

## HOLOSTEUS FIENIENSIS N. SP., A NEW FOSSIL FISH (TELEOSTEI: PARALEPIDIDAE) IN THE RUPELIAN FORMATIONS FROM FIENI (EASTERN CARPATHIANS, ROMANIA)

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**Abstract:** The Paralepididae consists of 4 fossil genera, together with 21 Recent genera. Among the genera with only fossil species, *Holosteus* AGASSIZ, 1843 has been known so far only by 2 species: *Holosteus esocinus* AGASSIZ, 1844 and *Holosteus mariae* (MENNER, 1948). The specimen described as *Holosteus fieniensis* n. sp. represents a new species of the genus.

The paleontological material was delivered by the Oligocene deposits from Fieni, developed in the Valea Caselor lithofacies, namely "The Lower Horizon of the Dysodilic Shales with Menilites"

The species diagnosis and the meristic characters formula, together with a detailed description of the holotype are presented.

*Holosteus fieniensis* n. sp. shows many affinities with *H. mariae* (MENNER) of which it differs mainly by its somatic characters. The poor pelvics development and the shorter predorsal and preanal distances are more alike to the Recent Paralepididae.

The morpho-functional characters of *Holosteus fieniensis*, and the fact that Recent representatives of the Paralepididae are meso- and bathypelagic fishes, show that the association mainly with littoral-neritic fishes, from Fieni, are due to the migration, most probably because of food necessities.

**Key words:** Fossil fish, Teleostei, *Holosteus*, New species, Rupelian, Eastern Carpathians, Fieni, Romania.

### INTRODUCTION

The latest research concerning oligocene fossil fish in Fieni area (Dâmbovița County) (Grigorescu & Constantin, 1997; Constantin, 2000; Constantin, 2001; Baci & Constantin, in press) revealed some uncommon but very interesting species, together with the common ones for the Romanian Eastern Carpathians (Constantin, in press). Thus, the specimens from Fieni, collected by us and described in this paper, represent a new fossil teleostean species.

### MATERIALS

In the Fieni area, the fish-fauna (hundreds of specimens, assigned to 16 families of marine fishes, collected between 1973-1999 and hosted by the Collection of Paleontological Department - University of Bucharest - collected by P. Constantin and D. Grigorescu) were provided by 10 fossiliferous outcrop placed in the North of Fieni, in the interfluvium between Ialomîța and Ialomicioara Valleys (Constantin, 2000).

The fossil fishes were first mentioned in the Fieni area by Popovici-Hateg who found a specimen on Caselor Valley (right tributary of Ialomia Valley) which was later determined by

Priem (1899) as *Scorpaenoides popovicii* n.sp. Paucă (1934) mentioned in the southern part of Țâța village (now called Dealu Mare), the following fossil fishes: *Serranus budensis* (HECKEL, 1856), *Clupea longimana* (HECKEL, 1850), *Clupea* sp., *Palaeogadus* sp. and *Scorpaenoides popovicii* (PRIEM, 1899) together with many Clupeidae and Serranidae scales.

A list of the fauna which has been determined so far from the Fieni area included at least 26 marine teleostean species (Constantin, 2000), crustaceans (*Portunus oligocenicus* PAUCA, 1929, probably), terrestrial plants (Ticleanu & Constantin, 2001) and insects as well (*Hydrophilus* sp. - Protescu, 1938).

The material examined in this paper (3 imprints, very well preserved, one of them in double impression) was provided by 2 outcrops (F<sub>4</sub> and F<sub>6</sub>) placed in both flanks of the Buciumeni syncline (North of Fieni locality) in oligocene formations (Figure 1).

### GEOLOGICAL DATA

The formation which provided the fossil fishes was separated as "The Lower Horizon of the Dysodilic Shales with Menilites" by

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Stefanescu (1970), as the first stratigraphic term of the Oligocene-Lowermost Miocene succession which appear in the area in the so-called Valea Caselor lithofacies. This formation was included in the post-tectonic cover with Upper Cretaceous tectogenesis, which, during younger tectonic stages had been folded or even removed together with the units which it overlies unconformably (Ceahlau and Teleajen Nappes) (Stefanescu, 1995).

It consists mainly of brown weathered to yellow argillaceous shales, exhibiting shaly

structure, sometimes poorly calcareous (this type of shales provided the most fishes and plants remains). The above mentioned shales are interbedded with either black, thin layered argillaceous bituminous shales with gypsum and sulphur occurrences (dysodilic shales type) or different coloured (grey, brown, black or even red) siliceous ones (menilite type). The last rocks are interbedded mainly in the middle or upper part of the formation. In this formation three-four laminitic, sometimes siliceous limestones (Tylawa type) are interbedded as well.

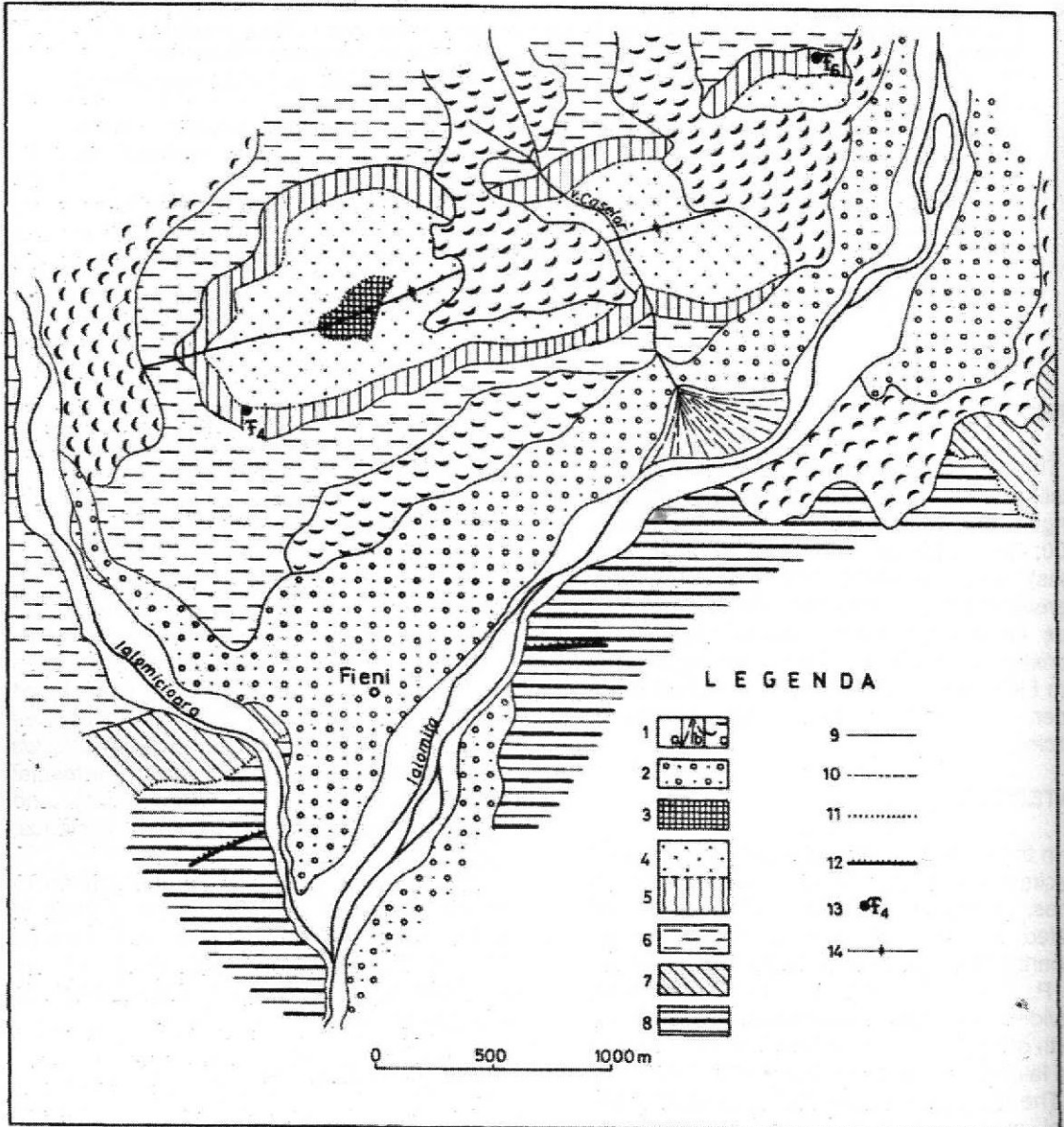


Figure 1 - Geological Map of Fieni area with fossil fishes outcrops (geological data according 's Stefănescu, 1970). Key: 1. Holocene (a. Alluvial deposits; b. Proluvial deposits; c. Landslides); 2. Pleistocene (Alluvial terrace); 3. Lowermost Miocene ("The Upper Horizon of the Dysodilic Shales"); 4. Oligocene ("The Shally Horizon with Marly-limestone"); 5. Oligocene ("The Lower Horizon of the Dysodilic Shales with Menilites"); 6. Paleocene-Eocene (Sotriile Formation); 7. Maastrichtian (Gura Beliei Formation); 8. Cretaceous (undivided deposits); 9. Normal boundary; 10. Lithologic boundary; 11. Unconformity boundary; 12. Thrusts; 13. Outcrops bearing fossil fishes; 14. Synclinal.

The micropaleontological samples collected by us from Caselor Valley prove that the formations bearing the fossil fishes (Figure 2)

of NP24 calcareous nannoplankton biozones) (Melinte in Popescu *et al.*, 1996).

SYSTEMATIC PART

Order Scopeliformes  
Suborder Myctophoidae  
Family Paralepididae RAFINESQUE, 1810

There are 21 Recent genera (Eschmeyer, 1990) of Paralepididae, represented by meso- or bathypelagic fishes (Post, 1970, 1973, 1986, 1987), common in all the oceans, from Arctic to Antarctic.

Four genera are represented by fossil forms: *Sudis* RAFINESQUE, 1810, *Paralepis* CUVIER, 1816, *Holosteus* AGASSIZ, 1843 and *Parascopelus* SAUVAGE, 1873 (*Paralepis* and *Sudis* genera have Recent species as well).

The Paralepididae include small to medium sized fishes (ranging from about 15 to 100 cm length), body elongate and slender, head large, sometimes with a pointed snout. Upper jaw toothless or bearing small teeth. Lower jaw with 1-3 rows of large teeth. About 60-100 vertebrae, more than half in trunk region. Dorsal- and anal- fins in posterior part of body. Adipose dorsal -fin usually present above last anal-fin rays. Pectoral fins, well developed, set low on body. Pelvic fins, small, behind middle of the body, with 8-12 rays. Caudal-fin small, forked. No spiny rays in fins. Body either naked or covered with thin cycloid scales. No photophores.

Genus *Holosteus* AGASSIZ, 1843

The genus *Holosteus* is represented by fossil forms only. Two species are mentioned (Agassiz, 1844; Menner, 1948; Danilenco, 1960): *Holosteus esocinus* AGASSIZ, 1843 and *Holosteus mariae* (MANNER, 1948). Danilenco (1960) considered *Pavlovichthys* MANNER, 1948 synonymous with *Holosteus* AGASSIZ, and the species described by Pauca (1933), Gorbach (1956) and Jonet (1958) as *Pronothacanthus sahel-almæ* DAVIS, 1887 were considered as belonging to *Holosteus mariae* (MANNER).

The fishes of this genera (only fossil forms) are small to medium sized, with elongate and slender body. Body length about 8-12 times the maximum body height. Head length 2-3 times body height. Snout long, conical. Lower jaw articulated with quadrate in front of the orbit and bearing sharp flat teeth: small anteriorly, larger in the posterior region. Vertebrae 70-90, with bifurcated neurapophyses. Thin and long ribs. Well developed intermuscular ossicles. Dorsal- and anal-fins situated in posterior part of the body, anal-fin starting in front of vertical from

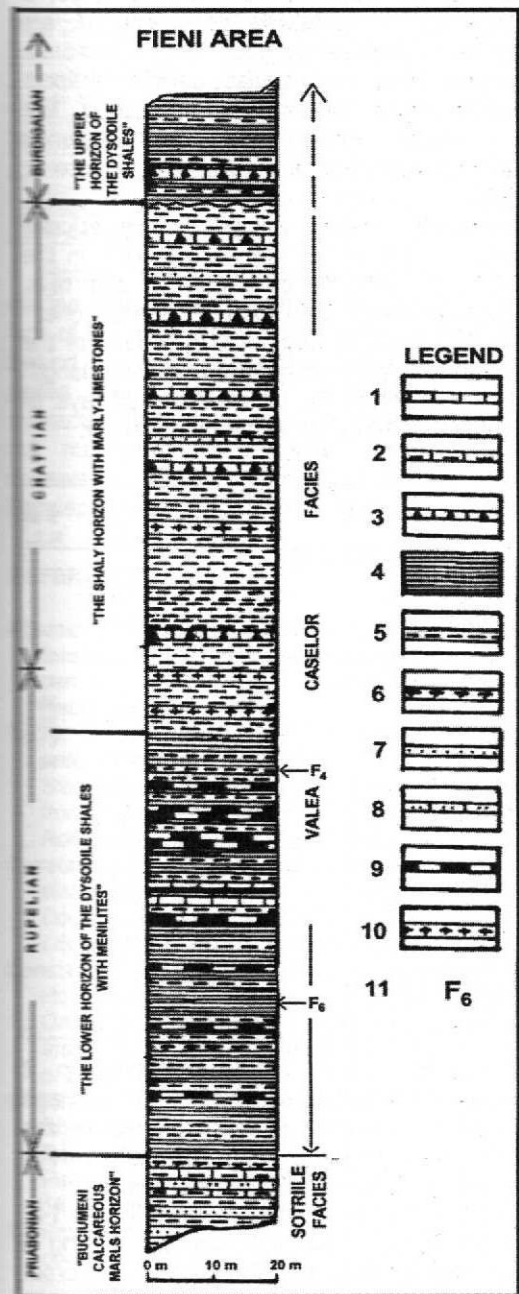


Figure 2 - Lithostratigraphic column from Fieni area with levels (F<sub>6</sub> and F<sub>7</sub>) bearing fossil fishes. Key: 1. Laminated limestones (Tylawa type); 2. Marly-limestones; 3. Dolomitic marly-limestones; 4. Dysodilic shales; 5. Clays; 6. Argillaceous silts; 7. Micaceous sandstones; 8. Calcareous sandstones; 9. Menilites; 10. Tuffs, bentonized tuffs, tuffites; 11. Levels bearing fossil fishes.

can be placed in the Lower Oligocene (Rupelian; NP22, NP23 and the lowermost part

beginning of dorsal-fin. Pelvic fins wide, with numerous rays. Caudal stem thin. Caudal-fin separated from anal- and dorsal-fins by small interval. Caudal-fin small and forked. No spiny rays in fins.

*Holosteus fieniensis* n.sp.

(Figure 1-3, Plate I; Figures 1-3, Plate II; Figures 1-2, Plate III)

**Etymology:** named after the place where it was discovered - Fieni locality in Romania (Dâmbovită County).

**Holotype:** The specimen no. CP570/4F (double impression) hosted by the Collection of Paleontological Department; Faculty of Geology and Geophysics; Bucharest University - collected by P. Constantin (Figures 1-3, Plate I; Figures 1-3, Plate II).

**Paratypes:** The specimens no. CP0618/4F (Figure 1, Plate III) and CP0474/8F (Figure 2, Plate III) hosted by the Collection of Paleontological Department; Faculty of Geology and Geophysics; Bucharest University - collected by P. Constantin.

**Type Locality:** Fieni; Dâmbovită County; Romania. (Outcrop "F<sub>4</sub>" - Figure 741).

**Type Horizon:** "The Lower Horizon of the Dysodilic Shales with Menilites"; Rupelian (Figures 1, 2).

**Formula of the main characteristics:**

Vert. = 77(54 + 23)

D = 20

A = 28

P = 20

V = 10-12

C = 5-6; 10-12/12-10; 5-6

**Diagnosis:** 77 vertebrae of which 54 are precaudal; lower jaw articulated with quadrate in front of the orbit; upper jaw larger than the lower one, strong teeth on the dentary; vertebrae without parapophysae; dorsal fin posteriorly; anal fin beginning anteriorly of the dorsal; caudal fin highly forked; caudal fin rays surrounding the urostyle; pelvics rather short, beginning in the last third of the body.

**Description:** middle sized fish, body elongated, mouth obliquely. Holotype measurements (S.L.=154mm) and other meristic characters are presented in Table 1.

**Skull:** elongated, rather large, triangle shaped (having its base posteriorly). Upper jaw toothless. Strong teeth on the lower jaw, larger posteriorly (Figure 2, Plate I). Preorbital distance longer than postorbital one, resulting in a characteristic "snout". Orbits upsid, almost near the dorsal edge of the skull (Figure 1, Plate II). Lower jaw articulated with quadrate in front of the orbit (Figure 3, Plate I; Figure 1,

Plate II). Four-five branchiostegal rays can be noticed.

**Vertebral column:** situated in the upper part of the body, closer to the dorsal edge; it consists of 77 vertebrae of which 54 are abdominal. Vertebrae centrum quadrate abdominal and rectangular caudal shaped. Vertebrae body haltered centrally. Long, fine ribs. Many small ossicles, covering neurapophys (Figure 2, Plate II, Figure 2, Plate III).

**Dorsal-fin:** much posteriorly (antedorsal distance 81,8% of the standard length, in the holotype). It consists of about 20 soft rays, decreasing in length from the first to the last one.

**Anal-fin:** anal-fin beginning anteriorly of the dorsal-fin, at a level corresponding to the length of about 5-6 vertebrae. It consists of 28 rays, of which the first 10 larger and forked distally.

Table 1

CHARACTERS	Measurements (mm)	% of S. L.	% of H. L.
Body length (including caudal fin)	174	-	-
Standard length (S. L.)	154	-	-
Maximum body height	22	14,3	-
Minimum body height	7	4,5	-
Head length (H. L.)	48	31,1	-
Maximum head height	24	15,6	-
Preorbital distance	21	-	43,7
Postorbital distance	17	-	35,6
Orbit diameter	10	-	20,8
Upper-jaw length	20	-	41,6
Lower-jaw length	19	-	39,5
Predorsal length	125	81,8	-
Preal length	128	83,1	-
Prepelvic length	108	70,1	-
Pectoral to pelvic length	64	41,5	-
Pelvic to anal length	18	11,6	-
Caudal-fin base length	20	12,9	-
Dorsal-fin base length	17	11	-
Anal-fin base length	24	15,6	-
Pectoral-fin base length	5	3,2	-
Pelvic-fin base length	6	3,8	-
Anal-fin largest rays length	14	9	-
Pectoral-fin largest rays length	21	13,4	-
Pelvic-fin largest rays length	15	9,6	-

**Caudal-fin:** highly forked, resulting in 2 lobes, each consisting of 10-12 main rays and 5-6 secondary ones, shorter, placed in the external part of each lobe. Caudal-fin rays surrounding the urostyle (Figure 3, Plate II).

**Pectoral fins:** highly developed (Figures 1-2, Plate II). Twenty rays for each fin, having a length equal with 13 abdominal vertebrae. Pectorals inserted ventrally, immediately behind the opercle (Figures 1-2, Plate II).

**Pelvic fins:** inserted ventrally, in the beginning of the last third of the body, bearing only 10-12 soft rays.

**Remarks:** The species shows many affinities with *Holosteus mariae* (MANNER) described by Danilenco (1960) from Caucasus. Generally, the 2 species are alike by their meristic and osteologic characters, the main differences consisting in their somatic characters (Table 2).

Table 2

CHARACTERS	<i>Holosteus fieniensis</i> n. sp. (HOLOTYPE)		<i>Holosteus mariae</i> (MANNER)	
	% of S. L.	% of H. L.	% of S. L.	% of H. L.
Head length (H. L.)	31,1	-	22-26	-
Maximum body height	14,3	-	9-11	-
Dorsal-fin base length	11,0	-	9-10	-
Anal-fin base length	15,6	-	11-12	-
Predorsal length	81,8	-	75-80	-
Preeanal length	83,1	-	82-86	-
Prepelvic length	70,1	-	64-69	-
Preorbital length	-	43,7	-	56-62
Orbit diameter	-	20,8	-	15-18
Lower-jaw length	-	41,6	-	45-50

*Holosteus fieniensis* n. sp. differs from *H. mariae* described by Danilchenko (1960) by the lack of the small bony plates on the dorsal side behind the occiput. As the presence of these plates is shown by Danilchenko as a characteristic of the genus *Holosteus* (but it is not mentioned by Agassiz, 1843), further reviews of the whole original material from Paralepididae may show even 2 different

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## PLATES

### Plate I

- Figure 1 - *Holosteus fieniensis* n. sp. - holotype, specimen no. 0570/4F. Fieni. "The Lower Horizon of the Dysodilic Shales and Menilites". Valea Caselor lithofacies.
- Figure 2 - *Holosteus fieniensis* n. sp. - holotype, specimen no. 0570/4F. Fieni. "The Lower Horizon of the Dysodilic Shales and Menilites". Valea Caselor lithofacies. Detail - fore area of the skull. Teeth can be noticed on the lower jaw.
- Figure 3 - *Holosteus fieniensis* n. sp. - holotype, specimen no. 0570/4F. Fieni. "The Lower Horizon of the Dysodilic Shales and Menilites". Valea Caselor lithofacies. Detail - opercular apparatus.

### Plate II

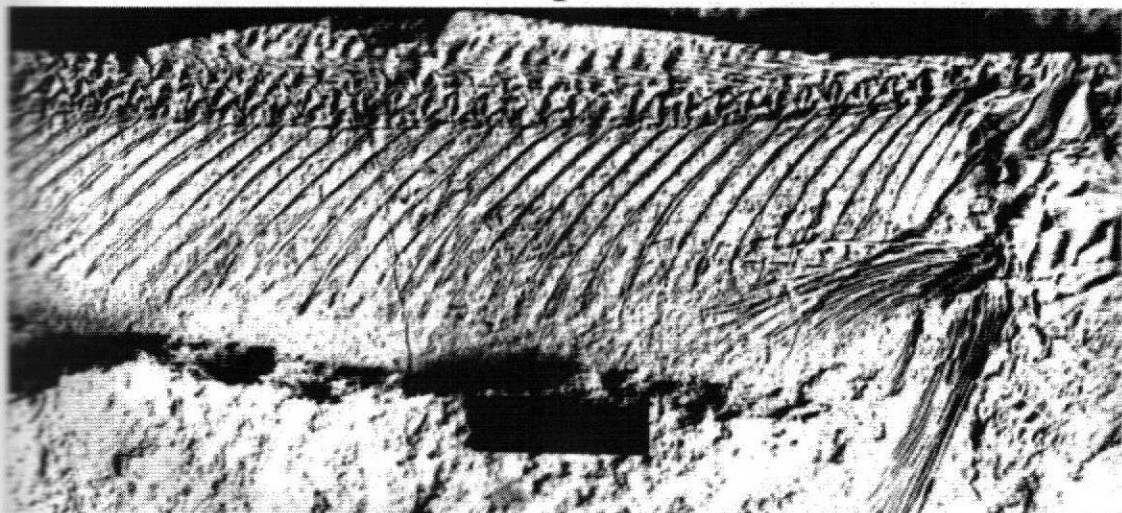
- Figure 1 - *Holosteus fieniensis* n. sp. - holotype, specimen no. 0570/4F. Fieni. "The Lower Horizon of the Dysodilic Shales and Menilites". Valea Caselor lithofacies. Detail - head and the first 13-14 vertebrae from the abdominal area. Pectoral fins display is noticed.
- Figure 2 - *Holosteus fieniensis* n. sp. - holotype, specimen no. 0570/4F. Fieni. "The Lower Horizon of the Dysodilic Shales and Menilites". Valea Caselor lithofacies. Detail - abdominal area. A small teleostean specimen, head pointing posteriorly (probably swallowed by *Holosteus fieniensis* n. sp.), can be noticed.
- Figure 3 - *Holosteus fieniensis* n. sp. - holotype, specimen no. 0570/4F. Fieni. "The Lower Horizon of the Dysodilic Shales and Menilites". Valea Caselor lithofacies. Detail - caudal body area. Anal- and dorsal-fins position, and the caudal-fin shape as well, can be noticed.

### Plate III

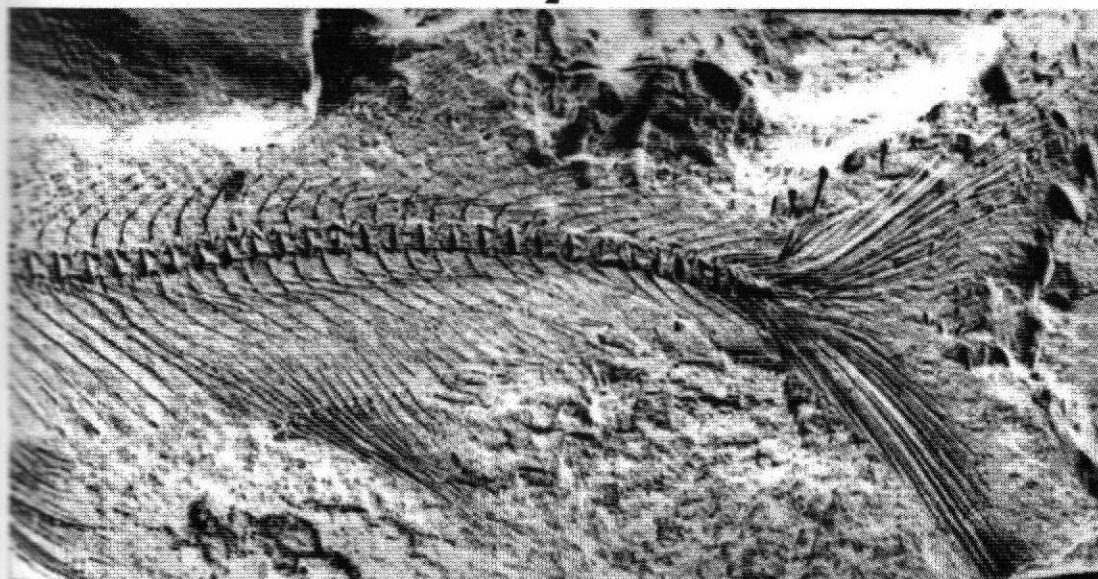
- Figure 1 - *Holosteus fieniensis* n. sp. - paratype, specimen no. 0474/6F. Fieni. "The Lower Horizon of the Dysodilic Shales and Menilites". Specimen in which the skull and the first vertebrae from toracal area can be noticed, and the pectoral fins display, as well.
- Figure 2 - *Holosteus fieniensis* n. sp. - paratype, specimen no. 0618/4F. Fieni. "The Lower Horizon of the Dysodilic Shales and Menilites". Valea Caselor lithofacies. Fragment - abdominal area, fine, long ribs, reaching ventral body profile, can be noticed. Intermuscular ossicles, well developed, covering neuropophyses.



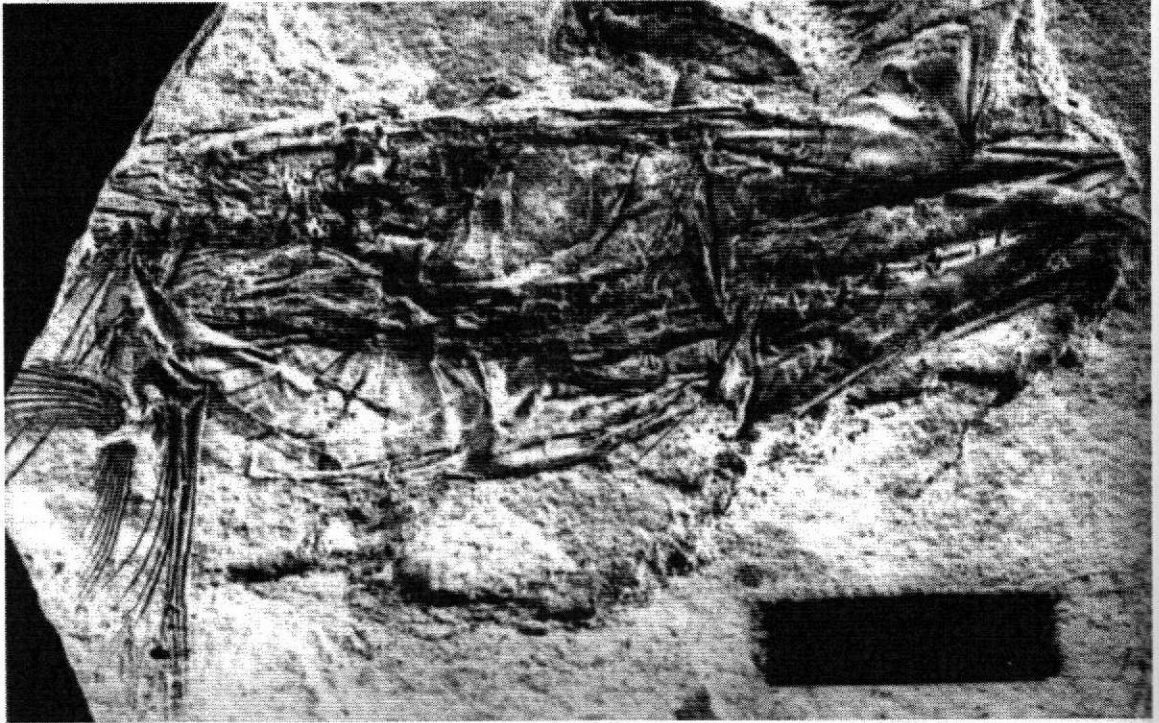
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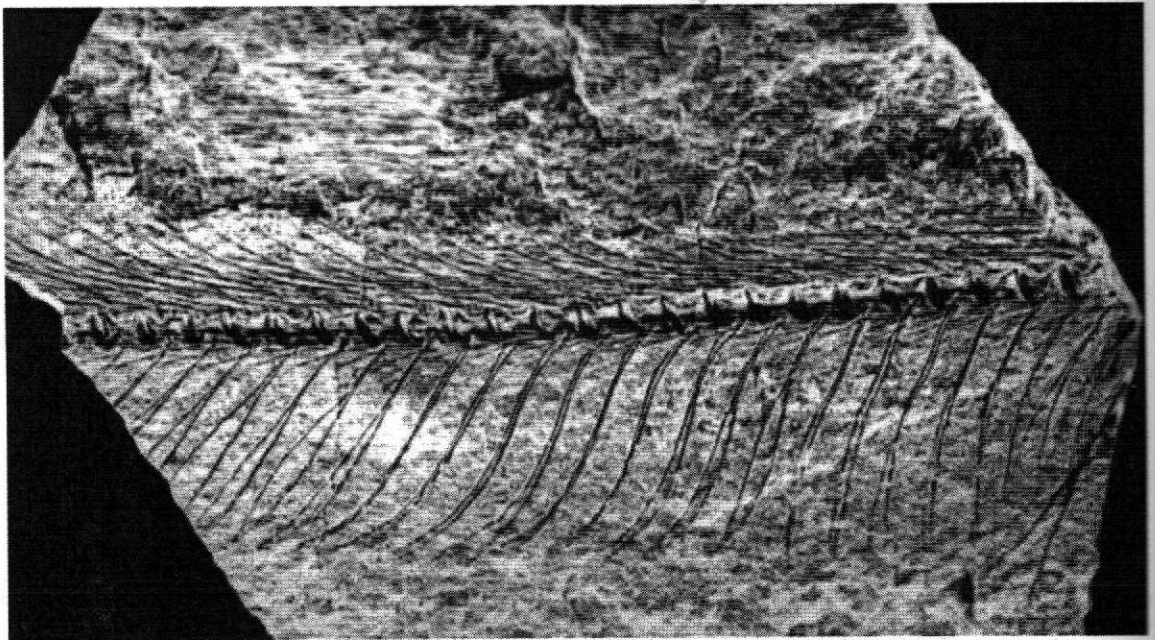
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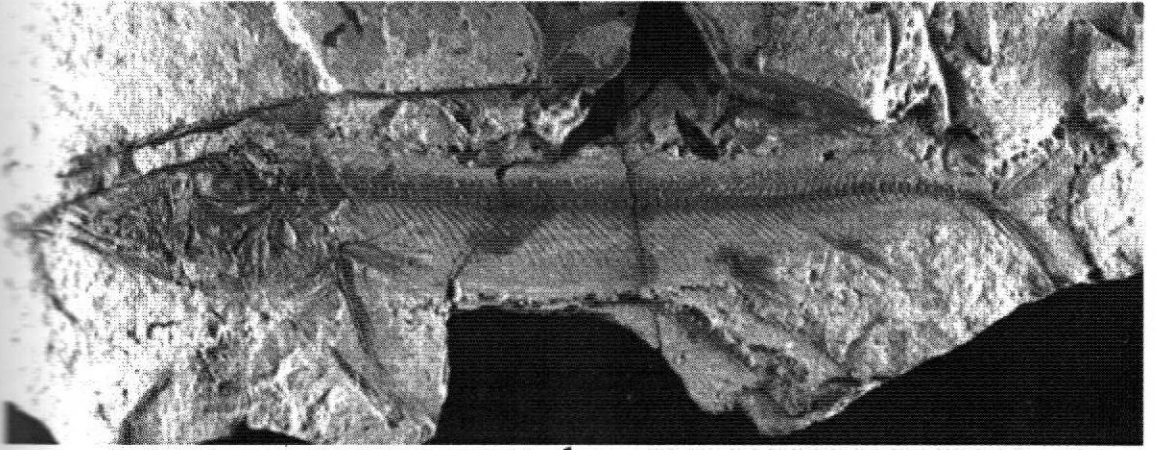
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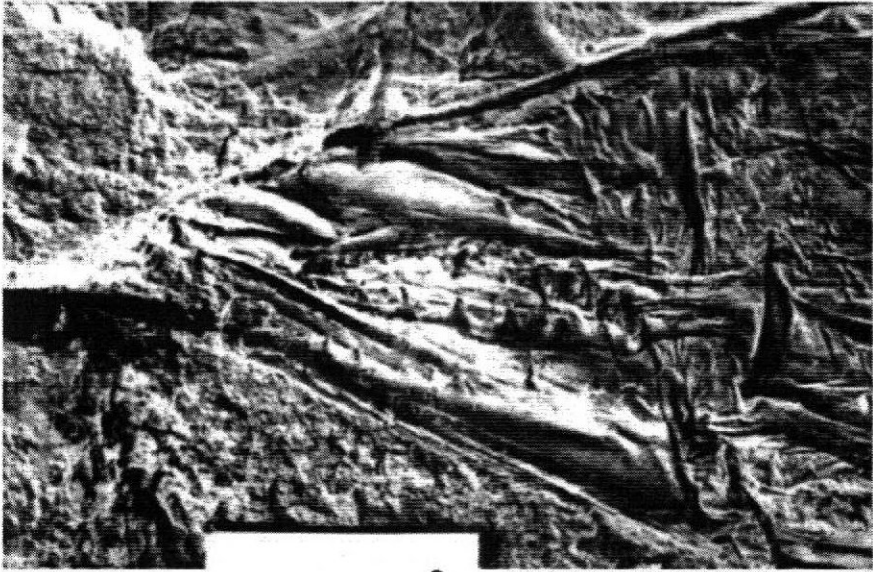
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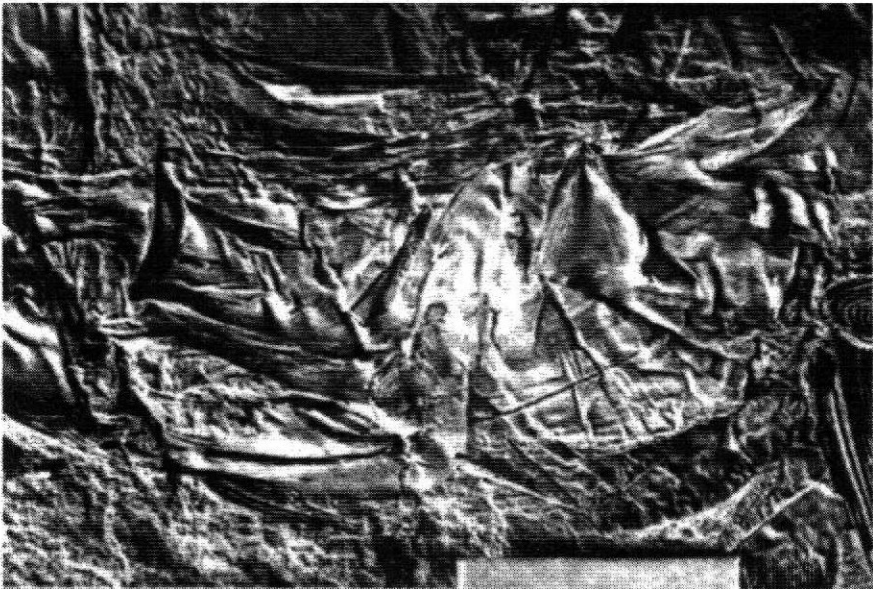
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