

## TRIASSIC FISHES FROM KUEICHOW, SOUTH-WEST CHINA

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In the summer of 1957, Mr. T. T. Ts'ao of Kueichow Museum collected fossil fishes and Sauropterygian remains from Langmu, Tachai village, Tingshao, Shingyi Hsien, S. W. Kueichow. It was alleged that all the materials were come from the same stratigraphical horizon. There are no detailed comments on the stratigraphical relationship of the fossils. The rocks containing fossils are greyish white mixed with dark gray, thin layered limestones or shales. Sauropterygian remains had been studied by Prof. C. C. Young (1958). According to him, the stratigraphy containing the fossils probably belongs to Kuanling Series. The fish remains described here are five in number and are recognized to be Peltopleuridae, Eugnathidae, Semionotidae.

The writer is greatly indebted to Messrs. T. S. Liu and H. T. Liu for their valuable guidance, to Professors C. C. Young and Minchen Chow for their untiring interest in this work and constant encouragement. The writer also wishes to express his thanks to Mr. T. T. Ts'ao for the specimens. Thanks are also due to Messrs. C. F. Wang and W. L. Cheng for making the photos and drawings of the specimens respectively.

### DESCRIPTION OF THE SPECIMENS

#### Order Subholostei

#### Family Peltopleuridae

#### Genus *Peltopleurus* Kner 1866

#### *Peltopleurus orientalis* Su, sp. nov.

(Pl. 1, figs. 1, 2, 3)

**Holotype.**—Nearly complete fish. Cat. No. V. 2432.

**Paratype.**—Two incomplete fishes, V. 2432.1, V. 2432.2.

**Horizon and Locality.**—Middle Triassic, Langmu, Tachai village, Tingshiao, Shingyi Hsien, S. W. Kueichow province.

**Diagnosis.**—A *Peltopleurus* with rather slenderly fusiform body. Head rather

small, its length is less than the maximum depth of the body and being about one 4.5th of the total length. External skull-bones smooth. Posterior part of maxilla somewhat triangular in shape. Operculum slightly larger than suboperculum. Preoperculum vertical. Anal fin larger and with longer base than that of the dorsal. Origin of the dorsal fin slightly in front of that of the anal fin. Flank with longitudinal row of greatly deepened scales, covering up to three fourths of depth of body.

**Description.**—These small fishes are rather slenderly fusiform, with small head and rather small fins. The external skull-bones, like the scales, are ganoine-covered, and their surfaces are smooth. The cranial roof is fragmentary. The principal element in the cheek-region is the large preoperculum, which is merely indicated by the impression. Its upper portion is wide and tapers almost to a point ventrally. The orbit is large and the suspensorium almost vertical. The jaws are broken. Maxilla is merely indicated by the impression and its posterior part is somewhat triangular in shape. Mandible is weak and narrow. The gill-cover is a large, more or less semi-circular plate, consisting of operculum and suboperculum. The operculum, which is slightly larger than suboperculum, is about one and a half times deep as wide. The suboperculum is almost triangular in shape. No trace of branchiostegal rays is preserved. The cleithrum is stout and wide, and its posterior border is deeply excavated for the pectoral fin. The supracleithrum is an elongated, slightly curved bone.

The pectoral fin consists of about nine longer rays, which are unjointed for long distance proximally, but towards the tips they are branched and jointed (V. 2432.1). The first and second rays are stouter than the rest and are neither branched nor jointed. The pelvic fins are much nearer the anal than the pectorals. They are very small and consist of about seven rays which are bifurcate and articulated distally. The dorsal fin is posteriorly placed, and with anal fin nearly opposite one another. It is triangular in form and made up of about ten rays which are bifurcated and articulated distally. The anal fin consists of twelve rays, resembles closely to the dorsal, but is rather large. The caudal fin is symmetrical and distinctly forked, and the tail almost reaches the condition of external homocercy, the dorsal scaly lobe being represented by a very small angular projection. It consists of about twenty-eight rays articulated throughout their length. The rays in the middle region of the fin are bifurcated distally. In the rays above and below these the bifurcation is not so marked.

All the scales are smooth and covered with a thick layer of ganoine. A longitudinal row of greatly deepened scales covers the flank. These scales cover three fourths of the flank in the abdominal region, but decrease in depth, slightly towards the anterior end and greatly towards the posterior. The deepest of these are about nine times deep as wide. The scales in the row below the main flank-scales are about as deep as wide. The dorsal side is covered by scales of moderate size. The ventral side of the body in the abdominal region is covered by a great number of relatively minute scales. There are thirty-five transverse rows of scales on the body.

**Measurements (in mm) of the holotype**

Total length (approx.)	32
Maximum depth of body	7.2
Length of body	26
Length of head	6.5
Depth of head	5.5

**Remarks.**—This fish is very like *Pelitoleurus rugosus*, *P. lissocephalus*, *P. splendens*, and *P. kneri*, but it differs from *P. rugosus* in its elongate body form, smaller head with smooth external skull-bones and its posterior part of maxilla being triangular in shape. It also differs from *P. lissocephalus* in its elongate body and smaller head, in its more transverse rows of scales on the body. It is also distinguished from *P. splendens* and *P. kneri* by different proportions of body. In *P. splendens* the body is relatively deep and the depth of body is 1/3.5 of total length, and its head is shorter. In *P. kneri* the head is smaller and length of head is 1/6 of total length. Pelvic fins is more advanced than that of present specimen. It is sufficient to distinguish this fish from all known species, therefore a new species *Pelitoleurus orientalis* (sp. nov.) is established.

**Order Holostei****Family Eugnathidae****Genus *Sinoeugnathus* Su, gen. nov.**

**Diagnosis.**—Holostean fish with somewhat deeply fusiform body. Length of head with opercular apparatus less than maximum depth of body. Frontals large, broad behind but attenuated in front. Parietals small and short. Suspensorium about vertical and orbital comparatively large. There are two very large postorbitals immediately in front of preoperculum, and there is a series of small suborbitals. Maxilla weak and long, extending back to preoperculum. Mandible slender and is not markedly deepened posteriorly. Teeth slender and pointed. Operculum rectangular in outline. Preoperculum wider and markedly swings forward ventrally. Dorsal fin placed on the posterior half of body. Pelvic fins arising mid-way between pectorals and anal. The scaly-lobe extending to about half-way towards tip of deeply forked caudal fin. Caudal fin-rays articulated throughout their length. Fulcra of moderate size on dorsal edge of caudal fin. Scales thick, and serrated on posterior margins of flank-scales.

***Sinoeugnathus kueichowensis* sp. nov.**

(Pl. 11, fig. 1, 2.)

**Holotype.**—Nearly complete fish, except caudal fin, all fins imperfect. Cat. No. V. 2433.

**Horizon and Locality.**—As above.

**Diagnosis.**—As for genus.

**Description.**—The body is fusiform, but rather deeply so. Head with opercular apparatus being about  $1/2.8$  in length of body, and less than maximum depth of body. The fins, so far as can be ascertained, are moderately large in size. The scaly-lobe extends about half the distance toward the tip.

The skull is well preserved. The frontals long and narrow, broad behind but attenuated in front, and the median suture between them more or less wavy. Parietals are small and short, being nearly square. Behind them there is a pair of extrascapulars, which are triangular in shape. Two large postorbitals are almost rectangular in outline. Before them there is a row of small suborbitals. Mouth gape is large. The maxilla is long and narrow, somewhat deepened behind, extending back to preoperculum. Above the posterior half of the bone there is a long narrow supramaxilla, which is pointed in front but truncated behind. The mandible is very long, not markedly deepened posteriorly. The oral margin is almost straight, and bears an even series of sharply pointed teeth of moderate size along its entire length. The opercular apparatus is complete. Operculum is large and almost rectangular in outline. Suboperculum is about half as large as operculum, and with a short ascending process at its antero-superior angle. Preoperculum is crescent-shaped. Its upper limb is slightly constricted and lower limb is markedly swung forward ventrally. Interoperculum is very small, and triangular in shape. The branchiostegal rays are unknown.

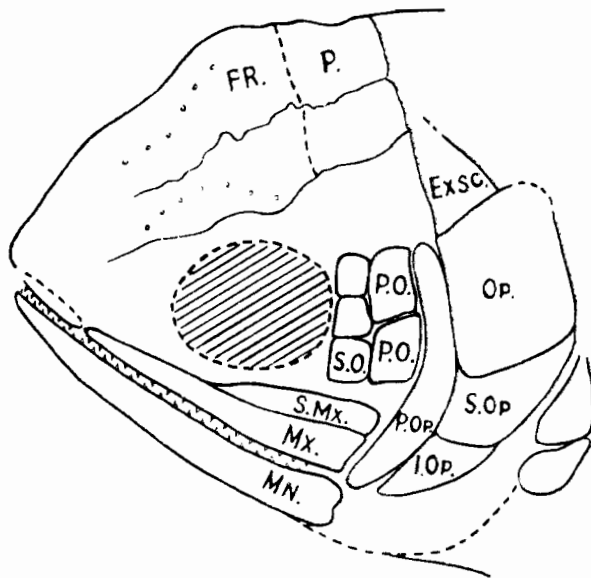


Fig. 1 The skull of *Sinoeugnathus Kueichowensis* gen. et sp. nov.  $\times 4$ .

Fr.=Frontal. P.=Parietal. Exsc.=Extrascapular. P.O.=Postorbital. S.O.=Suborbital. S.Mx.=Supramaxilla. Mx.=Maxilla. Mn.=Mandible. Op.=Operculum. S.Op.=Suboperculum. P.Op.=Preoperculum. I.Op.=Interoperculum.

The course of the lateral line can be seen on the anterior flank-scales. The course of the sensory canals on the head can only be traced. The supraorbital sensory canal is well displayed in the frontal.

No trace of the pectoral fin is preserved. The dorsal, pelvic and anal fins are represented by a bit of fragmentary rays. Pelvic fins appear to be very small, arising midway between the pectorals and anal fins. Dorsal fin arises slightly behind the pelvic. Anal fin arises behind the end of dorsal. There are about eighteen rays in the caudal fin, and all of these articulated throughout their length. All the fins bear fulcra, which on dorsal border of the caudal fin are of moderate size, but on the other fins are very small.

The body is covered with a series of thick, bony rhombic scales with ganoine. Those on the anterior flank are the largest, and are about two and a half times deep as wide, but the size of the scales decreases dorsally, ventrally and posteriorly. All scales are smooth, but their posterior margins on the flank are finely serrated. There are about thirty-one transverse rows of scales on the body, counting from the part behind the head to the base of the scaly-lobe of tail, about sixteen rows of scales in maximum depth of body, and about fourteen rows between the dorsal and anal fins.

**Measurements (in mm) of the holotype**

Total length (approx.) .....	67
Length of body .....	53
Maximum depth of body .....	22
Length of head .....	19
Depth of head .....	19

**Remarks.**—From the characters of the fish described above, it is quite obvious that this specimen is most akin to *Eoecugnathus*, and can be compared with *Eoecugnathus* by its body-shape, the arrangement of skull-roof bone, its long maxillia extending back to preoperculum, and the general structure of opercular apparatus etc. However, it differs from the *Eoecugnathus* in several characters which are of generic importance. Thus the length of head is less than the maximum depth of body, the maxilla is weak and narrow, the posterior portion of the mandible is not markedly deepened, the operculum is rectangular in shape, especially the preoperculum markedly swings forward ventrally, caudal fin is deeply forked, and jointed proximally. It differs from any known genus. Therefore, a new generic name, *Sinoecugnathus*, is proposed, indicating the first occurrence of Eugnathoid in South-West China. The writer likes to propose *Sinoecugnathus kueichowensis* as the type species. The species name is after the province Kueichow.

**Family      Semionotidae**

**Genus      *Asialepidotus* Su, gen. nov.**

**Diagnosis.**—Holostean fish with deeply fusiform body. Dorsal fin placed nearly opposite pelvic. Pelvic fins arise nearer to the origin of the anal than that of the pec-

toral. Fin-fulcra small and present on all the fins. External skull-bones ornamented with tubercles. Operculum larger and rectangular in outline. Suboperculum smaller than operculum, its lower end somewhat extended anteriorly. Preoperculum almost vertical, its lower limb slightly swinging forward ventrally. Scales thick, robust. Flank-scales not much deeper than broad, with their wide overlapped margin produced forwards at the upper and lower angles. Their posterior margins serrated.

***Asialepidotus shingyiensis* sp. nov.**

(Pl. 111, fig. 1, 2)

**Holotype.**—An imperfect fish, Cat. No. V. 2434.

**Horizon and Locality.**—As above.

**Diagnosis.**—As for genus.

**Description.**—A Holostean fish with deeply fusiform body. Maximum depth of body is about 1/1.6 of the length of trunk (including peduncle). Paired fins small. The skull is merely indicated by the suborbitals and opercular apparatus. Operculum is large, rectangular in shape, but somewhat narrow above than below. Its outer surface is ornamented with tubercles. Suboperculum is indicated by impression which is well preserved. It is elongate-triangular in outline, but with an ascending process in the anterior end. Preoperculum is almost vertical. Its ascending limb is slightly constricted and lower limb is short and expanded and sparsely ornamented with fine tubercles on its outer surface. Interoperculum is very small, and elongate-triangular in shape, ornamented with a few tubercles. The branchiostegal rays have not been clearly observed. The cleithrum comparatively large and curves well forwards. The supracleithrum, which is well developed, is a deep and narrow plate of bone. There are two large enamelled post-cleithrum plates, of which the upper one is deep and narrow, and its

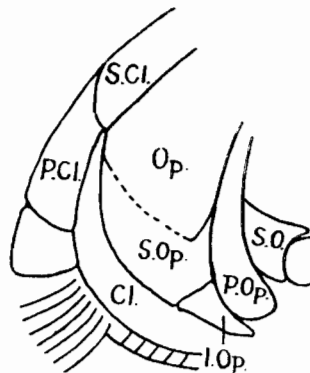


Fig. 2 Hinder portion of skull of *Asialepidotus shingyiensis*, gen. et sp. nov. Natural size.

S.O.=Suborbital Op.=Operculum. S.Op.=Suboperculum. P.Op.=Preoperculum. I.Op.=Interoperculum. Cl.=Cleithrum. S.Cl.=Supracleithrum. P.Cl.=Postcleithrum.

tapering upper end bounds the lower part of supracleithrum. The lower, directly beneath the upper, is about as deep as wide, and serrated along its posterior edge.

The pectoral fins consist of about seven rays, which articulated and divided on their distal end. Pelvic fins are very small, with about six rays. Dorsal fin was broken, the origin of which is lightly behind the pelvic. Anal fin consists of about eleven rays, which are articulated and divided in their distal half. The distal end of the caudal fin was damaged, its rays are closely articulated.

Scales are thick, with strong covering of ganoine. Anterior part of flank-scales are rectangular with postero-superior angle rounded off. The posterior half of the anterior flank-scales shows a number of radiating grooves running to the posterior border, which is sharply serrated. The number of serration of scales decreases dorsally, ventrally and posteriorly. There are about forty transverse rows of scales on the body.

**Remarks.**—From the characters above-mentioned, it is quite obvious that the present specimen is most akin to *Lepidotus*, and can be compared with *Lepidotus* by its body-shape, its structure of external skull-bones, and its robust scales covered with a thick layer of ganoine, etc. But it is different from *Lepidotus* in that its preoperculum does not markedly swing forward ventrally, its operculum more weak and its more advanced position of the dorsal fin. The earliest known *Lepidotus* is *Lepidotus (Prolepidotus) gallicus* from the Rhaetic beds of Upper Silesia (Michael, 1893) and *L. congolensis* from Lulaba beds of Congo (Hussakof, 1917). Our specimen is difficult to be compared with *L. congolensis* because the latter is badly preserved. Although it can be compared with *L. gallicus* by operculum apparatus and scales etc., but the latter is elongate in body form, and the lower limb of preoperculum more weakly swings forward ventrally than the later species, such as *L. minor* and *L. mantelli*. In addition, this specimen was collected from the same horizon with *Peltopleurus* and *Sinoeugnathus* (gen. nov.). By *Peltopleurus*, the age of the formation can be correlated with marine Middle Triassic of Besano, Lombardy. If so, the geological age of fish-bearing bed is also Middle Triassic. It is older than the earliest known genus, *Lepidotus*. Thus, the name *Asialepidotus shingyiensis* (gen. et sp. nov.) is suggested for the new specimen.

### Conclusion

(1) The marine Triassic deposits are rather developed in South China, but fossil fishes were rarely discovered. The new discovery gave an indication that this region will offer rich prospects for ichthyologists in studying Triassic fishes.

(2) The genus *Peltopleurus* represents the first discovery of the Peltopleuridae in China and even in Asia.

(3) By *Peltopleurus* and *Sinoeugnathus*, it can be concluded that the age of the

formation containing fossil fishes is Middle Triassic and can be correlated with the marine Middle Triassic of Besano, Lombardy.

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### EXPLANATION OF PLATE I

- 1. *Peltopterus orientalis*, sp. nov., the Holotype, olo type, 2432,  $\times$  6.
- 2. *Peltopterus orientalis*, sp. nov., incomplete fish, V. 2432.1,  $\times$  3.
- 3. *Peltopterus orientalis*, sp. nov., incomplete fish, V. 2432.2,  $\times$  3.

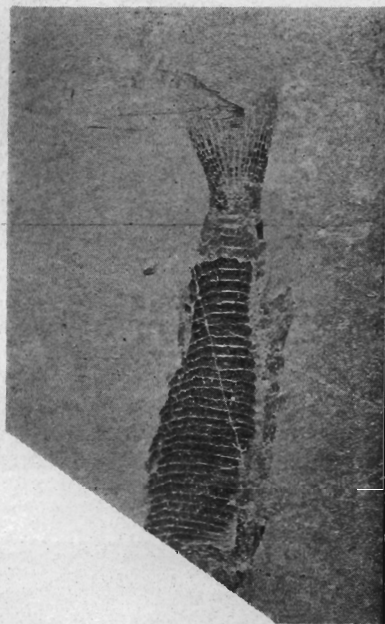
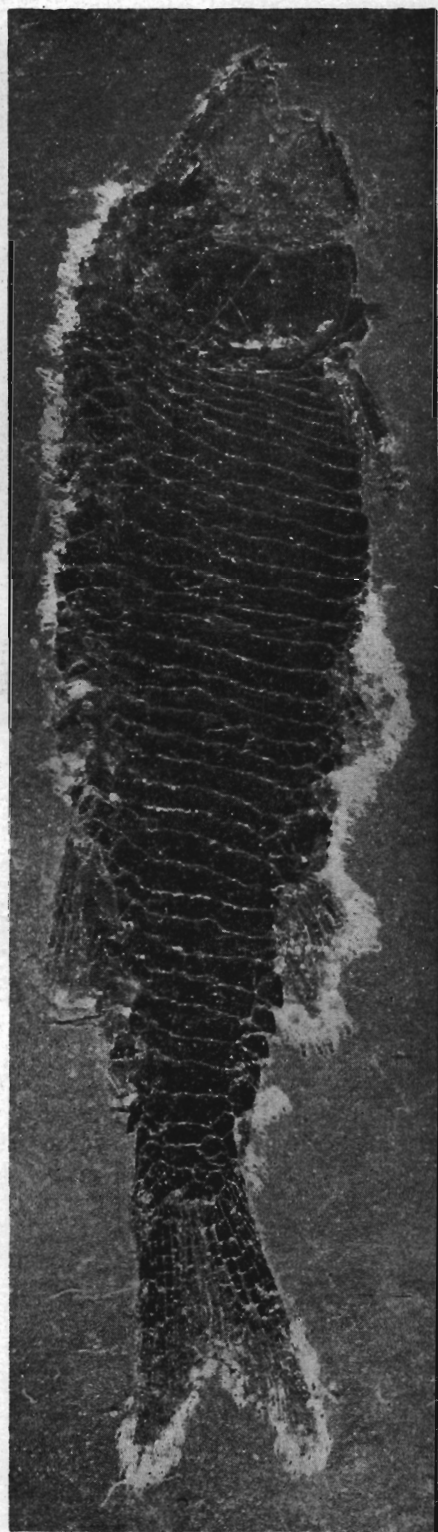
### EXPLANATION OF PLATE II

- 1. *Sinoeugnathus kueichowensis*, gen. et sp. the HV. 2433,  $\times$  6.
- 2. Ditto, enlarged ( $\times$  4), showing skull.

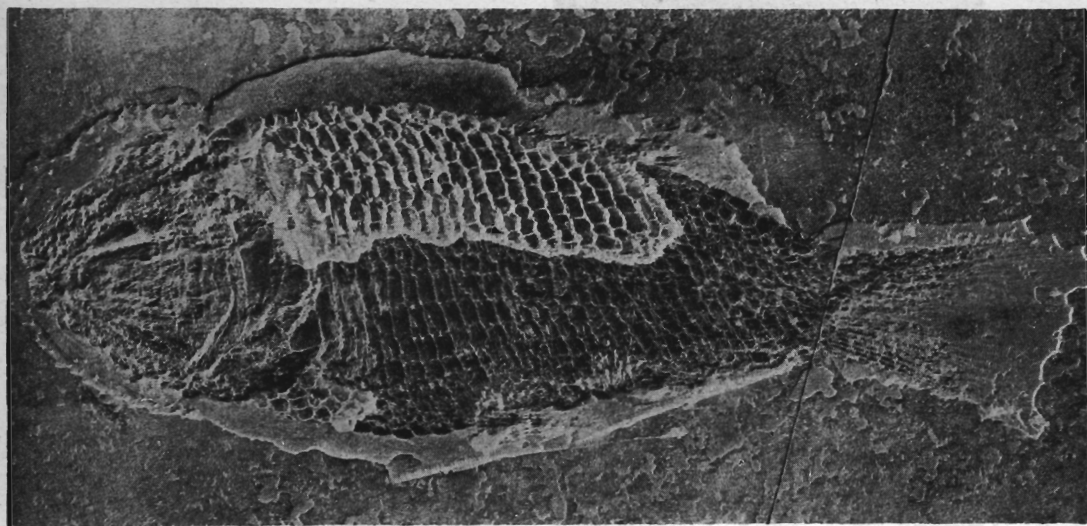
### EXPLANATION OF PLATE III

- 1. *Asialepidotus shingyiensis*, gen. et sp. nov., the Holotype, V. 2434, natural size.
- 2. Ditto, anterior flank-scales enlarged ( $\times$  3), showing serrations.

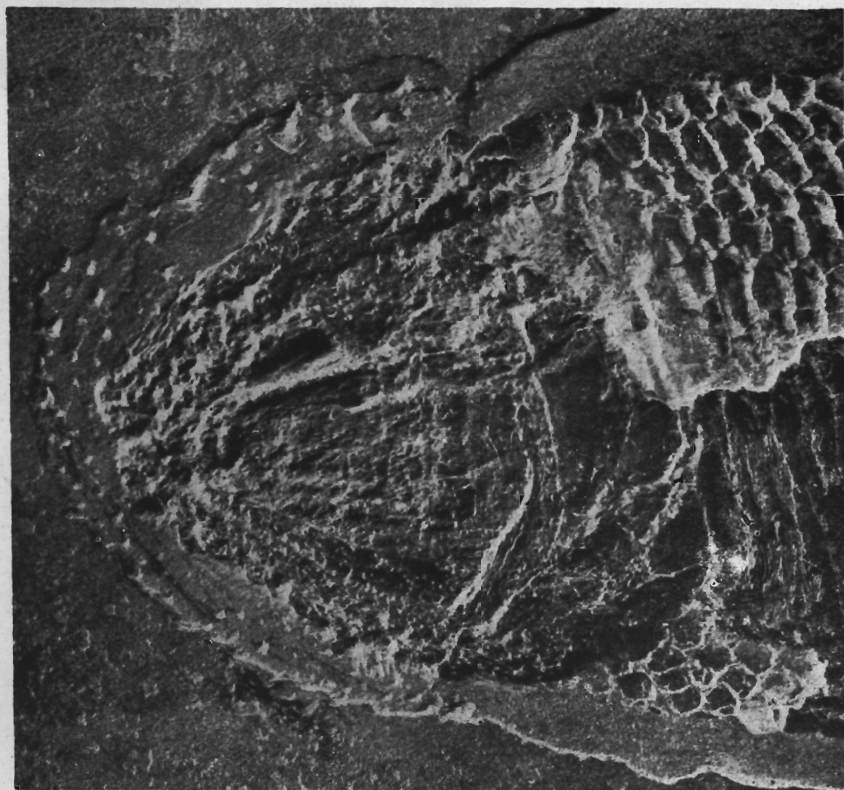


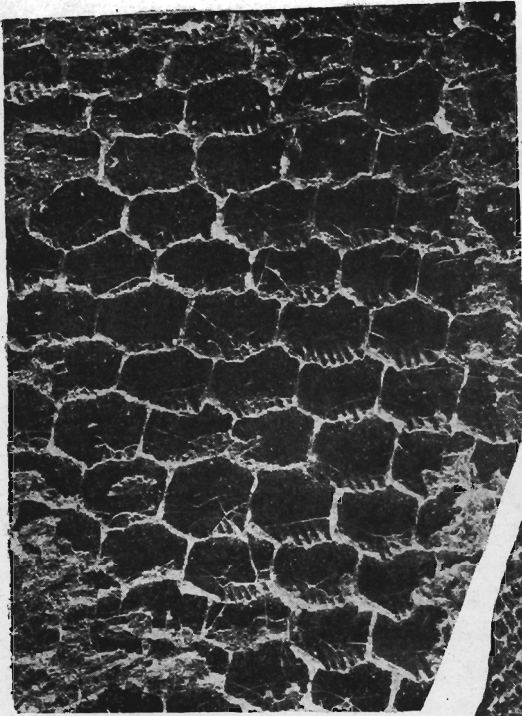


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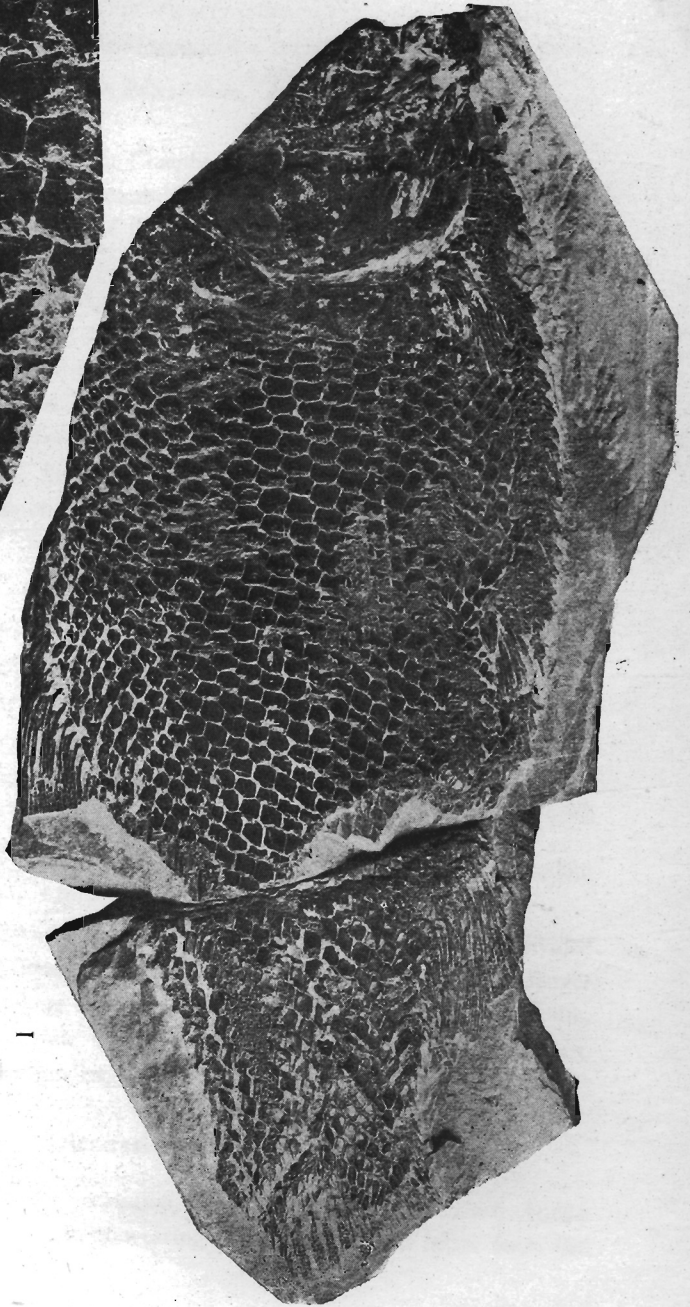


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