more massive appearance. Fossils are relatively rare, and the forms collected are the same as in the Large Flat Limestone. The thickness is great, several hundred feet. Silicified, "certy" bands occur regularly in the upper portion. The Cliefden Cabes are in these beds, and so this unit could be called the Cliefden Caves Limestone, to apply the name used by N.C. Stevens (1950). The Limestone at Limestone Creek one mile north of the Mandurama - Canowindra road represents a part of the Cliefden Caves Limestone also.

The top of the Cliefden Caves Limestone is in some outcrops brecciated and partly involved in interformational flowage (slumping) folds of the base of the next unit.

5. The Cliefden Caves Limestone is conformably overlain by black, calcareous, siliceous, hard, laminated beds (black calcareous cherts) with graptolites, brachiopods, sponges, trilobites, and apparently radiolarian. N. C. Stevens (1950) mentions the occurrence here of Glyptograptus teretiusculus. Dicranograptus, Dicellograptus, and perhaps Climacograptus bicornis, are present also. Hence this unit undoubtedly belongs to the Upper Ordovician, perhaps its lower part. The trilobites found include Dionide, Trinucleus, Remopleuridea, Encrinurella, and Ceraurus; the brachiopods are Chonetoidea (?), Pseudolingula, and three more forms not yet determined. The best outcrops are at Copper Mine Creek and on the Kalimnah proper so that the name Kalimnah Formation could be applied to this unit.

The rocks are usually hard and black, as are the interbedded limestones also. When leached they are grey and

light in weight, split well, and are more suitable for collecting fossils. The shelly fossils are unusually well preserved. Obviously the fossils described by Hall (1900) were collected from this horizon.

The uppermost formation in the area consists of basic tuffs and flows (andesites) again, with interbedded black cherty limestones. At "The Needles", in a calcareous bed, graptolites of Upper Ordovician aspect were collected, and thus the complete absence of Silurian rocks in this area was confirmed. According to N. C. Stevens this formation is unconformably overlain by Upper Devonian sandstones.

SUMMARY OF THE STRATIGRAPHY AND CORRELATION OF THE ORDOVICIAN

BELUBULA RIVER (BELUBULA RIVER GROUP)

General	Stratigraphic units	Suggested correlation	
		KIMBERLEYS, W.A. (1)	TASMANIA.
UPPER ORDOVICIAN	6. Needles Formation (Upper Andesitic)		
	5. Kalinmah Formation		
MIDDLE ORDOVICIAN	4. Cliefden Caves Limestone	Gap Creek	Lower part of the limestones at Benjamin, in the Florentine Valley, from the Spanodonta bed upwards.
	3. Large Flat Limestone	Dolomite	
	2. Davy's Creek Limestone	Top of Emmanuel Limestone	
	1. Lower Andesitic volcanic rocks.		

The names of stratigraphical units in this report are arbitrary, and are used for the sake of brevity. But they are also a suggestion for the future.

(1) Guppy and Opik, 1950.

CONCLUSION

The lateral distribution of Ordovician limestones and shelly faunas in New South Wales is unknown, but judging from the development of the Ordovician strata at the

Belubula River they represent a considerable part of the Palaeozoic sequence of more than local importance. Carne and Jones (1919, p.21) definitely mention the presence of Ordovician limestones in New South Wales. According to them the limestones at Parkes (p.167), Bringellet (p.176), and one 1½ miles west of Blayney (p.179), at Ponsonby (p.182), "The Mount" (p.183), Cow Flat (p.183), and Abercrombie (p.233), are Ordovician in age. They are all situated at the heads of the Lachlan River, and the Belubula limestone belongs to the same area.

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