A NEW FOSSILIFEROUS SITE IN THE SIBICIU VALLEY (BUZĂU COUNTY)

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Abstract. The paper presents a new paleontological site mapped in the Sibiciu Valley, which is near the diatomite quarry - Burdușoaia. On this site, outcrops of Palaeogene dysodilic shales which belong to the Tarcău Nappe, from Moldavide's Unit, have been found. The outcrop examination revealed two rich fossiliferous layers in the approximately 10 m thick package of disodiles. The preliminary analysis of palaeontological content reveals the presence of fishes remains (almost entire skeletons, scales, teeth, regurgitaliths, otoliths) from Clupeidae and Merlucidae groups, representing the main fossils and other fossil remains (possible of algae or/and arthropods) which complete the assemblage.

Keywords: paleontologic site, Sibiciu, Paleogen, fossil fishes.

Rezumat. Un nou sit fosilifer în Valea Sibiciului (județul Buzău). În lucrare este prezentat un nou sit paleontologic cartografiat în Valea Sibiciului, care se află în apropierea carierei de diatomite - Burdușoaia. În acest sit aflorează șisturi disodilice paleogene din Pânza de Tarcău, aparținând Unității Moldavidelor. Examinarea aflorimentului a evidențiat două strate fosifere bogate în pachetul de disodile de aproximativ 10 m grosime. Analiza preliminară a conținutului paleontologic relevă prezența resturilor de pești (schelete aproape întregi, solzi, dinți, regurgitalite, otolite) din grupele Clupeidae și Merlucidae, reprezentând principalele fosile și alte resturi fosile (posibil de alge și/sau artropode) care completează asociația.

Cuvinte cheie: sit paleontologic, Sibiciu, Paleogen, pești fosili.

INTRODUCTION

The paleontological site (outcrop), briefly described in this paper, is located N 45 degrees 20.651' and E 026 degrees 21.905' (GPS coordinates), near the Sibiciu de Sus village - Pătârlagele town area (Fig. 1). The site opens with dysodilic shales and fossils belonging to the Kliwa Formation, part of the Tarcău Nappe from Moldavide (SĂNDULESCU, 1984).

Figure 1. Location of site (outcrop) on the Google-Earth map (satellite image).

Geological formations from the region have been analysed by STOICA (1944), who describes the sequence of Paleogene deposits with their fossil content without specifying the location of the fossiliferous points. Many studies were subsequently carried out in order to produce geological maps at a scale of 1:50,000 by IGR teams, coordinated by ȘTEFĂNESCU (1993, 1994). CONSTANTIN in his PhD thesis (2000) and in IGR reports (1996, 1998a and b), made a brief presentation of a site from the Sibiciu Valley, without a precise location. In 1999, the same researcher mentions the site in the Sibiciu Valley in a synthetic paper on all the Oligocene-Miocene deposits in the area of the Eastern Carpathians and up to the Ialomița Valley. MELINTE (1993) draws, on the basis of nanoplankton, the boundary between Paleogene and Miocene deposits in the region. An extensive monography, with many details was published by FRUNZESCU & BRĂNOIU in 2004 – Geological Monograph of the Buzău River Basin, in which details of the diatomite quarry area of Burdușoaia hill appear.

GEOLOGIC FRAMEWORK

The geology of the region (Fig. 2A), at the boundary of the Paleogene Carpathian Flysch (Buzău Mountains) with Miocene-Pliocene molasse deposits, is relatively complicated by numerous faults and overlaps of rock packages, following a general ENE-WSW direction but also faults transverse to this direction. The structure belongs to the Tarcău Nappe in which several formations have been separated: Vinețișu, Fusaru, lower dysodilic member, bituminous marls member, lower menilites member, Ardeluța, Podu Secu, Tarcău Sandstone, Horgazu, Cârnu, Audia (GUERRERA, 2012). The lithological succession described by previous authors (STEFANESCU et al., 1993) comprises from the base to the top: coarse schistose flysch ± marls with globigerines – in Colți Formation (Ypresian); quartz sandstones - Lucăcești Sandstone (Priabonian); menilites (cherts), bituminous marls, Tylawa limestones, tuffs (a) - lower horizon of menilites and white marls with Lingurești Formation (Fierăstrău Sandstone) at the base (Oligocene); dysodilic shales, siderite marl-calcareous, thin quaternary sandstones and Tylawa limestones - Lower horizon of dysodilic shales (Oligocene); quartz-schist flysch with Jasio limestones - Lower horizon of Kliwa sandstones (Oligocene); Schistose flysch - Topilele Formation (Oligocene Lower - Miocene); Schistose-coarse flysch with tuffs (a. Vinețișu. B. Mlăcile) - Podul Morii Formation (Oligocene Lower - Miocene); quartz sandstones and sands with Bătrânilor tuffs - Upper Kliwa Sandstone Horizon (Lower Miocene); menilites, diatomites, disodiles, quartz sandstones and Bătrânilor tuffs - Upper Menilite Horizon (Lower Miocene); quartz sandstones, dysodilic shales, tuffs - Upper Menilitic Sandstone Horizon (Lower Miocene); gypsum, marls - Muncelul Cărmănesc Gypsum (Lower Miocene); massive and thin grey sandstones, red and grey pelites, gypsum, tuffs (Lower - Middle Miocene).

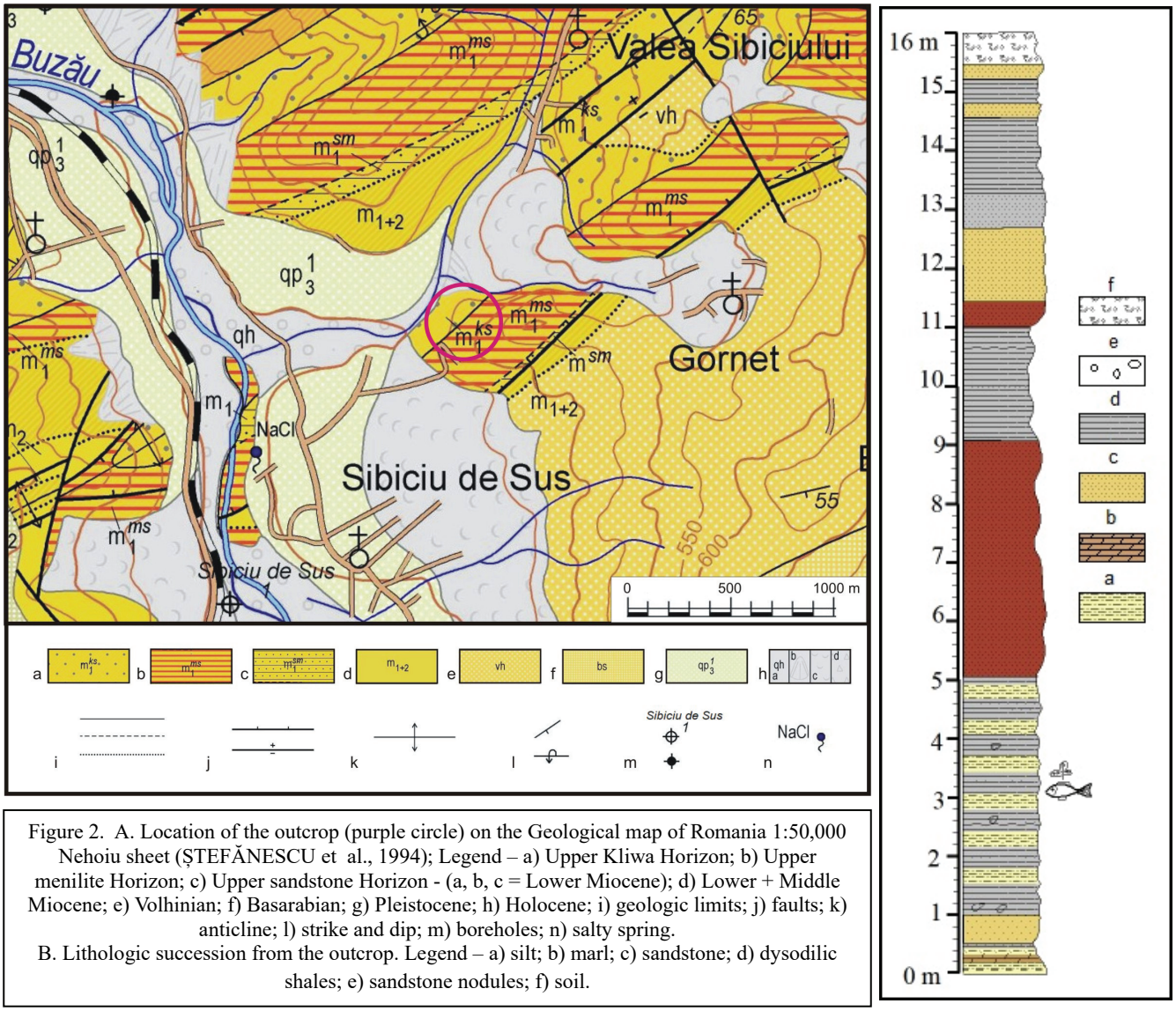

Figure 2. A. Location of the outcrop (purple circle) on the Geological map of Romania 1:50,000 Nehoiu sheet (ȘTEFĂNESCU et al., 1994); Legend – a) Upper Kliwa Horizon; b) Upper menilite Horizon; c) Upper sandstone Horizon - (a, b, c = Lower Miocene); d) Lower + Middle Miocene; e) Volhinian; f) Basarabian; g) Pleistocene; h) Holocene; i) geologic limits; j) faults; k) anticline; l) strike and dip; m) boreholes; n) salty spring.
B. Lithologic succession from the outcrop. Legend – a) silt; b) marl; c) sandstone; d) dysodilic shales; e) sandstone nodules; f) soil.

The Burdușoaia Hill is an anticline with N30ºE orientation, whose tectonic detail is complicated, cumulating the effect of dislocations in the Tarcău foreland with those of pene-contemporaneous marine sedimentation slides. In the quarry talus it appears as a straight or slightly eastward-dejected normal anticline, with flat or weakly folded flanks due to post-depositional flows of constituent materials and, especially, at the level of those near the pits (FRUNZESCU & BRĂNOIU, 2004).

MATERIALS AND METHODS

The present study began with fieldwork in the fall of 2022 consisting of sampling fossiliferous levels, location determination, layers measurements and overall analysis of the position of sedimentary deposits.

The collected material was prepared in the laboratory (cleaning, drying, sorting, stabilization of non-cohesive fragments), following the selection of fossil material, photographs of the samples were taken and partially analysed under binocular magnification (preliminary determinations). The documentation of the geology of the area was carried out through materials available in the library of the Geological Institute of Romania and materials available in the virtual environment (internet); for the fossils, identification books and reference works were used. Data from the bibliography were corroborated with our observations in the field or about fossils in order to establish a correlation between these deposits and fossil assemblage and the other previously described.

DESCRIPTION OF SITE

The fossiliferous site is located about 300 m from the village of Sibiciu de Sus (Pătârlagele Village), at the edge of the road (DC 69) that climbs the Sibiciu Valley towards the village of Colți (Fig. 1). The outcrop is part of a wider opening, about 300 m along the road, with variable heights and slopes (10 - 80 m), continuing on the hollow of a left tributary of the Sibiciu stream thatoutflows from the slope of the Burdușoaia Hill. The outcrop is discontinuous, interrupted by wooded portions and drainage valleys. The analysed portion is an opening of dysodilic shales, about 5-8 m wide and about 10 m high, between tree stands.

Figure 3. Outcrop of Ruppelian deposits on the left bank of Sibiciului Valley on the National Road DC69 (North from Sibiciu de Sus village): (a) The outcrop (Upper Paleogene – Lower Miocene); (b) Detail with dysodilic shales and fossils.

The lithology (Fig. 2B) in this outcrop comprises the following terms in succession:
- 30 cm alternating siltstone (quartz with yellow sulphur films) and marlstone (dark brown laminates);
- 6 cm layer of reddish-yellow quartz sandstone with hieroglyphs on top;
- 13-14 cm thicker layered dysodilic shales;

- 0.5 cm sandstone similar to the one below, the states are arranged almost at an inclination of 85^0-90^0;
- 4 m of alternating siltstones and dysodilic clays with interbedded greyish brown-creamy-beige nodules, there are also sandstone laminae with gypsum (shiny stone) florescence surface;
- 4 m layer of reddish-brown sandstone alternating in larger blocks, smaller on the outside;
- 2 m fine dysodilic shales with rare 0.5 layers of sandstone;
- 40 cm layer of reddish-brown sandstone with manganese dendrites;
- 110 cm slightly altered yellowish sandstone;
- 60 cm hard sandstone with silica;
- 1.5 m dysodilic shales;
- 30 cm hard yellowish sandstone;
- 40 cm dysodilic shales;
- 30 cm hard yellowish sandstone;
- Topsoil.

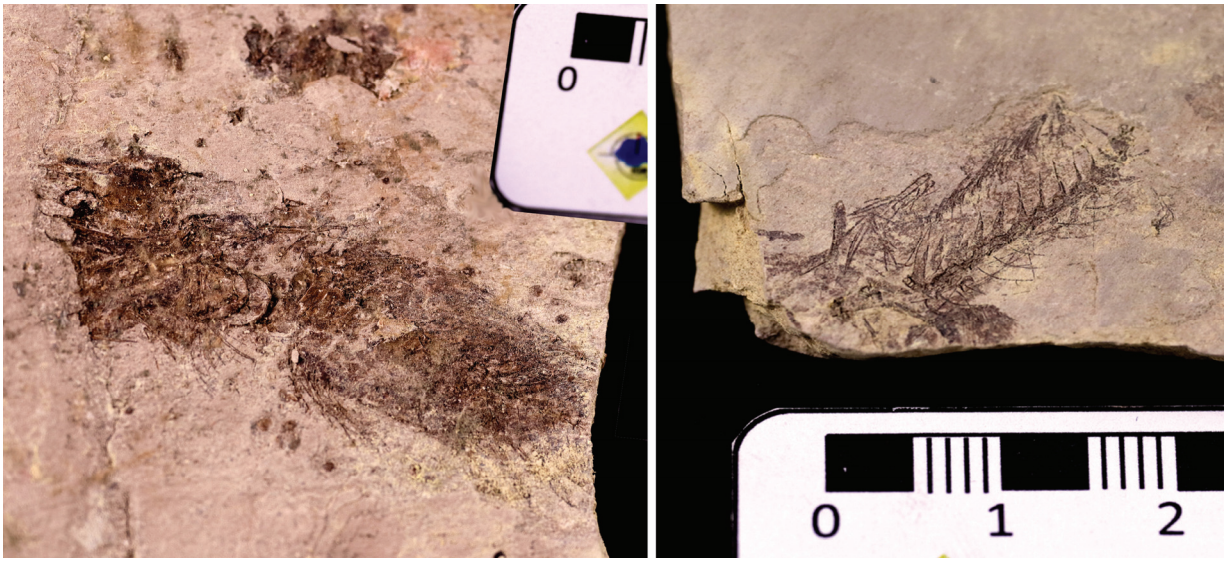

Figure 4. Fish fossils (Oligocene): a. Fam. Merlucciidae; b Incomplete skeleton of a Pericforme.

It has a steep slope and is part of the northwestern slope of the Burdușoaia hill, where the diatomite quarry is also open on the opposite slope (Fig. 3a).

There two levels containing fossil remains (see column in Fig. 2B). The shales containing the fish remains are rich in sulphur content, with a striped appearance alternating between finer, lighter-coloured material and coarser, grey-tinted material. Small, radiating gypsum nests occur between the strata.

The presence in the Bituminous Facies (Ruppelian in age) of fishes fossils is remarkable, with several species and genera, previously mentioned (STOICA, 1943; CONSTANTIN, 1999); the species mentioned from this area were: *Clupea longimana* (Heckel, 1850) – mentioned as *Meletta crenatta* by POPESCU-VOITEȘTI (1909), *Clupea crenatta* (Heckel) by PAUCĂ (1929) or *Clupea (Meletta) crenata* (Heckel) by PROTESCU (1938); other species - *Scorpaenoides popovicii* (Priem, 1899) and *Serranus budensis* (Heckel, 1856). Also, a similar succession and fossil assemblage was described from the Outer Carpathians, in Poland, by KOTLARCZYK et al. (2006).

Until now, by means of field observations and primary paleontological analysis (determinations) we can affirm that: the fossil remains (Fig. 4, 5 and Plate 1) are unevenly distributed and there are two types of associations: an association containing fish remains (more or less complete – of Clupeidae, Merlucciidae, Syngnathidae etc.) and another association composed of scattered fish remains (scales, bones, teeth, etc.), algae (?), otoliths, regurgitaliths (like those described in BRUSTUR & CHITEA, 2021) and possibly arthropods.

Figure 5. Cycloid scales and algae (?) remains from dysodilic shales layers

CONCLUSIONS

The on-site analysis and preliminary determinations on the fossil remains, as well as the varied association encountered, are prerequisites for more in-depth studies in the site. We believe that the site (outcrop) can become a point of reference in the future after more detailed studies and it may be proposed as a paleontological reserve. At the same time, if the macro-paleontological and micro-paleontological studies demonstrate the presence of the Paleogene here, a reinterpretation of the structure and deposits in the region and a revision of the existing map are required, along with the correlation with similar formations described both in the surroundings and in the rest of the Moldavides (BORDEIANU et al., 2018).

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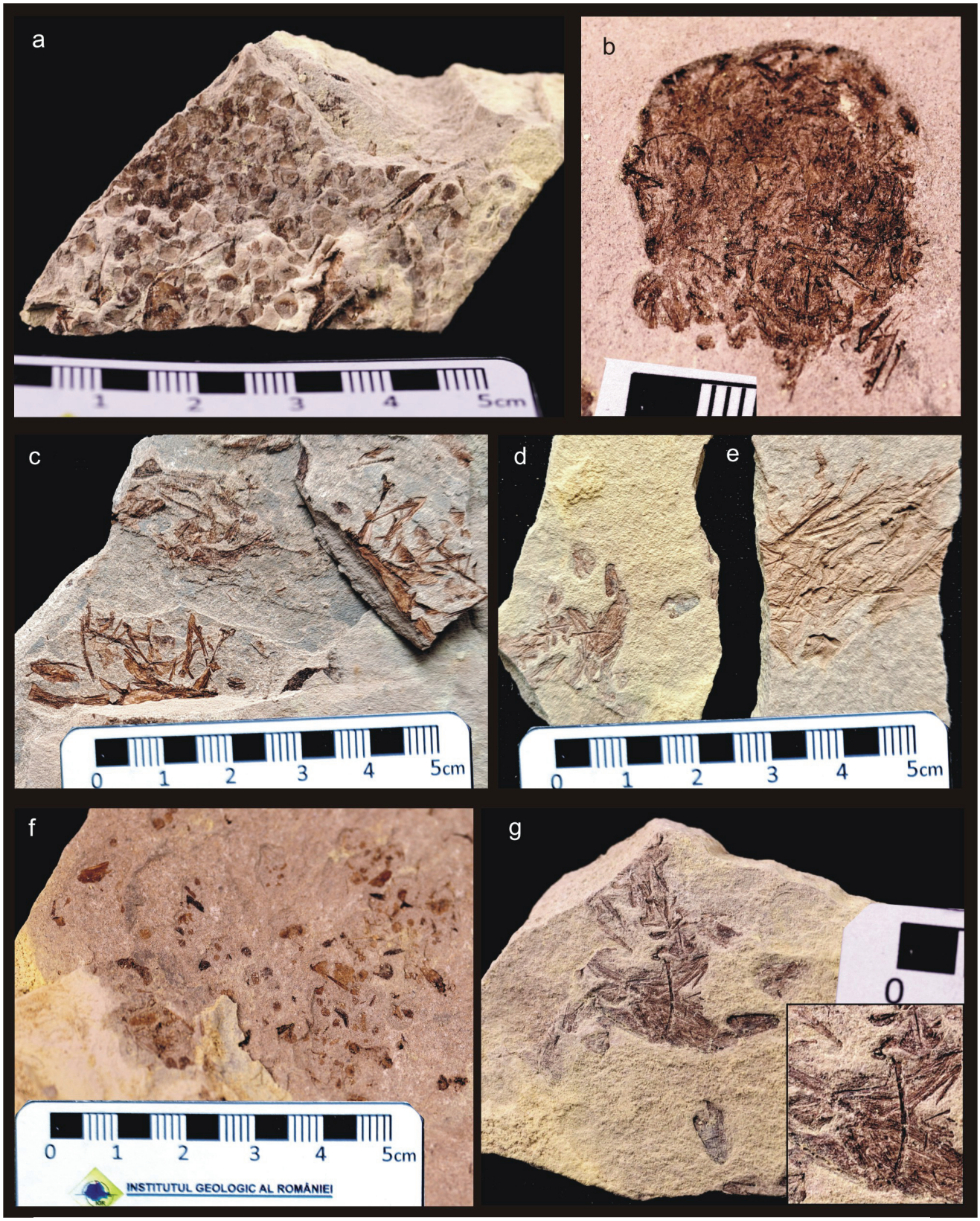
Plate I



a. Fish cycloid scales and bones; b. Regurgitalith; c. Disarticulated fish head skeletal bones; e. *Fish bones*; f. Urohyal bones; d. g. Undetermined fossil remains.