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# A second actinistian from the Middle Triassic of Monte San Giorgio, Kanton Tessin, Switzerland

By OLIVIER RIEPPEL<sup>1)</sup>

## ABSTRACT

A second actinistian is described from the Middle Triassic of Monte San Giorgio. Fragments of the skull and of the caudal fin as well as scales are preserved. The species is larger than *Ticinepomis peyeri*. On the basis of scale structure and ornamentation the specimens are tentatively referred to cf. *Holophagus picens* (COSTA).

## ZUSAMMENFASSUNG

Ein weiterer Actinistier aus der mittleren Trias des Monte San Giorgio wird beschrieben. Es sind lediglich Fragmente des Schädels und der Schwanzflosse sowie Schuppen erhalten. Der Fisch ist deutlich grösser als *Ticinepomis peyeri*. Er wird vorläufig zu cf. *Holophagus picens* (COSTA) gestellt.

## Introduction

The Alpine Triassic of Central and Southern Europe has yielded a number of actinistian genera such as *Graphiurichthys* (KNER 1866), *Heptanema* (BELLOTTI 1857; ALESSANDRI 1910) and *Holophagus* (COSTA 1862; BASSANI 1895). A large representative of the genus *Coelacanthus* has been reported from the Late Triassic of LUNZ (TELLER 1891), but the generic determination remains questionable (REIS 1900). In 1916, ANDERSSON (STENSIÖ) reported a few scattered actinistian scales from the middle Triassic of Monte San Giorgio, found at Cava Tre Fontane. A fairly complete specimen of an actinistian of rather small size from Monte San Giorgio (Point 902) was recently described and named *Ticinepomis peyeri* (RIEPEL 1980). Its scales show some similarity with those described by ANDERSSON (1916), but differ in details of ornamentation and in size.

It is the purpose of this paper to describe the fragmentary remains of a second actinistian from the Middle Triassic of Monte San Giorgio, which is of considerably larger size than attained by *Ticinepomis*.

## Materials

The material consists of two fragmentary specimens, one exhibiting part of the skull, the other scattered remains of the caudal fin. Both specimens show scattered scales and basally bifurcated neural and/or haemal arches. The assignment of the two specimens to

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the same taxon is based on the similarity of scales structure. Both specimens belong to the Tessin collection of the Paläontologisches Institut und Museum der Universität Zürich.

*T 1273*: Point 902, layer 120, collected on September 30, 1957. The specimen consists of the posterior part of the skull roof, both opercula, the impression of the cleithrum and scattered fragments of the branchial skeleton, preserved on two slabs of a fine grained, bituminous dolomite which, due to weathering, appears light brownish.

*T 1458*: Point 902, layer 104, collected on August 19, 1960. Of the 21 broken pieces the most important ones are the part and counterpart of remains of the caudal fin, again preserved on a fine-grained, bituminous dolomite of light brown colour.

### Description

*T 1273*: Only the posterior part of the skull roof is preserved (Fig. 1). It consists of the paired parietals, posterior to which are located the unpaired median and the paired lateral extrascapulars. Lateral to the posterior part of the parietals, broken fragments of the supratermporals may be identified, less clearly on the right than on the left side of the head.

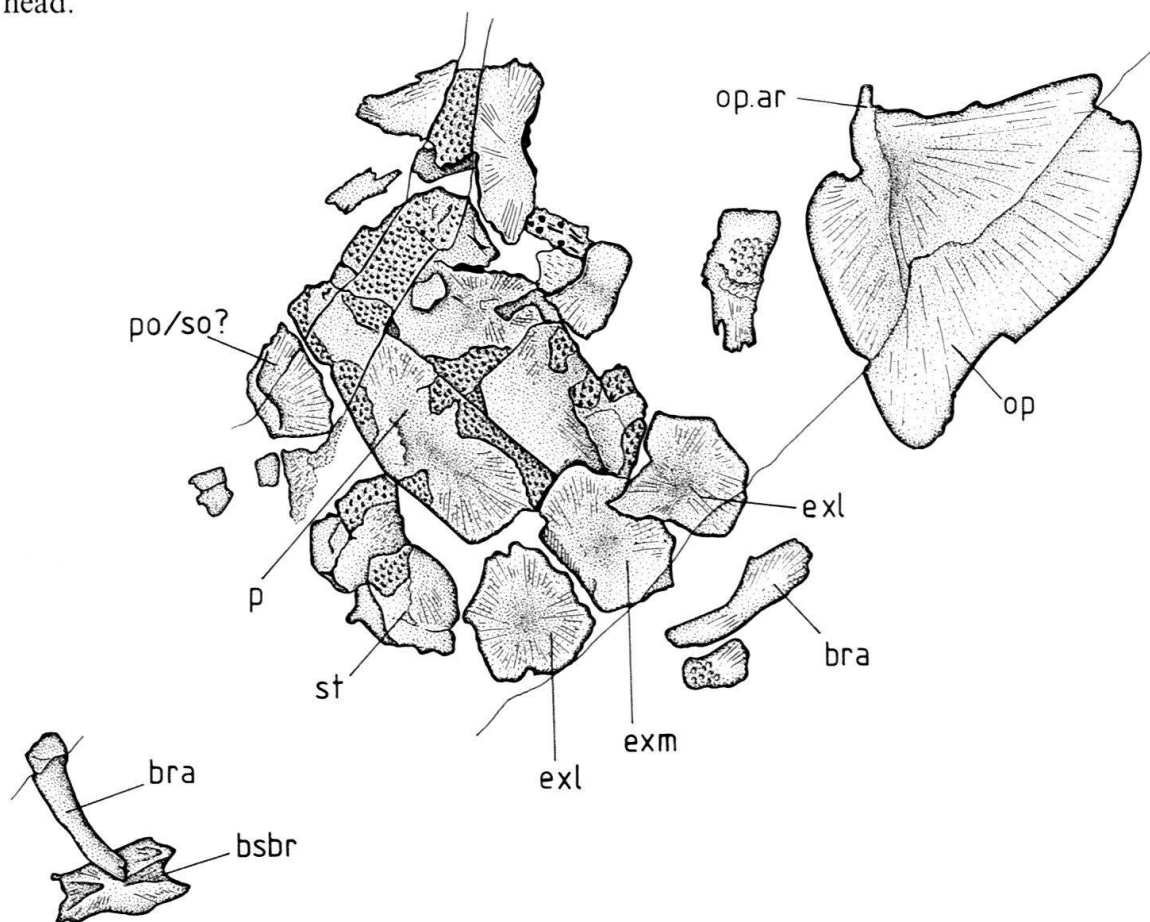


Fig. 1. The skull remains in *T 1273*. Abbreviations: *bra*, branchial element; *bsbr*, basibranchial; *exl*, lateral extrascapular; *exm*, medial extrascapular; *op*, operculum; *op.ar*, opercular articulation; *p*, parietal; *po/so*, postorbital, supraorbital?; *st*, supratemporal.  $\times 0,5$

Broken fragments of bone around the anterior portions of the parietals may represent parts of supraorbitals and postorbitals. The length of the parietals is between 69 and 75 mm, their width in the posterior part around 23 mm. Anteriorly their width is not conspicuously reduced, broken edges rendering measurements difficult, however. The rectangular median extrascapular is about 32 mm long and 22 mm broad along its posterior margin. The left extrascapular is about 28 mm long and 24 mm broad in its posterior portion.

All the bones of the dermal skull roof are exposed in medial view. But where the bone has weathered away to leave the matrix exposed, the impressions of a conspicuously tuberculated bone surface are exposed.

Both opercula are preserved in medial view. The medial surface of the pear-shaped bone is strongly concave. The articulation of the operculum must have been in its anterodorsal part which projects anteriorly to some extent. The dorsal margin of the bone is almost straight; it forms a medially overhanging shelf. The anterior and posterior margins converge towards the ventral extremity of the bone. The height of the right opercle is about 76 mm, its maximum width along the dorsal margin measures about 65 mm.

Various fragments of branchial arch elements are present, but not identifiable in detail, except for one (?) basibranchial (Fig. 1). It is an elongated plate of bone, notched anteriorly and posteriorly (or laterally?), and a little wider at one end compared to the other. Its maximal length is 29 mm, its maximal width is 14 mm.

The details of scale structure and ornamentation are the same as in specimen *T 1458*, and will be described below.

*T 1458*: The most important information to be obtained from this fossil concerns the structure of the caudal fin (Fig. 2). In front of both the upper and lower lobes of the caudal fin traces of the anal and second dorsal fins can be observed, but no details are discernible. Since it is impossible to orientate the fragmentary specimen, it is impossible to determine the dorsal and ventral side respectively.

The caudal fin is represented by remains of the dorsal and ventral lobes. No remains of an accessory lobe are preserved. Between the two lobes and in front of them basally forked neural and haemal arches are preserved. Both the upper and lower lobes of the caudal fin are supported by stout radials which are well ossified, each showing an expanded distal end. The length of the radials measures between 27 and 30 mm, their width in their middle portion is 2 mm.

There is a one to one relationship between the lepidotrichia and the radialia. The lepidotrichia have mostly separated into their two halves, exposing their concave inner surface. Each lepidotrichium consists on an unjointed basal and a jointed distal portion. The unjointed basal part overlaps the radial for about one third of the latter's length. The basal part of each lepidotrichium which articulates with the radials is narrow and tapers proximally. It is only about half as wide as the non-overlapping, jointed portion. Only small portions of the segmented part of the lepidotrichia are preserved. In all instances, the segments are narrow and consequently numerous. Where the outer convex surface of the lepidotrichia is exposed, transversely extended "tubercles" can be observed. They probably represent pedicels formed by bone of attachment on which spines were positioned which have fallen off as a consequence of preservational events (P. Forey, personal communication).

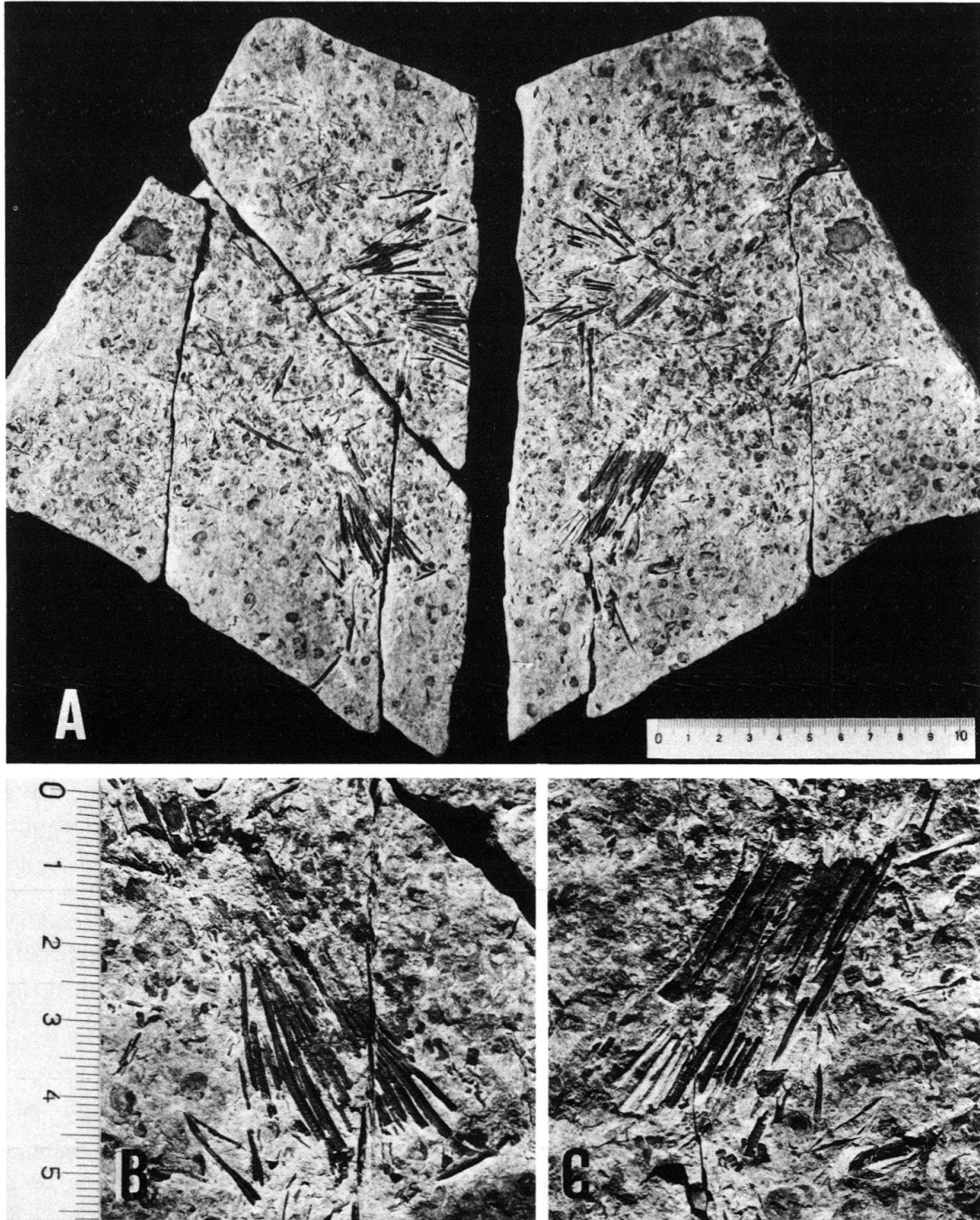


Fig. 2. Remains of the caudal fin in *T 1458*; A: main slab, part and counterpart. B, C: "lower lobe" on main slab, enlarged, part and counterpart. Scale in millimeters.

Characteristic of the actinistian here described is its scale ornamentation (Fig. 3). The scales are circular or weakly elliptical. They show a large overlapping part which lacks dentine ornamentation. It is characterized by concentric growth lines. Posteriorly, there is a triangular area which bears an ornamentation of short, dentinous spines. They all project straight backwards in a rostro-caudal direction, and end in a blunt tip. At the



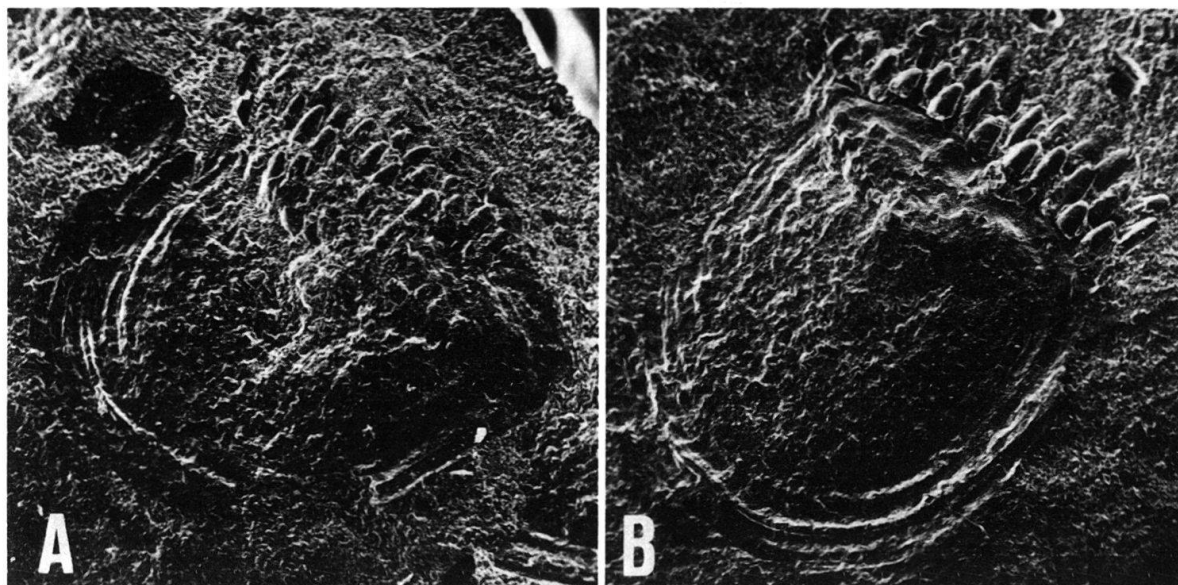


Fig. 3. Scanning electron micrographs of silicon casts of the scales in *T 1458*;  $\times 15$

deepest portion of the ornamented part of the scale, the spines are arranged in five or possibly six rows one behind the other. On most of the scales, however, only two or three rows of spines are preserved along the caudal marginal zone of the scale. The spines reaching the dorsal surface of the scale towards the apex of the triangular ornamented part seem to have been lost.

### Discussion

The specimens here described are identified as actinistian primarily on the basis of scale structure. The basally forked neural and haemal arches, and – in *T 1458* – the remains of the caudal fin support this identification.

The remains of the skull roof (*T 1273*) are peculiar in several respects. The skull roof of actinistians usually has a more triangular appearance, due to the incorporation of the supratemporal into the parietal complex. Interesting is the occurrence of three large elements in the extrascapular series. In the Actinistia from the Triassic and later on the extrascapular series is usually represented by a larger number of smaller elements. This has led to the question as to whether the skull remains of *T 1273* are wrongly interpreted as actinistian and should rather be viewed as representing the frontals plus the rostral and nasal bones of an actinopterygian comparable to *Axelina* (STENSIÖ 1921, p. 91, Fig. 40). However, the arrangement of the various bony elements seems to refute such a hypothesis. Accepting the skull remains as those of an actinistian, then the specimen represents a member of this group with a large medial and two equally large lateral extrascapulars from the Middle Triassic. A similar differentiation of the extrascapular series is known only from the Palaeozoic (Devonian) genera *Diplocercoides* and *Nesides* (STENSIÖ 1937; confirmed by P. Forey, personal communication).

The operculum is again of rather unusual shape. The edges, however, are for the most part natural, i.e. neither weathered nor damaged by preparation. A similar pear-shaped operculum is described by STENSIÖ (1937) for the genera *Diplocercoides* and *Nesides*.

On the other hand, the attachment of spines or denticles to the lepidotrichia by means of a pedicel of bone of attachment is an advanced feature of the taxon here described, otherwise typical for later actinistians (P. Forey, personal communication).

A comparison with other actinistians from the Middle Triassic may best be based on scale structure.

The fossil here described differs from *Ticinepomis* as well as from the specimen found in Cava Tre Fontane (ANDERSSON 1916), since their scales bear an ornamentation consisting of rather elongate ridges or spines which may converge towards the caudal tip of the scale and project beyond it (RIEPPPEL 1980, Fig. 7). Likewise, the genus *Heptanema* (ALESSANDRI 1910) differs by its elongate and carinate scales.

In 1862 COSTA described an actinistian now referred to the genus *Holophagus* however, which is primarily of Jurassic occurrence (for details see RIEPPPEL 1980). COSTA gives a very diagrammatic figure of scale structure which is difficult to use for any comparison.

In 1895, BASSANI redescribed *Holophagus picens* (COSTA) from the "Dolomia Principale di Giffoni". The fish is somewhat smaller than the fossil here described, as is indicated by the relative size of the operculum. The lepidotrichia of BASSANI's specimen show distinct tubercles or spines at least in the first dorsal and the caudal fins. Interestingly, the description of the scales and the rather diagrammatic figure given by BASSANI (1895) seem to correspond closely to the Monte San Giorgio fossils. Scale structure is the only recognizable feature which would indicate that the specimens might be members of the same taxon.

If this is accepted as a tentative conclusion, the problem arises as to how this taxon should be named. COSTA (1862) based the name *Urocomus picens* on the dorsal fin of a fish which later turned out to be an actinopterygian. His species description, however, was based on a more or less complete actinistian which may thus bear the species name *picens*. The taxon is usually referred to the genus *Holophagus*, but this should probably be considered a preliminary assignment only.

The specimens here described testify to the presence of a second actinistian in the Middle Triassic of Monte San Giorgio, which is distinctly larger than *Ticinepomis peyeri* (RIEPPPEL 1980). It is tentatively referred to cf. *Holophagus picens* (COSTA 1862; BASSANI 1895).

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