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1955/37

PROBABLE LOWER CARBONIFEROUS DEPOSITS IN THE FITZROY BASIN, WESTERN AUSTRALIA.

by

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In 1953 a small collection of fossils was made in calcarenites thought to be Fairfield Formation near the 12 Mile Bore, Brooking Station. The collection was made by the writer when examining sections in collaboration with Messrs. Guppy, Lindner, Elliott and Kempen of West Australian Petroleum Pty. Ltd., and J. G. Glover of the Bureau. The beds concerned are a few feet of calcarenites at the top of a sequence of calcarenites, totalling about 450 feet and thought by Guppy and Lindner to be part of the Fairfield Formation.

The position is indicated in Fig. 1 which is a tracing from portions of the Lennard River and Noonkanbah four-mile maps. The Section DF10, Fig. 2 was prepared by West Australian Petroleum Ltd.; the numbers K Duf 532-538 refer to BMR collections. The topmost beds at K Duf 538 show steep dips with variable strike in contrast to the gentler south-west dip of the underlying beds. This dip difference has been ascribed to faulting or slumping, but could possibly indicate an unconformity. Time did not permit (in 1953) the tracing of these beds along the strike for any great distance.

These beds, near the 12 Mile Bore, mapped as Fairfield Formation, are separated from the Upper Devonian Oscar Formation to the north-east by a belt of "black soil" alluvium in which there are no outcrops. Likewise the upper boundary on the south-west side is obscured by sand. Small outcrops of Permian Grant Formation are the nearest Permian rocks exposed. The Grant Formation is known to be transgressive and unconformable over the Devonian.

The beds represented by collections K Duf 532-537 are not very fossiliferous and the fossils present are mostly

fragmentary.

The collection from K Duf 538 (though small) contains two identifiable species and some fragments, including small apparent placoid shark denticles, productid spines? and brachiopod fragments.

One species is an incomplete shark's tooth of the cladodid type (Fig. 3). Cladodid teeth are known from the Upper Devonian to the Permian but are particularly characteristic of the Lower Carboniferous. The know Upper Devonian examples are confined to North America, Russia and Germany.

The form from K Duf 538 resembles most closely certain specimens described from the Lower Carboniferous of Great Britain and Ireland. Most of the described teeth are isolated from other shark remains and grouped by older authors under the name Cladodus. One well described species, the teeth of which are very similar in size and shape to the Western Australian form is Ctenacanthus costellatus Traquair from Glencarthsholme, Dumfriesshire, Scotland, of Lower Carboniferous age.

Moy-Thomas who redescribed this species states that one feature distinguishing the Lower Carboniferous cladodid teeth from the Upper Devonian is the presence of enamel in the former. The Western Australian specimen shows traces of thin enamel.

Descriptions of later Upper Devonian species such as Cladoselache fyleri Dean show only one or two small lateral cusps on either side of the main crown in contrast to the West Australian form with three.

The other recognisable fossils are two brachial valves of a productid (Fig. 3, A and B). Only the internal side is exposed in each specimen. Photographs and sketches were forwarded to Dr. H. Muir-Wood of the British Museum by courtesy of Mr. J. J. Veevers. Dr. Muir-Wood's comments follow:

"It is almost impossible to give you any definite opinion about the age without seeing the specimens and trying to find out how the shell is ornamented externally. I have compared the photographs carefully with my Productus Memoir plates and think they are nearest to the Dictyoclostus (formerly semireticulatus group) which is very common in this country in the Lower Carboniferous but in America can be Pennsylvanian or Permian.

The interior of the B.V. is rather similar to specimens of Antiquatonia (formerly antiquatus and costatus group) which could be Lower or Upper Carboniferous".

The genus Dictyoclostus mentioned by Dr. Muir-Wood is also well known from the Permian of the Fitzroy Basin, in the Noonkanbah Formation. The Permian forms show more advanced features of the cardinal process than Dr. Muir-Wood's Lower Carboniferous examples or the form from K Duf 538.

Pedicle valves of Dictyoclostus, similar in size to the K Duf "Productus" are present in collections from the Septimus Limestone of Lower Carboniferous age, from the East Kimberleys.

There are some rare records of "Productus" from the Upper Devonian of Japan and Russia; the forms described are quite distinct from the W.A. one, as far as the available literature shows.

Nothing like either of these species has been previously recorded from the Fitzroy Basin. The genus Productella, more primitive than the true productids occurs in the Fairfield Formation elsewhere in the area. It is readily distinguished from this form.

A small Productella is known from the Carnarvon Basin Gneudna Formation of Upper Devonian age - probably Frasnian. Productella has a range of Upper Devonian to Mississippian in North America. A true productid similar in size to the Fitzroy Basin form but poorly preserved is found in the top beds of the Moogooree Limestone of the Carnarvon

Basin. The top beds of this formation must be somewhat younger than the Warsaw Stage of the Mississippian as B. F. Glenister (1953) described a Spirifer nov. sp. from a bed several hundred feet lower which he correlated with the Warsaw. Better material will be necessary before the relationships of the K Duf 538 species and the Moogooree species are elucidated.

A record of a large Productella from the top beds of the Burt Range Limestone of the Ord-Victoria area was made by Matheson and Teichert (1948). Dr. Öpik (1950) has drawn the Devonian/Carboniferous boundary at the top of the Burt Range Limestone. I have not yet seen these specimens but if they belong to the genus Productella they are generically distinct from the species in K Duf 538. Teichert and Matheson correlate the lower part of the Burt Range Group with the "Productella Zone" now named the Fairfield Formation of the Fitzroy Basin. Teichert 1949 regards the Productella Zone as Stage IV Upper Devonian by correlating the goniatites with the German sequence. Matheson and Teichert suggest that the higher beds of the Burt Range Limestone embrace Stages V and VI.

The collections K Duf 532-538 have not been studied in detail. Below are listed some preliminary identifications and comments:

K Duf 532 cf. Syringopora. This is a tabulate coral. Syringopora ranges from Upper Devonian to Permian.

K Duf 533) Crinoid stems, small; fragmental gastropods.

K Duf 534) Fragmental gastropods, Crinoid stems

K Duf 535 Bradyodont Sharks' teeth. Two small teeth of bradyodontids are present in this collection. Such forms have not been previously noted in the Fitzroy Basin. Bradyodonts are reported elsewhere from the Devonian but are particularly characteristic of the Carboniferous and Permian. Teichert (1943) described bradyodont teeth from the Permian of the Carnarvon Basin and I have noted others in recent

collections from the Permian of the Carnarvon and Fitzroy Basins. The West Australian Permian forms are all much larger.

K Duf 536 cf. Camarotoechia sp. A considerable number of somewhat broken small rhynchonellids are present. Rhynchonellids of this general type range from Devonian to Carboniferous

Pelecypods - Fragmental

K Duf 537 cf. Camarotoechia sp. This is perhaps a different species to that in K Duf 536.

Strophomenoid? brachiopod indet.

Athyrid brachiopods

Bryozoal fragments

The above fauna of collections K Duf 532-537 does not seem to have any very diagnostic elements.

A noteworthy feature is the absence of the fossils characteristic of the Fairfield Formation, notably the rich brachiopod fauna with many species of Crytospirifer, Spiriferid cf. Theodossia, other spiriferids and Productella spp. etc. It is therefore likely that the beds from K Duf 532-537 are not equivalent to the lower part of the Fairfield Formation mapped elsewhere with its Productella Zone fauna but are younger. The age cannot yet be stated definitely but it could correspond to Stages V and VI of the Upper Devonian and perhaps in part to the basal part of the Carboniferous. Better material and more detailed study is necessary to determine the precise age.

A number of sections of the Fairfield Formation were measured in 1953. These sections usually were from about 100 to 250 feet thick. Two exceptions are section DF10 and one south of Barramundi Range, Fossil Downs Station, which totalled 650 feet. The basal 200 feet of calcarenite and siltstone contains the characteristic Productella Zone fauna. Then follow 150 feet with very little outcrop and at the top are 300 feet of calcarenites, partly sandy and some siltstone.

This sequence contains very few fossils. One sample K Duf 126 with a few brachiopods - not Productella Zone - is being studied by J. J. Veevers. These upper beds may correspond in part to section DF10.

Conclusion.

It seems probable that Lower Carboniferous marine beds are present in the Fitzroy Basin, near 12 Mile Bore, Brooking Station. The precise part of the Lower Carboniferous cannot yet be stated. There is insufficient evidence available to state the structural relationships of the Carboniferous calcarenites with the underlying calcarenites. Unconformable relationships are quite possible. The beds below the Carboniferous which have been mapped as Fairfield Formation have a different fauna to the "Productella Zone" Stage IV Upper Devonian which is characteristic of other exposures of the Fairfield Formation. These beds are probably younger than the Productella Zone.

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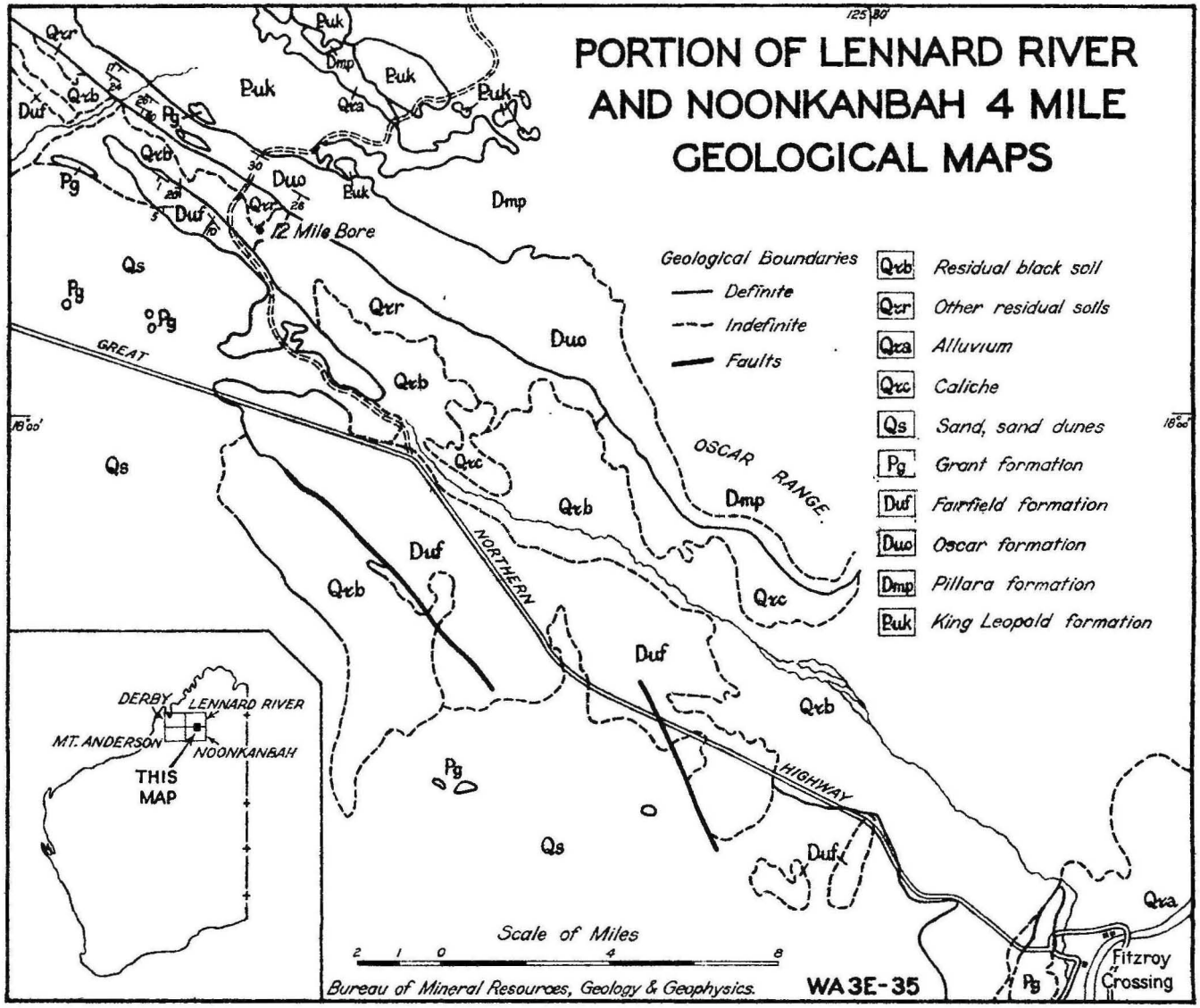
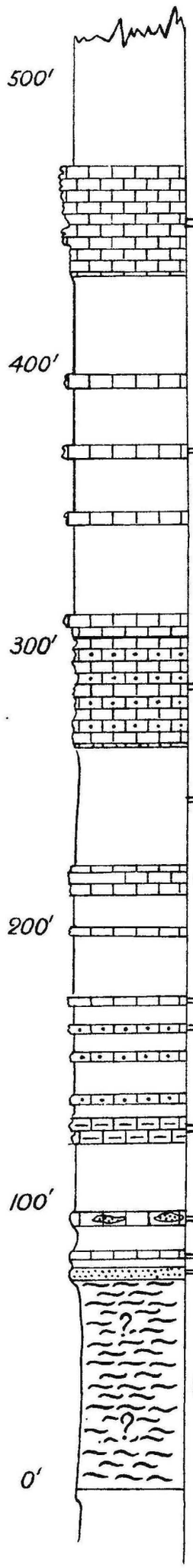

PORTION OF LENNARD RIVER AND NOONKANBAH 4 MILE GEOLOGICAL MAPS
Geological Boundaries
Definite
Indefinite
Faults
Qrb Residual black soil
Qrr Other residual soils
Qra Alluvium
Qrc Caliche
Qs Sand, sand dunes
Pg Grant formation
Duf Fairfield formation
Duo Oscar formation
Dmp Pillara formation
Puk King Leopold formation
12 Mile Bore
GREAT NORTHERN HIGHWAY
OSCAR RANGE
DERBY
LENNARD RIVER
MT. ANDERSON
NOONKANBAH
THIS MAP
Scale of Miles
2 1 0 4 8
Bureau of Mineral Resources, Geology & Geophysics.
WA3E-35
Fitzroy Crossing
125°30'
18°00'

Fig 1

SECTION D.F.10 "FAIRFIELD" FORMATION - 12 MILE BORE, BROOKING STATION



NO OUTCROP

KDuf 538

B¹ 40' *Calcarenite, shelly, yellow-brown* G204 537

KDuf 536

Poor outcrops with beds of
(A⁵) 125' *Calcarenite, pale brown-grey,*
fine to medium grained.

(A⁴) 40' *Calcarenite, sandy, medium grained* G 203
Quartz sand medium to coarse, rounded KDuf 535

(A³) 52' *Calcarenite, pale grey brown, fine to medium grained at base. Outcrops poor in remainder of unit.* KDuf 534

KDuf 533

Calcarenite, sandy, fine to medium grained, poorly sorted. Quartz grains medium to coarse rounded.

Calcarenite, pale grey-brown, medium grained G 202
(A²) 140' *Calcarenite, pale grey brown, sandy. Quartz grains medium to coarse, rounded.*
Calcarenite, sandy, fine. Quartz grains fine to medium, rounded.
Calcarenite, sandy medium. Quartz grains sub-angular

Calcarenite, silty, fine-grained.

Calcarenite, medium, with small lenses of medium sandstone
Calcarenite, sandy.
Sandstone, coarse grained, pale grey KDuf 532

(A¹) 74' NO OUTCROP *Ant mounds indicate a sediment similar to marl covered with black soil.* G201

NO OUTCROP.

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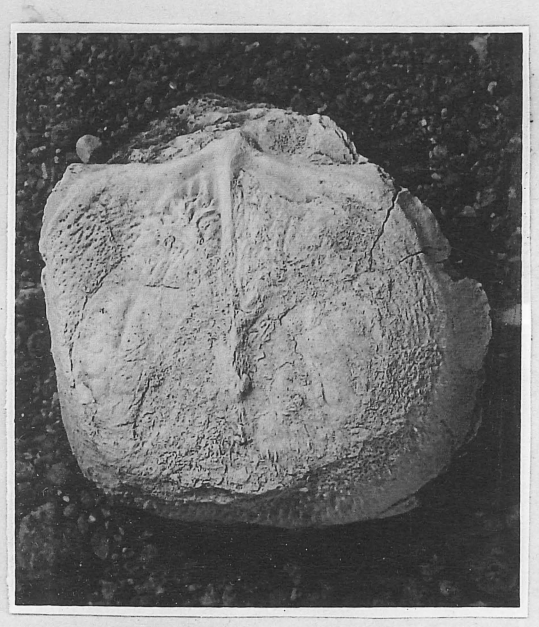
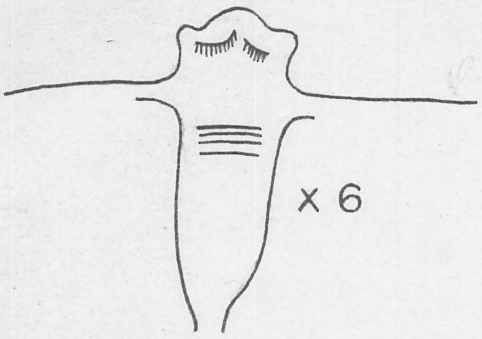
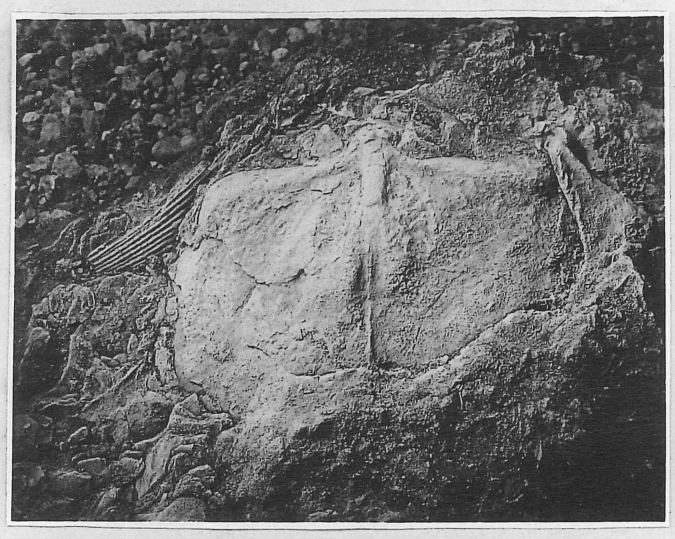
Rig 2



"Productus" specimen A

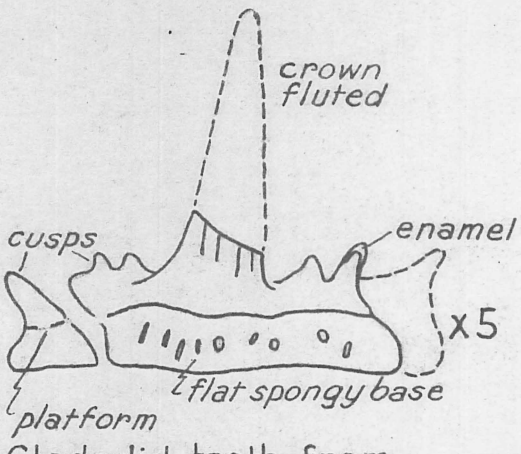
Cardinal process of "Productus" specimen B from inside of valve



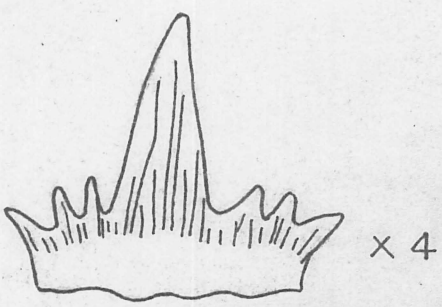


"Productus" specimen B

Specimen B external view



Cladodid tooth from K Duf 538 near Brooking Bore, Brooking Station, Fitzroy Basin.



Ctenacanthus costellatus Traquair
(after Moy-Thomas)