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BRIEF SYNTHESIS OF PRESENT INFORMATION ON THE GEOGRAPHICAL AND STRATIGRAPHICAL DISTRIBUTION OF FOSSIL FISH WITHIN THE STORMBERG SERIES, SOUTH AFRICA

by

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ABSTRACT

A list is given of all specimens of *Semionotus capensis* Smith Woodward in South African collections. In addition a recent discovery of fish comparable with *S. capensis* in the Molteno Beds is recorded. This is the first true record of vertebrate life in this stage of the Stormberg Series, and if the identification can be confirmed, extends the record of this species in South Africa quite considerably.

INTRODUCTION

In the fossil record the family Semionotidae, to which is assigned the genus *Semionotus* Agassiz, 1832, is known from early Triassic to late Jurassic. The wide-spread genus *Semionotus*, the type species being *Semionotus bergeri* Agassiz, occurs in European Keuper Sandstone of Coburg and Thuringia (Zittel, 1932), as well as the Bunter (Lower Triassic), Muschelkalk, Rhaetic (Upper Triassic), the Trias of Connecticut Valley and New Jersey of the United States, Madagascar and South Africa. Hills (1958) considers that the semionotid *Corunegenys bowralensis* Wade, from Bowral (Upper Triassic, Australia), is very close to *Semionotus capensis* Smith Woodward, 1888.

STRATIGRAPHY

The Stormberg Series was reviewed (Anderson and Anderson, 1970) and correlated in age as follows:

Drakensberg Lavas
Cave Sandstone Formation } —Lower Jurassic
Red Beds Formation—Uppermost Triassic
Molteno Formation—Lower Upper Triassic

(Note: The use of Formation names is at variance with the present stratigraphic names which are based on the old dual system of stratigraphic classification. Acceptance of these new names awaits the findings of the South African Committee of Stratigraphy.)

The following quote (Beukes, 1970, pp. 326–7) is of importance in helping to ascertain the stratigraphic origin of most *Semionotus capensis* records:

> "The sedimentary structures and properties of the rocks of the Red Beds are indicative of a warm climate with seasonal rain storms during deposition. Furthermore these properties, together with a change of heavy-limbed fossils of dinosaurs in the lower strata to lightly-built cursorial types in the upper strata (Haughton, 1924), are evidence in favour of an increasing aridity in climatic conditions during deposition of this stage (Haughton, 1969, p. 367). This gradual change in climate resulted in the uneven contact between the Red Beds and Cave Sandstone stage as indicated by lenses of Red Beds in Cave Sandstone and *vice versa*. They also indicate that aeolian sand gradually encroached upon this area and that at one stage deposition of Red Beds and Cave Sandstone took place simultaneously."

In the Bethlehem-Kestell area Van Eeden (1937) found that, as stated above, the dividing line between the Red Beds and Cave Sandstone is not sharply defined. As this is adjacent to the Senekal-Ficksburg area, which is so rich in well-preserved specimens of *Semionotus capensis*, it would be reasonable to associate these fish fossils with the transition beds, and would account for the record of Anderson and Anderson (loc. cit.) of freshwater fish fossils from both the Upper Red Beds and Lower Cave Sandstone stages.

As there has been disagreement as to whether or not vertebrate remains are known from the Molteno Formation the new record of *Semionotus* cf. *capensis*, discussed below, is thus of importance. This appears to be the first record of vertebrates definitely coming from the Molteno Formation.

FOSSIL FISH

(a) *Cave Sandstone and Red Beds*

In spite of the numerous records of *Semionotus capensis* quoted below there is little information available regarding the exact localities or horizon from which the specimens came. The most detailed description is that of the type locality itself (Smith Woodward, 1888). The fish fossils were found in rocks in caves at the base of a precipice on Farm Weltevreden between Senekal and Ficksburg. The rocks at the base of the precipice were described as consisting of a belt of ribbon

sandstone which, when worked down, showed a beautiful ribbon pattern of varying colours—red, white, yellow and light buff.

Stockley (1947) quoting Du Toit (1904) states: "Above Palmietfontein the Telle River runs between cliffs of Cave Sandstone from two hundred to two hundred and fifty feet in thickness. I am informed by the Rev. D. F. Ellenberger, of the Masitise Mission Station, that at a point close to the Telle River, four miles from Masitise, many fish fossils were obtained from the Sandstone. These fish remains, I believe, have been presented to the museum at Maseru."

The fossils mentioned by Stockley (loc. cit.) have not been discovered. There is no Museum at Maseru but I have been informed by Dr. L. G. S. Smits of the University of Botswana, Lesotho and Swaziland, that a slab with fossil fish is in the small museum at the Training College at Morija, but it is not known whether these are from the Masitise Mission or Quthing. Gardiner (*in litt.*) has informed me that he has seen fragments of *Semionotus capensis* from the Cave Sandstone of the Likhoele Hills near Mafeteng.

In the museums of the Republic of South Africa *Semionotus capensis* is well represented in fish fossil collections. These have been examined and all, many with numerous fish in an excellent state of preservation, are preserved in sandstone. In the absence of any detailed localities being available these are taken as coming from the transition between Red Beds and Cave Sandstone. The following is a list of the specimens of *S. capensis* examined:

National Museum, Bloemfontein:
C.2842: Wittebergen between Bethlehem and Fouriesburg, no exact locality recorded.
C.292: 24 km west of Senekal, Mr. Collins, 1926.
C.2827: Daskop, Ficksburg, Mrs. J. F. Wiesner.
C.2606: Stafford Hill, 1,5 km north-east of Ficksburg, G. Liquori.
C.286: Driefontein, 40 km east-north-east of Senekal, C. Barrett, 1924.
C.2821: Schutters Draai, near Ficksburg, C. Stevens.
C.1079: No locality, just Orange Free State.
No number: Witteberg, M. J. Keyter.

McGregor Memorial Museum, Kimberley:
428: Ficksburg, Orange Free State.
No number: Two slabs with excellent specimens from Ficksburg, Orange Free State.

Natal Museum, Pietermaritzburg:
741: Ficksburg, Orange Free State.
821: Ficksburg, Orange Free State.
822: No Locality recorded.

Museum and Snake Park, Port Elizabeth:
1201B: Orange Free State, no locality.
1201C: Basutoland Border, no locality, F. C. Bengstedt.
1201E: Orange Free State, no locality.

South African Museum, Cape Town:
K436: Clocolan, Orange Free State, P. J. Lange.
2781: Narime (?) Vale, Senekal, Orange Free State.
1065: Ficksburg, Sir H. de Villiers.
No details: Two slabs with good specimens.

Transvaal Museum, Pretoria:
2829(209): Two slabs from Ficksburg.
2830(210): One small block, Rouxville, Orange Free State.

Albany Museum, Grahamstown:
477: Two slabs from National Museum, Bloemfontein, recorded as coming from Senekal, Orange Free State.

University of Lesotho, Botswana and Swaziland, Roma, Lesotho:
No number: One slab presented by C. F. Jacot Guillarmod, from a quarry at Excelsior, Orange Free State. Slab could not be traced.

Although it is stated by Anderson and Anderson (loc. cit.) that in the lower zone of the Cave Sandstone, where *Semionotus capensis* occurs, occurrences of freshwater fishes are rare, it should be noted that slabs of sandstone from the Senekal and Ficksburg Districts with fish fossil remains indicate that there was a considerable concentration of fishes at the time of preservation. No other fossil remains or fish species have been discovered in those particular slabs quoted above, but Forey and Gardiner (1973, Volume 15) have described a new redfieldid fish from the Likhoele Hills near Mafeteng (Cave Sandstone), Lesotho.

Haughton (1924, pp. 338–341) has discussed *Semionotus capensis* as well as an unidentified incomplete small fish preserved in a piece of shale taken from near the base of Cave Sandstone, Siberia, Wodehouse, Cape Province. The long-based anal fin distinguishes this species from *Semionotus capensis*. Unfortunately the specimen is not available at present for examination and comparison with what appears to be similar material from two other sites.

One of these is Sutherlands Quarry, Biggarsberg, Natal, from which two incomplete specimens, Registered No. N.M. 21, Natal Museum, Pietermaritzburg, were described as representing an "Unidentified Palaeoniscid Fish" by Smith Woodward (1893). These fish remains are preserved in sandstone referred, at that time, by Mr. Draper

to the "Molteno Beds, 150 feet above the main coal seam". As Biggarsberg lies well within the Ecca Series the possibility of locating the exact site, Sutherlands Quarry, is being investigated.

The other site is near a coal mine, Stormberg, Cape Province, where fish fossil 1201 D Port Elizabeth Museum (see Figure 5) was discovered. This is also an incomplete fish which resembles greatly the two specimens from Biggarsberg. As it comes from near a coal mine it could possibly be from the Molteno Stage, this being the only formation with well-developed coal seams in the area. Unfortunately the exact horizon and locality from which this fossil came are unknown. This species, with a long-based anal fin and scale markings similar to the Biggarsberg material, and the fish discussed by Haughton (loc. cit.), is the same average size as *Semionotus capensis* but is neither a semionotid nor redfieldid. Kodachrome photographs of important features of this fossil have been sent to Gardiner who has informed me (*in litt.*, 1972) that after comparison with Triassic fish fauna material in the British Museum he has come to the conclusion that the Stormberg fish represents a new form. Further material is required before a detailed description can be published.

(b) *Molteno Stage*

Up to early 1971 no fish fossils from the Molteno Beds were known for certain. The Stormberg fossil referred to above appears to have been overlooked, and the Biggarsberg fossil shelved due to a suspected discrepancy in stratigraphic interpretations. Then an interesting discovery, confirmed again in January this year, was made by Mrs. Heidi Anderson, of the Bernard Price Institute for Palaeontology, who found impressions of fish amongst some of her specimens whilst she was collecting plant fossils on the Farm Denwood, Bird's River, near Dordrecht. [B.P.I. collection C-Dt.II. 355, 750a, b; 752a, b (fin only). Spp. 355 and 750 are substantially complete except for the head (Figs. 1 and 2).].

Stratigraphy:

The stratigraphy is obscured in this area by the "Bird's River Dolerite Complex" (P. Booth, 1971, M.Sc. thesis, Rhodes University). The Molteno Stage is about 230 metres thick in this area and the fossiliferous kaolinitic shales appear to lie close to the top (pers. comm. B. Turner, 1972). The kaolinitic shales have been tilted by the dolerite to 13 degrees from the horizontal and are exposed over a large area along the back of the dam.

Associated fossils:

This is an excellent plant fossil locality with a *Dicroidium* flora, the most common leaf being *Baiera* sp. and to a lesser degree *Dicroidium*, *Lepidopteris*, *Phoenicopsis*, *Ginkgo*, *Taeniopteris*, *Yabeiella* and various reproductive structures. A number of insect wings including 5 Ephemeroptera, 1 Meganioptera, 8 Odonata, 1 Plecoptera, 1 Protoorhoptera, 1 Orthoptera, 13 Blattodea, 7 Homoptera, 3 Coleoptera, 1 Megaloptera (E. Riek in press and preparation) have also been found.

Specimens of the fish impressions were sent to the Albany Museum and these were identified as either closely related to, or conspecific with, *Semionotus capensis* Woodward. Full details and a photograph, (Figures 1 and 2) were sent to Gardiner who confirmed the identification. In his letter Gardiner drew attention to the similarity of the Bird's River specimens to those of the Likhoele Hills, Lesotho. Figures 3 and 4 are of *Semionotus capensis* near Senekal, these are preserved in Cave Sandstone. The Bird's River specimens are incomplete, but the anal, dorsal and caudal regions are sufficiently complete to separate this species from the Stormberg and Biggarsberg species discussed above, as well as the redfieldid from Lesotho.

This discovery of *Semionotus* cf. *capensis*, where the horizon can be determined and described with certainty as near the top of the Molteno, is of considerable interest in being the first vertebrates definitely from it. The material available is poorly preserved and, if future collecting proves the identification of this fish to be correct, the period of existence of *Semionotus capensis* in South Africa will have to be extended considerably.

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Figure 1
Semionotus cf. *capensis* from Farm Denwood, Bird's River, E. Cape. C–Dt. II 355. B.P.I.

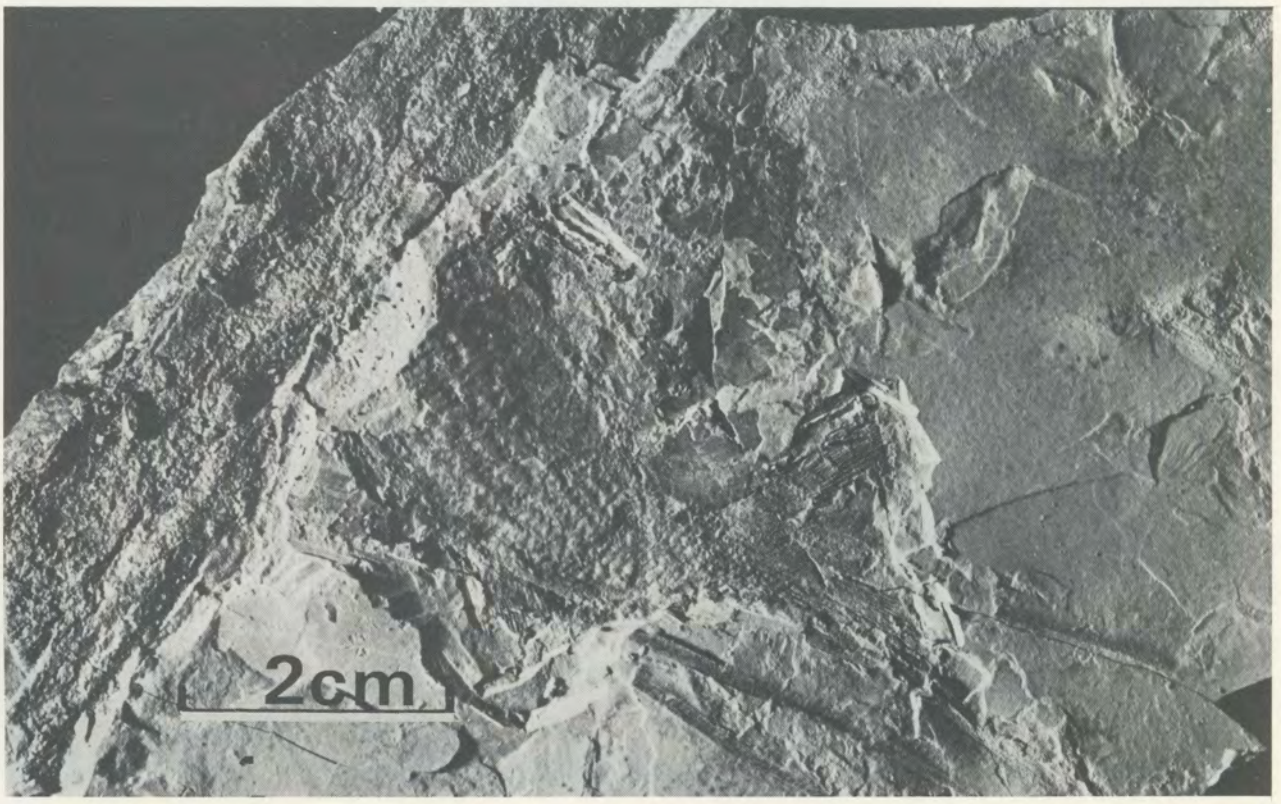

Figure 2
Semionotus cf. *capensis* from Farm Denwood, Bird's River, E. Cape. C–Dt. II 750a.

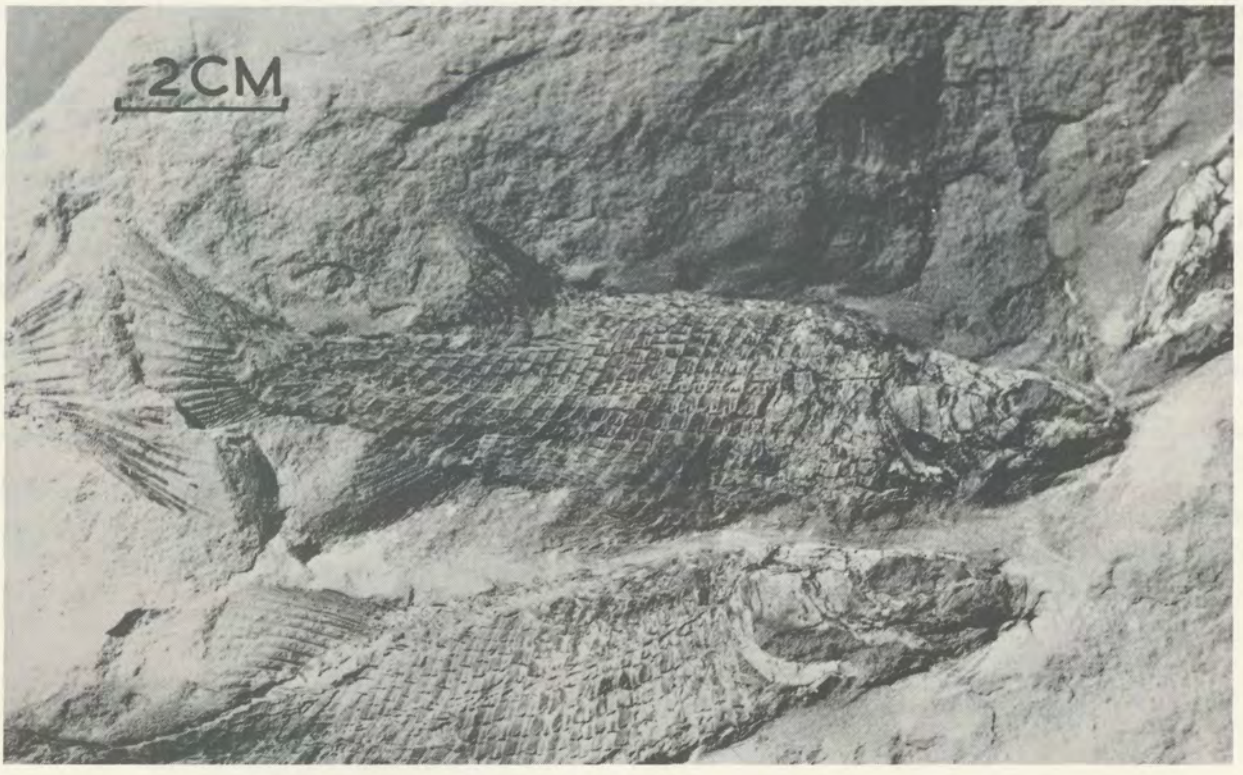

Figure 3
Semionotus capensis. Cave Sandstone, Ficksburg. McGregor Memorial Museum No. 428.

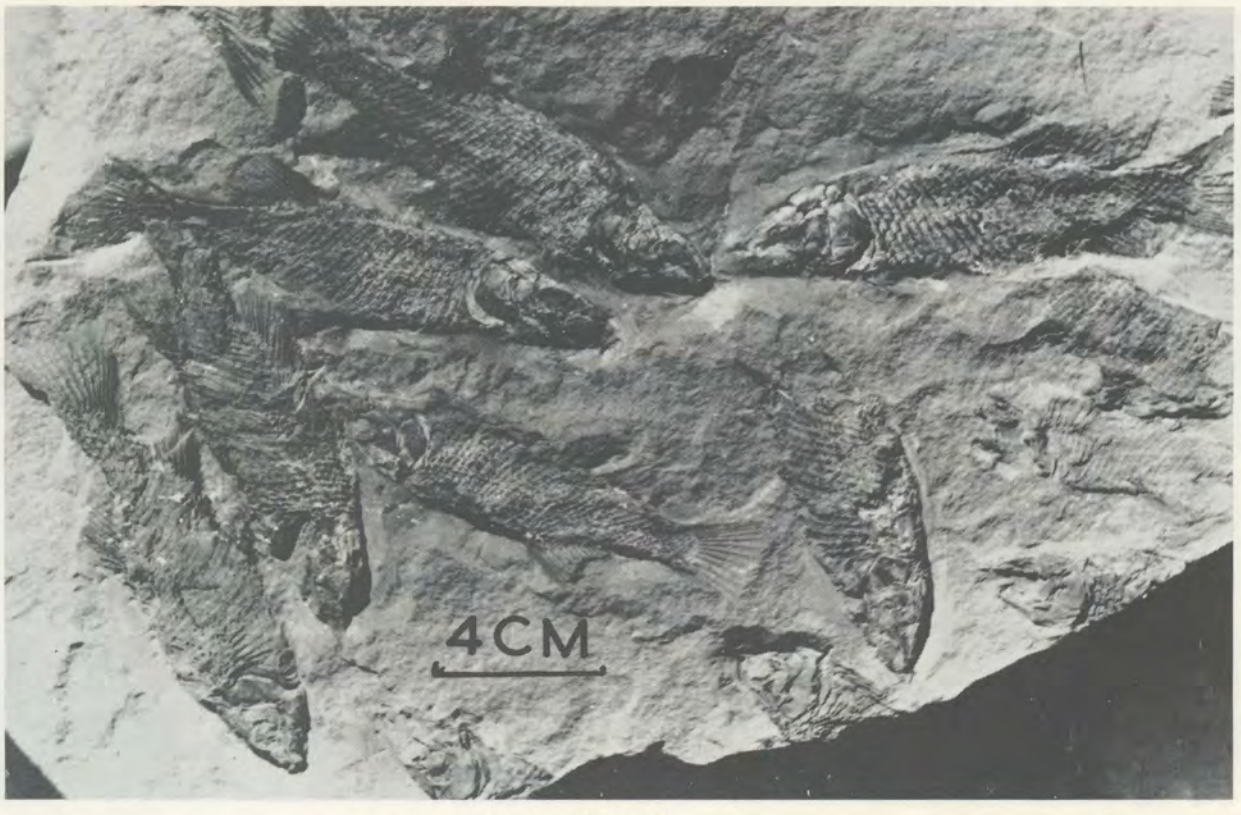

Figure 4
Semionotus capensis. Cave Sandstone. Ficksburg. McGregor Memorial Museum No. 428.

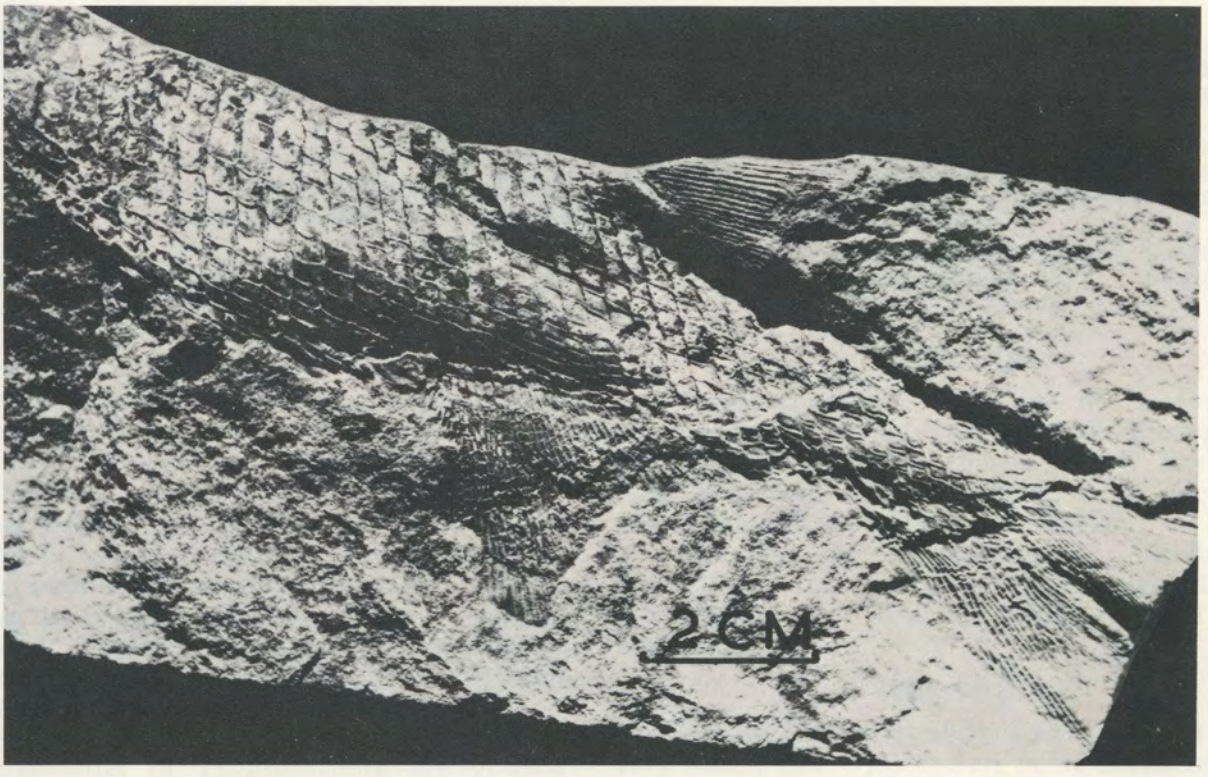

Figure 5
Fish fossil from Stormberg, Cape Province. Port Elizabeth Museum No. 1201 D.