

**A Pliensbachian (Early Jurassic) Bivalve Faunula from the
Harsány-hegy: First Record of the Domerian Substage from the
Villány Hills (southern Hungary)**

by

I. SZENTE and A. VÖRÖS

Abstract: A new temporary exposure of Lower Jurassic rocks, a nearly 8 m thick sequence of previously unknown fossiliferous limestone and chert beds is described. The bivalves and brachiopods indicate a Domerian (Late Pliensbachian) age, first recorded from the Villány Hills. Bivalves, the dominant elements of the fauna represented by 7 species, are briefly commented.

INTRODUCTION

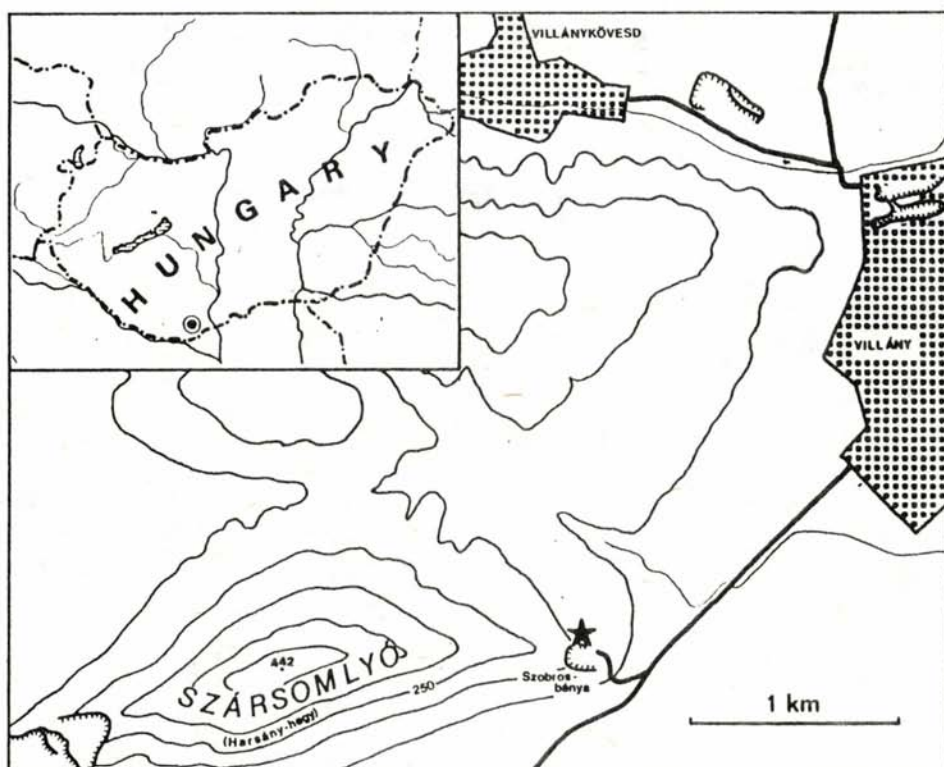
The Villány Hills are composed of several thrust sheets comprising Mesozoic sedimentary rocks steeply dipping to the south. In the Villány and Harsány thrust sheets thin beds of fossiliferous Lower and Middle Jurassic sequences are sandwiched between thick Triassic and Upper Jurassic-Lower Cretaceous carbonate complexes.

The Villány Hills has been well known among Jurassic stratigraphers and paleontologists since the monographs of Till (1910, 1911) and Lóczy (1915) describing the extremely rich Callovian ammonoid fauna. Surprisingly, the sandy and crinoidal limestone beds immediately underlying the fossiliferous Callovian strata had been regarded as Bathonian in age essentially without any evidence. The Early Jurassic age of these rocks was not recognized until 1969, when ammonites and brachiopods indicating the basal Pliensbachian Jamesoni Zone were collected and identified from the classical Templomhegy and Somsich-hegy sections near the village of Villány (Ager and Callomon 1971, Dommergues and Géczy 1989).

Lower and Middle Jurassic deposits of the Villány thrust sheet and their faunas are well studied and documented. Apart from the works mentioned above, several papers were published on their sedimentology (Vörös 1972, 1989) and the Jurassic belemnite (Galács and Vörös 1969) and bivalve faunas (Vörös 1971). An account of the ammonites was given by Géczy (1984a).

Due to the poor exposures, the Lower and Middle Jurassic sequence of the Harsány thrust sheet has been much less known. Crinoidal and cherty limestones underlying the Callovian were mentioned by Rakusz and Strausz (1953) and these rocks were assigned to the Pliensbachian by Vörös (1972) on the basis of a few fossils (*Gryphaea*, *Spiriferina*). In the early 1970's the Upper Triassic to Upper Jurassic sequence was penetrated by drilling (I. Nagy, pers. comm.) but the results have remained unpublished. No detailed information on the Lower Jurassic deposits was available until now.

In 1990 a new temporary exposure of Lower Jurassic rocks was discovered by Cs. Péró (Eötvös University, Budapest). It was located approximately 1.5 km southwest of the village of Villány, near the open-air museum called "Szobrosbánya" on the eastern slope of the Harsány-hegy (Text-fig. 1). The section was



Text-fig. 1. – Location map showing the position of the outcrop with Domerian fauna at the eastern end of the Harsány-hegy (asterisk). The dot in the insert map marks the situation of the Villány region in Hungary

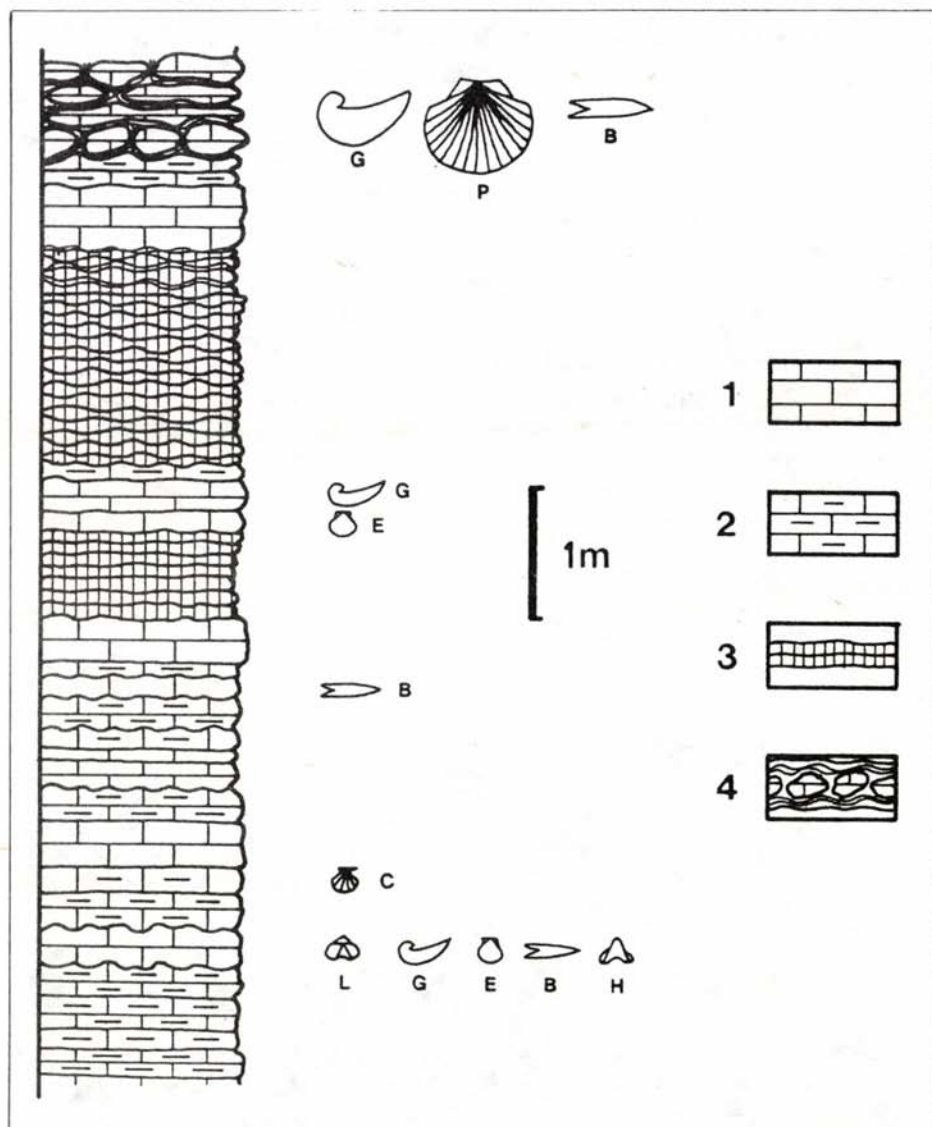
exposed by an excavation of a wine cellar and its faunula is briefly described here due to its considerable importance to the understanding of the Jurassic geology of the Villány Hills. This is the first documentation of the Pliensbachian of the Harsány thrust sheet and the first record of the Domerian Substage from the area.

THE SECTION

The excavation exposes a more than 7 m thick sequence (Text-fig. 2). The steeply dipping (approx. 60°) beds are truncated abruptly at the middle of the wall of the pit and are covered by thick loess.

The lowermost beds consist of siliceous limestone, sometimes strongly leached, forming 20-30 cm thick layers. At about one meter a less siliceous and very fossiliferous bed appears with nodular bedding surface. The following 2.5 m thick interval shows similar features: siliceous and cherty limestone beds alternate

with pure limestone layers, the bedding surfaces are even or nodular in various degree; the fauna is relatively poor. At about the middle of the section the limestone is overlain by almost pure siliceous deposits: this 70 cm thick, thinly bedded interval is made up of spiculitic chert. Above a 40 cm thick fossiliferous limestone intercalation the spiculitic chert becomes predominant again. It is very thinly layered, the bedding surfaces are undulating and 1-2 cm thick clay interbeds are frequent in the upper part. The spiculitic chert is terminated abruptly and the



Text-fig. 2. – Detailed lithological column of the temporary exposure at the Szobrosbánya locality with symbols of the most important fossils found. 1: limestone; 2: siliceous and cherty limestone; 3: spiculitic chert; 4: coarse nodular limestone, clay interbeds. B: belemnites;

C: *Chlamys*; E: *Entolium*; G: *Gryphaea*; H: *Homoeorhynchia*; L: *Liospiriferina*;

P: *Pseudopecten*

topmost 1,5 m of the exposed sequence consists of pure limestone changing from well bedded to nodular in appearance. The uppermost 80 cm of coarsely nodular limestone is the most fossiliferous level yielding large gryphaeids and several specimens of *Pseudopecten*. The nodular structure of the rock is probably caused by bioturbation. This, together with the enrichment of other benthonic elements indicates optimal environmental conditions.

GENERAL COMMENTS ON THE FAUNA AND ANNOTATED LIST OF BIVALVES

The majority of the material was collected as float from the dump of the excavation. All specimens are more or less damaged. The fauna is dominated by bivalves. More than 70 specimens belonging to seven taxa were found. A conspicuous feature of the preservation is the silicification of large bivalve shells resulting in beekite structures (Pl. II, figs. 1-2).

In addition to the bivalves, a few brachiopods and indeterminate fragments of belemnite rostra were also found. Two brachiopod species were identified. One of them, *Liospiriferina* cf. *rostrata* (SCHLOTHEIM) was already recorded from the Harsány-hegy by Ager and Callomon (1971). *Homoeorhynchia* cf. *acuta* (J. SOWERBY, 1818) is represented by several distinctive fragments. It is a stratigraphically important find since the species is restricted to the latest Pliensbachian (Alm  ras 1964).

A list of bivalve taxa with remarks concerning their morphological features and stratigraphic importance is given below. Figured specimens are deposited in the collection of the Paleontological Department, Hungarian Natural History Museum.

Limea (*Pseudolimea*) *pectinoides* (J. SOWERBY, 1815) Pl. II, Fig. 3

According to Dhondt (1989), *Pseudolimea* ARKELL in DOUGLAS and ARKELL, 1932 is regarded as a subgenus of *Limea* BRONN, 1815. Two specimens were found. The better preserved one possesses 20 obtuse ribs with interspaces occupied by weak radial threads. The anterior and posterior areas are smooth. According to Hallam (1987), this distinct species has a long stratigraphic range from the Early Sinemurian to the end of the Pliensbachian.

Plagiostoma sp.

Three very incomplete specimens are available. Their ornamentation consists of fine radial threads of which at least 120 can be counted on the best preserved specimen.

Gryphaea gigantea J. de C. SOWERBY, 1823

Pl. I, Figs. 1-2, Pl. II, Fig. 2.

This is the most frequent species of the recently collected material. It was already recorded from the Harsány-hegy by Vörös (1971). More than 25 specimens, mainly articulated but fragmentary shells were found. The length of the largest specimen is 132 mm. Some left valves with unbroken dorsal region show well defined posterior flange (Pl. II, Fig. 2.).

As Hallam (1982) pointed out, a phyletic increase of maximum size can be observed among successive *Gryphaea gigantea* faunas of Europe from the early Pliensbachian appearance of the species until the end of the age. Specimens exceeding 110 mm in length are known only from the Late Pliensbachian. It must be mentioned, however, that specimens larger than postulated by Hallam (1982) were recorded by Arnaud and Monleau (1979) from the Early Pliensbachian of Provence. The presence of a well developed posterior flange, however, seems to be indeed characteristic of the Domerian representatives of *G. gigantea* (see e.g. Hallam 1968, fig. 52., Shopov 1974, pl. III, fig. 1. and Tietze 1872, pl. VI, fig. 1.). This indicates the Late Pliensbachian age of the rocks exposed on the Harsány-hegy.

Entolium (*Entolium*) cf. *lunare* (ROEMER, 1839)

Eight very poorly preserved specimens were collected. As the careful revision by Johnson (1984) suggests, all European pre-Toarcian Jurassic representatives of the genus *Entolium* can be assigned to *E. lunare*. Measurements of the newly found shells as well as those of the specimens described by Vörös (1971) from Villány as *Entolium* cf. *hehlii* (D'ORBIGNY 1850) are well within the range of *E. lunare*. Its distinctive feature, a small byssal notch in the juvenile, cannot be observed, however.

Pseudopecten (*Pseudopecten*) *equivalvis* (J SOWERBY, 1816)

Pl. II, Fig. 4.

Beside the abundance of *Gryphaea gigantea*, the presence of large specimens of *Pseudopecten* (*Pseudopecten*) *equivalvis* is the most striking feature of the Harsány-hegy fauna. 14 incomplete valves were found. The height of the largest measurable shell exceeds 120 mm. This specimen bears 23 rounded plicae. As shown by Johnson (1984), phyletic size increase is a marked trend in *P. (P.) equivalvis*. The largest shells, similar in size to the specimens found on the Harsány-hegy, were recorded from condensed Upper Pliensbachian sequences suggesting a similar age for the Harsány-hegy fauna.

Chlamys (*Aequipecten* ?) cf. *prisca* (SCHLOTHEIM, 1820), now regarded as a synonym of *P. (P.) equivalvis*, was described by Vörös (1971) from the basal Pliensbachian of Villány.

Apart from the occurrences listed by Johnson (1984) large specimens were figured by Rzehak (1904) from the Upper Pliensbachian of Freistadt, Moravia and by Jekelius (1915) from the Pliensbachian of the Brasov Mts., Rumania.

Pseudopecten (Pseudopecten) veyrasensis (DUMORTIER, 1864)

Three small specimens were collected. Their ornamentation consists of 13-14 ribs separated by wide interspaces. This early and middle Liassic species was previously described and figured from the Harsány-hegy as *Chlamys (Aequipecten ?) humberti* (Vörös 1971).

Chlamys (Chlamys) textoria (SCHLOTHEIM, 1820)
Pl. I, Fig.3.

This long ranging species is represented by two very incomplete shell fragments with plicae bearing characteristic imbricate lamellae.

**PALEOBIOGEOGRAPHICAL AFFINITIES OF THE
HARSÁNY-HEGY FAUNA**

Paleobiogeographical affinities of the Pliensbachian faunas of the Villány Hills were discussed by Ager and Callomon (1971), Vörös (1971, 1984a, 1984b, 1990), Dommergues and Géczy (1989), Géczy (1984a, 1984b), Prossorovskaya and Vörös (1988), Szabó (1990) and Sente (1990). All these studies concluded that the Villány Zone was part of the northern margin of the Early Jurassic Tethys since the fauna shows strong northwest European affinity. The brachiopods and bivalves discussed above are also widely distributed in the epicontinental middle Liassic of Europe, confirming the previous statements.

ACKNOWLEDGEMENTS

Csaba Péró kindly drew the attention of the authors to the exposure and made the fossil material collected by him and his students available for study. Sente gratefully acknowledges the support of the "Magyar Tudományért Alapítvány".

REFERENCES

- AGER, D. V. and CALLOMON, J. H. (1971): On the Liassic age of the "Bathonian" of Villány (Baranya). - Ann. Univ. Sci. Budapest., Sect. Geol., **14**: 5-16.
- ALMÉRAS, Y. (1964): Brachiopodes du Lias et du Dogger. - Docum. Lab. Géol., Fac. Sci. Lyon, **5**: 1-161.
- ARNAUD, M. and MONLEAU, C. (1979): Étude de l'évolution d'une plate-forme carbonatée: exemple de la Provence au Jurassique (Hettangien-Oxfordien). - Trav. Lab. Géol. Hist. et Pal. Univ. Marseille, fasc. 2: Stratigraphie et Paléontologie, 381 pp.
- DHONDT, A. (1989): Late Cretaceous *Limea (Pseudolimea)* species of Europe. - Bulletin de l'Institut royal des Sciences naturelles de Belgique, Sciences de la Terre, **59**: 105-125.
- DOMMERGUES, J.-L. and GÉCZY, B. (1989): Les faunes d'ammonites du Carixien basal de Villány (Hongrie); Un témoin paléobiogéographique des peuplements de la marge méridionale du continent Euro-Asiatique. - Revue de Paléobiologie, **8** (1): 21-37.

- GALÁČZ, A. and VÖRÖS, A. (1969): Belemnite fauna of the ammonite-rich Callovian bed at Villány, South Hungary.- *Ann. Univ. Sci. Budapest., Sect. Geol.*, **12**: 117-139.
- GÉCZY, B. (1984a): The Jurassic ammonites of Villány.- *Ann. Univ. Sci. Budapest., Sect. Geol.*, **24**: 189-198.
- GÉCZY, B. (1984b): Provincialism of Jurassic ammonites; examples from Hungarian faunas.- *Acta Geol. Hung.*, **27**(3-4): 379-389.
- HALLAM, A. (1968): Morphology, paleoecology and evolution of the genus *Gryphaea* in the British Lias.- *Phil. Trans. R. Soc. Lond.*, **B254**: 91-128.
- HALLAM, A. (1982): Patterns of speciation in Jurassic *Gryphaea*.- *Paleobiology*, **8**(4): 354-366.
- HALLAM, A. (1987): Radiations and extinctions in relation to environmental change in the marine Lower Jurassic of northwest Europe.- *Paleobiology*, **13**(2): 152-168.
- JEKELIUS, E. (1915): Die mezozoischen Faunen der Berge von Brassó. I. Die Lias-fauna von Keresztényfalva.- *Mitt. Jb. k. Ungar. Geol. Reichsanst.*, **23**(2): 27-113.
- JOHNSON, A. L. A. (1984): The palaeobiology of the bivalve families Pectinidae and Propeamussiidae in the Jurassic of Europe.- *Zitteliana*, **11**: 3-235.
- LÓCZY, L. (1915): Monographie der Villányer Callovien-Ammoniten. - *Geol. Hung.*, **1** (3-4): 1-253.
- PROSOROVSKAYA, E. L. and VÖRÖS, A. (1988): Pliensbachian, Bajocian and Callovian Brachiopoda. In: M. RAKÚS, J. DERCOURT, and A. E. M. NAIRN (eds.): Evolution of the northern margin of the Tethys, Vol. I. *Mém. Soc. géol. Fr.*, n. s. **154**: 61-70.
- RAKUSZ, GY. and STRAUZ, L. (1953): A Villányi-hegység földtana (La géologie de la Montagne de Villány).- *Ann. Inst. Geol. Hung.*, **41**(2): 1-43.
- RZEHA, A. (1904): Das Liasvorkommen von Freistadt in Mähren.- *Zeitschr. Mähr. Landesmus.*, **4**: 89-152.
- SHOPOV, V. L. (1974): Genus *Gryphaea* Lamarck (*Bivalvia*) representatives from the Lower Jurassic in Bulgaria.- *Bull. Geol. Inst., Ser. Pal.*, **23**: 57-74.
- SZABÓ, J. (1990): Az alp-kárpáti térség liász-dogger gastropoda paleobiogeográfiai kapcsolataihoz (A contribution to the Lower and Middle Jurassic gastropod palaeobiogeography of the Alpine-Carpathian region). - *Ált. Földt. Szemle*, **25**: 265-271.
- SZENTE, I. (1990): Középső liász bivalviák paleobiogeográfiai értékelése az alp-kárpáti régióban (Palaeogeographic evaluation of Middle Liassic bivalves in the Alpine-Carpathian region). - *Ált. Földt. Szemle*, **25**: 223-229.
- TIETZE, E. (1872): Geologische und paläontologische Mittheilungen aus dem südlichen Theil des Banater Gebirgsstockes.- *Jb. k. k. geol. Reichsanst.*, **22**: 34-142.
- TILL, A. (1910): Die Ammonitenfauna des Kelloway von Villány (Ungarn), II.- *Beitr. Pal. Österr.-Ung.*, **23**: 251-272.
- TILL, A. (1911): Die Ammonitenfauna des Kelloway von Villány (Ungarn), III.- *Beitr. Pal. Österr.-Ung.*, **24**: 1-49.
- VÖRÖS, A. (1971): The Lower and Middle Jurassic bivalves of the Villány Mountains.- *Ann. Univ. Sci. Budapest., Sect. Geol.*, **14**: 167-208.
- VÖRÖS, A. (1972): A Villányi-hegység alsó- és középső jura képződményeinek üledékföldtani vizsgálata (Lower and Middle Jurassic formations of the Villány Mountains).- *Földt. Közl.*, **102** (1): 12-28.

- VÖRÖS, A. (1984a): Comparison of Jurassic benthonic mollusc and brachiopod faunas of the Transdanubian Mountains (Hungary). - *Acta Geol. Hung.*, 27 (3-4): 391-401.
- VÖRÖS, A. (1984b): Lower and Middle Jurassic brachiopod provinces in the western Tethys.- *Ann. Univ. Sci. Budapest., Sect. Geol.*, 24: 207-233.
- VÖRÖS, A. (1989): Villány, Templom hill - A Pliensbachian to Oxfordian incomplete sequence. In: Galász, A. and Vörös, A.: Jurassic sedimentary formations in Transdanubia.- IAS 10th Regional Meeting, Excursion Guidebook: 125-188.
- VÖRÖS, A. (1990): Liász és dogger brachiopoda-elterjedési adatok az alp-kárpáti régió ösföldrajzi értékeléséhez (Distribution of Lower and Middle Jurassic brachiopods: data to the palaeogeographical evaluation of the Alpine-Carpathian area). - *Ált. Földt. Szemle*, 25: 251-263.

Authors' address:

István SZENTE
Department of Paleontology
Loránd Eötvös University
H-1083 Budapest
Ludovika tér 2.
Hungary

Dr. Attila VÖRÖS
Geological and Paleontological Department
Hungarian Natural History Museum
H-1088 Budapest
Múzeum krt. 14-16.
Hungary

EXPLANATION OF PLATES

PLATE I

Fig. 1-2: *Gryphaea gigantea* J. de C. SOWERBY, No. M.91.405, Harsány-hegy, x 1.

Fig. 3: *Chlamys (Chlamys) textoria* (SCHLOTHEIM), No. M.91.406, Harsány-hegy, x 1.2

PLATE II

Fig. 1: Shell of *Pseudopecten (P.) equivalvis* showing beekite silicification centers, No. M.91.407, Harsány-hegy, x 1.4

Fig. 2: *Gryphaea gigantea* J. de C. SOWERBY. Specimen with well-defined posterior flange, No. M.91.408, Harsány-hegy, x 1

Fig. 3: *Limea (Pseudolimea) pectinoides* (J. SOWERBY), No. M.91.409, Harsány-hegy, x 1.5

Fig. 4: *Pseudopecten (Pseudopecten) equivalvis* (J. SOWERBY), No. M. 91.410, Harsány-hegy, x 0.7

Fig. 5 a-c: *Homoeorhynchia cf. acuta* (J. SOWERBY), No. M.91.411, Harsány-hegy, x1

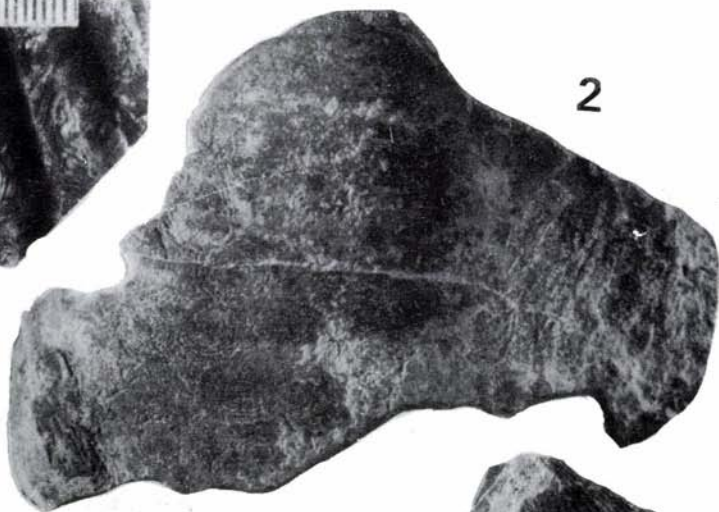
PLATE I.



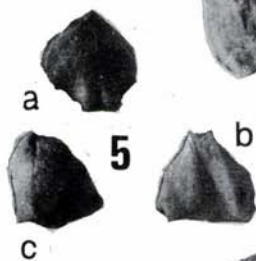
PLATE II.



1



2



a

5

b

c



3



4