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OXFORDIAN IDOCERATIDS (AMMONOIDEA) AND THEIR RELATION TO *PERISPHINCTES* PROPER

Abstract. — An attempt is made to reconstruct the evolution of idoceratids (Perisphinctidae) during the Oxfordian. The subgenus *Nebrodites (Passendorferia)* is supposed to be the ancestor of *N. (Mesosimoceras)*, whilst *N. (Enayites)* subgen. n. — of *N. (Nebrodites)* and possibly of *Idoceras planula* group. Both genera appear to be of European origin. Differentiation of Mediterranean and Submediterranean perisphinctidae appears questionable.

INTRODUCTION

In 1973 one of the co-authors (W. Brochwicz-Lewiński, 1973) proposed a new subgenus *Nebrodites (Passendorferia)* for Middle Oxfordian forms interpreted as descendants of Mediterranean *Kranaosphinctes cyrilli-methodii* group and ancestors of *Nebrodites* proper; the *Idoceras planula* group was assumed to be an off-shoot of the evolutionary line. Subsequent collecting gave several *Passendorferia* and *Passendorferia*-like forms from the Oxfordian of Poland, Switzerland (Gygi, *pers. inf.*), Spain (Sequeiros, 1974) and Bulgaria (Sapunov, in press). Moreover, ancestral forms of the *Idoceras planula* group were reported from the Bimammatum Zone of the F. R. G. (Nitzopoulos, 1974). These finds made it possible to draw some conclusions concerning the history of these Mediterranean perisphinctids and their relationship to the Submediterranean ones.

The material described comprises forms from authors' G. Kułesza (Br, Kl) and Dr. J. Liszkowski's (L) collections housed at the Warsaw University as well as others from the Geological Museum of Sofia University (Bulgaria) and Geological Museum of the Polish Academy of Sciences at Cracow.

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ORIGIN OF *NEBRODITES (PASSENDORFERIA)* AND *N. (ENAYITES)* SUBGEN. N.

The subgenus *Nebrodites (Passendorferia)* was originally interpreted as a possible derivative of the simoceroid group of Neumann (1907), comprising the *Kranaosphinctes cyrilli-methodii* group (Enay, 1966), *"Perisphinctes" navillei* Favre, *"P." densicosta* Gemmelaro and *"P." birmensdorfensis* (Moesch). To that subgenus there were assigned both macroconchs, *N. (Passendorferia) teresiformis* Brochwicz-Lewiński and others, as well as microconchs, *N. (P.) birmensdorfensis* (Moesch). However, it appears desirable to exclude the microconchs from that subgenus. This is connected with the problem of their relation to some forms assigned to *Perisphinctes (Otosphinctes)*, hardly distinguishable from them and interpreted as the microconchs of *Kranaosphinctes* (Enay, 1966). Some specimens assigned to *P. (Otosphinctes)* may actually belong to *Passendorferia*; this is the case of *P. (O.) paturattensis* de Loriol in Enay (1976*a*, pl. 3, fig. 1), a presumable *N. (Passendorferia) czenstochovensis* (Siemiradzki).

It has to be admitted that the inner whorls of macroconchiate *N. (Passendorferia)* and *Kranaosphinctes* are hardly distinguishable if ever. The genus *Kranaosphinctes* disappears before the former but it is not excluded that it might have given rise to still poorly known Mediterranean *Arisphinctes* (see text-fig. 1). Therefore, in order to avoid an endless discussion on the dimorphic relationships of Mediterranean *Kranaosphinctes*, macroconchiate *N. (Passendorferia)* and microconchiate *N. (Passendorferia)* (see also Brochwicz-Lewiński & Różak, 1976), the authors have decided to propose a separate subgeneric name for the latter: *Enayites* subgen.n., leaving them in the genus *Nebrodites* Burckhardt, 1912. The species best known (see revision made by Enay, 1966, p. 463) and previously considered as typical of that group, *Ammonites birmensdorfensis* Moesch, 1867, is designated as the type species of this subgenus (see below).

The earliest macroconchs, hitherto known from the upper Antecedens Zone of Poland and Spain (Sequeiros 1974), were considered as presumable derivatives of *Kranaosphinctes promiscuus* (Bukowski), and other Mediterranean *Kranaosphinctes* of the *K. cyrilli-methodii* group. The studies on the lower Antecedens Zone gave numerous representatives of the latter (cf. Brochwicz-Lewiński & Różak, 1975, pls 4—5, fig. 1; and pls XXXII—XXXIII herein), but no transitional forms were found. The macroconchiate *N. (Passendorferia)* differ from the Mediterranean *Kranaosphinctes* in: (1) point of furcation accentuated and situated markedly higher, on ventral margin or on the venter, (2) biplicate and single and finally single ribbs,

and (3) a trend to development of smooth band and sculpture not fading out on the venter of the outermost whorl.

In the Cordatum Zone there were found some incomplete forms displaying the features of *N. (Passendorferia)*. This is the case of a fragmentary phragmocone from the Cordatum Zone of Kotowice hill, Częstochowa area (pl. XXXI, figs 1—2), and the specimens from contemporaneous rocks from Wrzosowa hill in cluding that identified originally as *Perisphinctes (Kranaosphinctes) promiscuus* Bukowski by Malinowska (1963, p. 155, pl. 37, fig. 175). These specimens may easily be accomodated in *N. (Passendorferia)*. However, there remains a break in the record of the macroconchs from the middle Cordatum to the upper Antecedens Zone. [1]

Thanks to the courtesy of Professor I. Sapunov, the authors had an opportunity to analyse some Bulgarian specimens dated at the Lower--Middle Oxfordian transition. One of them (pl. XXXVI, fig. 1 a-b) seems to represent a dwarfish *N. (Passendorferia)*; attention should be paid to the fact that so loose spacing of primaries as on the outer whorl (? body chamber) of that form makes possible their trifurcation. The same was recently found on *N. (Passendorferia) teresiformis* Brochwicz-Lewiński characterized by similarly loosely spaced primaries (pl. XXXVIII). Two other Bulgarian specimens (pl. XXXVI, fig. 2 a-b) display the features of *Idoceras planula* (Hehl) and appear to have been erroneously dated (Sapunov, *pers. inf.*).

It may be concluded that it is highly probable that the macroconchiate *N. (Passendorferia)* appeared in the early Oxfordian or even earlier and thus they could not have evolved from the Middle Oxfordian representatives of the *Kranaosphinctes cyrilli-methodii* group. A remarkable contribution to that problem was made by Matyja (1976 MS), who recorded forms very close to *Kranaosphinctes cyrilli* (Neumann) in well-dated strata of the Cordatum Zone in the Holy Cross Mts, Central Poland; such forms were subsequently found by the authors in coeval strata of the Częstochowa area. Taking into account the remarkable similarity of macroconchiate *N. (Passendorferia)* and Mediterranean *Kranaosphinctes*, viz. hardly distinguishable inner whorls, dimensions, density of ribbing, etc., it may be assumed that they represent closely related evolutionary lines separate throughout the Cordatum and early Antecedens times. Ancestral forms of the two groups should be looked for in still older, basal Oxfordian and Callovian strata.

The origin of microconchiate *N. (Enayites)* appeared to be easier to solve. Soon there were found some forms best referable to *Perisphinctes czenstochovensis* Siemiradzki (former *P. birmensdorfensis* Moesch *sensu* Bukowski) in both the lower part of the Antecedens Zone (Brochwicz-Lewiń-

[1] Right now *Passendorferia* was said to be common in strata with *Campylites delmontanus*, i.e. of pre — Antecedens age, from northern Turkey (Enay 1976).

ski & Różak, 1974, 1975, pl. 1, fig. 5) and the lower Cordatum Zone in the Częstochowa area (pl. XXXI, figs 2a, b). These forms exhibit all the features of the Middle Oxfordian representatives, including: circular whorl section, highly evolute coiling, whorls weakly overlapping one another, radial ribbing consisting of single and biplicate ribs, and parabolic-node-like swellings on the outermost whorl. Both *N. (E.) czenstochovensis* (Siemiradzki) and *N. (E.) birmensdorfensis* (Moesch) were assigned to "Mutationsreihe des *Perisphinctes alligatus*" by Siemiradzki (1899, p. 85), and subsequently to *Alligaticeras* Buckman, 1923, by Spath (1930, p. 42), Arkell (1936, p. xlii), Gygi (1966) and others. The type species of that genus, *Ammonites alligatus* Leckenby, 1859, from the Upper Callovian, actually resembles *N. (Enayites) birmensdorfensis* (Moesch) and its allies in ribbing "dense, regular, not sharp, bifurcating regularly, high on the peripheral margin, the secondaries delicate and passing nearly straight over the venter" (Arkell, 1936, p. xlii) and in constrictions, differing from the latter in subquadrate whorl section, parabolae and not parabolae-resembling swelling, and generally in less evolute coiling. The differences could be explained by the differences in age as the latter are Oxfordian. It would follow that this is a fairly conservative evolutionary line — from the Late Callovian (or even Bajocian if earlier links of the evolutionary series suggested by Siemiradzki, 1899, p. 85, actually belong here) to the Late Oxfordian or even Kimmeridgian (cf. Siemiradzki, 1899). However, the direct transition from Callovian *Alligaticeras* to early Oxfordian *N. (Enayites)* is still not proved and there appear to be some other forms, especially those of the *Perisphinctes (?) mairei-matheyi* group (Enay, 1966) which display the above features of *Alligaticeras* and may represent its more direct descendants.

ORIGIN OF *IDOCERAS* AND *NEBRODITES* PROPER

The main problem here is the relation between *Nebrodites (Passendorferia)* and *N. (Enayites)* subgen.n. passing the Middle-Upper Oxfordian boundary from below, and *Nebrodites* proper and *Idoceras*, sometimes considered as typical Kimmeridgian genera (cf. Krimholz, 1972) and thought not to appear below the uppermost Oxfordian.

From the Upper Oxfordian there were recorded *Nebrodites* proper (i.e. *Mesosimoceras* — see Zeiss, 1962, Barthel, 1963, and others; and *Nebrodites* s.s. — see Behmel, 1970), *Idoceras* (see Behmel, 1970, Nitzopoulos, 1974, and references cited) and their presumed forerunners, *Nebrodites (Passendorferia)* and *N. (Enayites)*. However, the reconstruction of the relationships between these genera is still impeded by scarce data and unsatisfactory zonation of the Upper Oxfordian — Lower Kimmeridgian strata.

Kimmeridgian *Nebrodites* do not appear in greater numbers below the

Planula Zone, but it should be remembered that such a form (*Simoceras convolutus* Neumayer) was cited by Neumayer (1871) from the Transversarium Zone. A record of *Nebrodites (?Nebrodites)* sp. from the Bifurcatus Zone of the Holy Cross Mts (Matyja, 1976 MS) confirms the credibility of the former (here the authors are indebted to Professor R. Enay for accepting the identification). Similarly, *Idoceras* was thought not to appear below the Planula Zone. However, from the Behmel's (1970) paper it follows that *Idoceras* may be present in the upper Bimammatum Zone, and the studies of Nitzopoulos (1974) has shown that this is the case.

From the lower Upper Oxfordian, a highly diversified assemblage of *Nebrodites (Enayites)* was recorded by the authors (Brochwicz-Lewiński & Różak, 1974, pl. 4, figs 1—2; and here pl. XXXV, fig. 2; pl. XXXVII, fig. 3). This assemblage comprises several forms characterized by subcircular whorls, highly evolute coiling and single ribs more numerous than biplicate (at least on inner whorls). These features bring them very close to *Nebrodites (Nebrodites)*; the similarity is so high that fragmentary material may be easily misidentified. If the above mentioned records of *N. (Nebrodites)* from the Middle Oxfordian are not confirmed, these representatives of *N. (Enayites)* may be accepted as ancestral forms of that subgenus.

Other specimens of *N. (Enayites)*, characterized by more rectangular cross section, appear closer to *Idoceras*. The main differences in respect to *Idoceras* include the lack of smooth band on the venter (the importance of which was questioned, e.g. by Siemiradzki, 1891, p. 29), secondaries not bent forward (which is of minor importance if ever — compare the *Dichotomosphinctes-Dichotomoceras* group in which forward sweep of secondaries appears and disappears), and still present swellings resembling parabolic nodes. Sometimes it is really difficult to state whether we are dealing with *N.* (*Enayites*) or *Idoceras* (see pl. XXXVII, fig. 3). Recently Professor R. Enay (*pers. comm.*) has kindly informed about finding early *Idoceras* in the Bifurcatus-Bimammatum junction beds of Alger and Turkey. It is not excluded that *Idoceras* actually appeared first at the turn of the Bifurcatus and Bimammatum times but, unfortunately, there is still no record of any relevant forms from the strata younger than lower Hypselum Subzone and older than those bearing *Idoceras proteron* Nitz. Any sufficiently preserved forms derived from that interval would contribute to stating when *Idoceras* actually evolved.

The records of *N. (Passendorferia)* from the lower Upper Oxfordian are similarly scarce. Nevertheless, they show that large forms with a trend to uniplicate ribbing of outer whorls, typical of that subgenus, are fairly common in these strata. It is disputable whether or not some Late Oxfordian forms referred to *Arisphinctes* by Bărbulescu (1974) or *Decipia* by Enay (1966) are related to them. On the other hand, the appearance of Late Oxfordian *Nebrodites (Mesosimoceras)* figured by Zeiss (1962) and Bart-

hel (1963) is such that it is difficult to state whether we are dealing with late *N. (Passendorferia)* or early *N. (Mesosimoceras)*. A transition between those subgenera is thus assumed. A presumed representative of the latter, *N. (Mesosimoceras) sapunovi* sp.n., still retaining some features of *N. (Passendorferia)*, is described below.

It seems desirable to revisit the hypothesis of Mexican origin of *Idoceras*, Burckhardt, 1906, and *Nebrodites* Burckhardt, 1912 (see Arkell, 1956), previously rejected by Brochwicz-Lewiński (1973). It should be noted that these are European genera from the moment when Spath (1925, p. 131) selected European species, *Ammonites balderus* Oppel and *Simoceras agrigentinum* Gemmellaro for them. Thus, there is a theoretical possibility that neither *Idoceras* nor *Nebrodites* are present in Mexico. Mexican representatives of these genera were thought to appear not before the Kimmeridgian whereas in Europe these genera are known from the uppermost Oxfordian (Planula Zone) or even older strata. In that situation one could argue that *Idoceras* and *Nebrodites* came to Mexico from Europe. However, it should be remembered that the stratigraphy of the Upper Oxfordian and Lower Kimmeridgian is still unsatisfactory and that the age of the *Idoceras*- and *Nebrodites*-bearing beds in Mexico was defined taking into account the presence of these genera as well as *Aspidoceras, Streblites*-like forms and *Sutneria* (see Imlay, 1961, Verma & Westermann, 1973, and references cited). All these forms are known from both the Lower Kimmeridgian and Upper Oxfordian of Europe and Mexican *Sutneria* is of limited importance as it may as well represent a late *Mirosphinctes* close to those recently described from the ?Middle Oxfordian-?lower Upper Oxfordian strata of Cuba (Myczyński, 1976). It follows that the lower part of the strata bearing *Idoceras* and *Nebrodites*-bearing beds from Mexico may be of the Late Oxfordian age (see also Imlay, 1961, p. D-6); this dating is confirmed by the records of several Mexican species of *Idoceras* from the Upper Oxfordian of Spain (Behmel, 1970). In that situation it is not excluded, again theoretically speaking that there are still undiscovered Middle Oxfordian ancestors of the Late Oxfordian *Idoceras* and *Nebrodites* in Mexico and that the Mexican region was the center of evolution and dispersal of these genera as Arkell (1956) assumed. The data available, however, rather favour the hypothesis of European origin of these genera; they appear to be long-domesticated in this region and similar morphotypes (see Spath, 1930, p. 42) are nothing unusual in the geological record of European Jurassic. (See e.g. *Idoceras* — like form from the Cordatum Zone of Poland — Fig. 2—1 ab).

Other hypotheses concerning the origin of *Idoceras* were put forward by Spath (1930, p. 42), who assumed that this genus evolved from still poorly known European genus *Prososphinctes* Schindewolf, 1925, and by Collignon (1959), who described the genus *Preidoceras* from Madagascar.

RELATION BETWEEN OXFORDIAN IDOCERATIDS AND *PERISPHINCTES* PROPER

As it was stated by Enay (*pers. inf.*), the Oxfordian idoceratids are characterized by: (1) coiling so evolute that whorls weakly overlap one another, (2) subcircular section of at least inner whorls, (3) ribs relatively numerous, (4) numerous simple ribs and a trend to predominance of simple ribs on outer whorls of geologically older species and throughout the shell of younger species. These features are sometimes displayed by the representatives of *Perisphinctes* proper, e.g. simple ribs are displayed by the *P. (Dichotomosphinctes) wartae-elisabethae* group. This is the combination of these features which gives the specific appearance of the Oxfordian idoceratids.

The results of the present studies confirm the continuity of evolutionary lines of European Perisphinctidae during the Oxfordian, assumed by Siemiradzki (1891, 1899) and other authors from the end of the XIX century, and by Cariou (1973) recently.

The main evolutionary line of *Perisphinctes* proper, comprising *Perisphinctes s.s.* and its ancestors ("*Martelliceras*" and *Arisphinctes*) as well as accompanying microconchs displaying identical inner whorls (*Dichotomoceras, Dichotomosphinctes* and *Otosphinctes*), was traced from the Antecedens Z. to basal parts of the Bimammatum Z. (Enay, 1966, Brochwicz-Lewiński & Różak, 1974, Duong, 1974). There is some evidence for the occurrence of forms indistinguishable from Mid-Oxfordian *Perisphinctes* proper in the Cordatum Zone of the Lower Oxfordian; *Perisphinctes waehneri* Siemiradzki, considered by the present authors as a synonym of *Perisphinctes (Dichotomoceras) stenocycloides* Siemiradzki is everywhere cited by Siemiradzki (1922, pp. 393, 396) from the Cordatum Zone. *P. (Dichotomosphinctes) wartae* Bukowski, another classical Mid-Oxfordian species, was also sometimes reported from the Lower Oxfordian (Siemiradzki, *l.c.*, 393, 397). The present authors are familiar with several other Early Oxfordian forms which are hardly distinguishable from the Mid-Oxfordian ones. It is assumed that this reoccurrence of morphotypes takes place within an evolutionary line comprising the *Perisphinctes* proper. If this is the case, the evolutionary lines of idoceratids and *Perisphinctes* proper would be parallel to each other (text-fig. 1); and their separateness would be confirmed by the lack of transitions. In earlier attempt to make a distinction between these evolutionary lines (Brochwicz-Lewiński & Różak, 1974, p. 122) Mediterranean *Arisphinctes* and *Dichotomosphinctes* of Enay (1966) were interpreted as closer to the idoceratid line whilst *Liosphinctes* and the *Arisphinctes pickeringius* group — as closer to the *Perisphinctes* line. As it was stated above, Mediterranean *Kranaosphinctes* do not represent ancestors of *Nebrodites (Passendorferia)* but rather close relatives. The Mediterranean *Kranaosphinctes* rapidly disappear in the Buckmani horizon of

the Antecedens Zone but it seems probable that they have given rise to Mediterranean *Arisphinctes* of Enay (1966). Thus, it is possible to assume the existence of a third evolutionary line, leading from the Mediterranean *Kranaosphinctes* to Mediterranean *Arisphinctes* and, finally, to Late Oxfordian *Arisphinctes* and *Decipia sensu* Enay (1966). The forms figured as

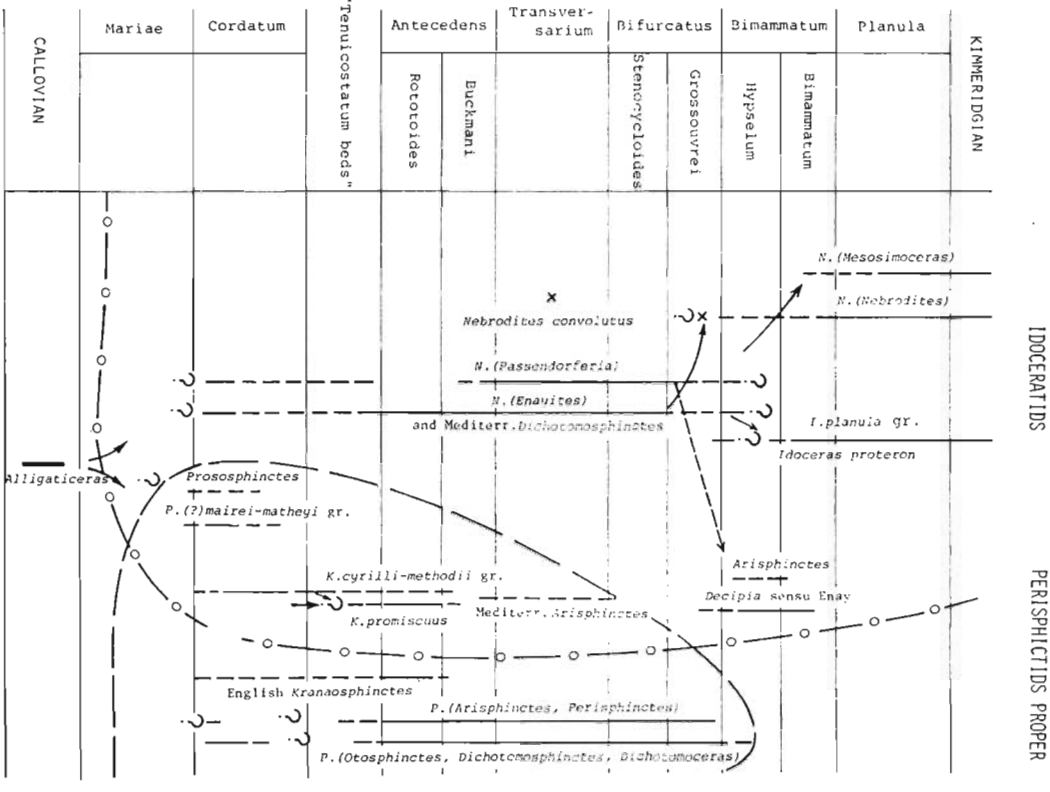


Fig. 1. The inferred relationships between the idoceratid and *Perisphinctes* proper evolutionary lines and affined genera and groups of species.

Perisphinctes (M. [2]) *Arisphinctes*) *helenae* de Riaz, *P.* (*M. Arisphinctes*) sp., *P.* (*M. Arisphinctes*) *torcalense* (Kilian) and *P.* (*M. Arisphinctes*) *plicatilis* (Sowerby) from the Middle Oxfordian of Spain (Sequeiros, 1974) and interpreted as hardly distinguishable from *Nebrodites* (*Passendorferia*) belong neither to *P.* (*Arisphinctes*) proper nor to Mediterranean *Arisphinctes* but rather to *Nebrodites* (*Passendorferia*). The third evolutionary line appears much closer to the idoceratids than to the *Perisphinctes* proper line. However, there remains a problem of a transition from it to the latter via English *Kranaosphinctes*; unfortunately, the Polish material available is insufficient for solving that problem.

[2] *M.* for macroconchs after Sequeiros (1974).

The Mediterranean *Perisphinctes* (*Dichotomosphinctes*) figured by Enay (1966) and Sequeiros (1974) differ from *N.* (*Enayites*) merely in the lack of swellings of the parabolic node type, and they most probably belong either to the idoceratid or the third evolutionary line.

Early Oxfordian *Perisphinctes* (?) *mairei-matheyi* group and *Prososphinctes* seem closer to the idoceratid line but their knowledge is still unsufficient for any equivocal interpretation. Text-fig. 1 shows the inferred relationships between these genera and species groups and it suggests the necessity of some further taxonomical cuts.

BIOGEOGRAPHIC STATUS OF OXFORDIAN IDOCERATIDS

The Oxfordian idoceratids described here were widely regarded as Mediterranean forms (cf Enay, 1966, 1976*b*), i.e. forms inhabitating areas of Alpine belts in Europe (Sicily, Appenines, Betic ranges in Spain, northern Africa, Carpathians, Balcan Mts, Turkey), sometimes entering the Submediterranean province situated west- and northwardly. Actually, the idoceratids when found in the latter regions represent a relatively small (1-5%) admixture to overhelmingly Submediterranean perisphinctid assemblage (*Perisphinctes* proper and their allies); the faunas of the Planula Zone are the exception here as they are somewhat enriched in the idoceratids. It would follow that the evolutionary series of the idoceratids could be reconstructed only on the basis of Mediterranean sections.

However, it appears that the idoceratids are omnipresent in the Submediterranean Europe (but not the Subboreal province). In turn, *Perisphinctes* proper was recorded from marginal or even central areas of the Mediterranean province: Alger (Sapunov, 1973), Betic ranges (Sequeiros, 1974), Basses-Alpes (Duong, 1974 MS), North Dobrogea (Gradinaru, 1976), or Balcan range (Sapunov, 1977), sometimes even predominating within the Perisphinctidae (see also Ziegler, 1963). At the same time the studies failed to show any Mediterranean area where idoceratids would clearly predominate upon *Perisphinctes* proper. In that situation it is really difficult to state whether the subdivision of Perisphinctidae of Oxfordian age into the Mediterranean and Submediterranean is reliable. Most probably *Perisphinctes* proper and its allies were distributed throughout the areas of the Subboreal, Submediterranean and Mediterranean Europe and further eastwards along the northern shelf of the Tethys to Japan (Takahashi, 1969), except for areas where conditions were unfavourable for them. The idoceratids, as far as it is known, inhabitated the areas of the Mediterranean and Submediterranean provinces, extending to the north as far as the Holy Cross Mts. Outside Europe and North Africa they are known from Mexico and Japan. From the Oxfordian of Japan there were recorded forms refe-

rable to *Nebrodites* (*Enayites*), i.e. *Perisphinctes kaizaranus* Yokoyama (see Sato, 1962, p. 88, pl. 3, fig. 8) as well as *Kranaosphinctes* surprisingly similar to those of the Mediterranean *Kranaosphicntes* group — see e.g. *Perisphinctes (Kranaosphinctes)* cf. *matsuhimai* Yokoyama and *P.* (*Kranaosphinctes*) sp. in: Takahashi (1969, p. 75, pl. 13, fig. 3, pl. 14, fig. 5, and p. 76, pl. 12, fig. 2, respectively). The Mediterranean-Submediterranean character of the Oxfordian ammonite assemblage of Japan, further uphold by the occurrence of forms referable to the Submediterranean genus *Subdiscosphinctes* Malinowska (i.e. *Discosphinctes* of Sato, 1962, and Takahashi 1969) may be explained assuming that Japan was an element of northern margin of the Tethyan Ocean in the Jurassic times (Pożaryska & Brochwicz-Lewiński, 1975).

The records of Oxfordian idoceratids from the Indo-Ethiopian province are questionable so it may be assumed that in the Oxfordian times idoceratids were confined to the Mediterranean and Submediterranean provinces in Europe, and their eastern extension — northern shelf of the Tethyan Ocean (Japan), and to Mexico (where *Perisphinctes* proper is lacking), and not to the Subboreal province inhabitated by *Perisphinctes* proper. Thus the geographic distribution of idoceratids and *Perisphinctes* proper markedly overlaps.

DESCRIPTIONS

In explanations to the plates and in systematic descriptions the datings are made with the reference to the somewhat modified zonal scheme given in Brochwicz-Lewiński (1976).

Family **Perisphinctidae** Steinmann, 1890
Subfamily **Idoceratinae** Spath, 1924

Genus *Nebrodites* Burckhardt, 1912

Type species: *Simoceras agrigentinum* Gemmellaro 1872.
Diagnosis as given by Ziegler (1959, p. 21).

Subgenus *Nebrodites* (*Enayites*) nov.

Type species: *Ammonites birmensdorfensis* Moesch, 1867.

Derivation of the name: In honour of Professor R. Enay, an outstanding student of Jurassic ammonite faunas.

Diagnosis as that for the *N.* (*Passendorferia*) *birmensdorfensis* group (Brochwicz-Lewiński, 1973, p. 304): Shell markedly evolute, up to 70 mm in diameter or more. Whorls subcircular, slightly overlapping. Ribs radial, biplicate and single. Heavy constrictions. Aperture formed by lappets proceeded by constriction. Swellings resembling parabolic nodes, usually 3, marked on final body chamber.

Differences in respect to other Oxfordian taxa as discussed previously (Brochwicz-Lewiński, 1973).

Stratigraphic and geographic range: Oxfordian, Cordatum — lower Bimammatum Zones of Submediterranean and Mediterranean Europe (France, Switzerland, F.R.G., Poland, Roumania, ?Bulgaria, ?Spain), and ?Japan.

Nebrodites (*Enayites*) *czenstochovensis* (Siemiradzki, 1899)

(pl. XXXI, figs 3—4)

1887. *Perisphinctes Birmensdorfensis* Moesch; Bukowski, p. 144, pl. 30, fig. 10.
1891. *Perisphinctes Birmensdorfensis* Moesch; Siemiradzki, p. 54.
1899. *Perisphinctes Czenstochovensis* n. sp.; Siemiradzki, p. 86.
1917. *Perisphinctes czenstochovensis* Siem.; Ronchadzé, p. 8, pl. 1, fig. 3.
1966. *Perisphinctes czenstochovensis* Siem.; Enay, p. 467.
1975. *Nebrodites* (*Passendorferia*) *czenstochovensis* (Siem.); Brochwicz-Lewiński & Różak, pl. 1, fig. 5.

Material. — Two lappeted and several fragmentary specimens.

Description. — Specimens about 50 mm in size, with subcircular whorls weakly overlapping one another; 3—4 swellings resembling parabolic nodes marked along the body chamber. Peristome with prominent lappet. Constricted.

Remarks. — The species differs from its presumable descendants *N.* (*Enayites*) *birmensdorfensis* (Moesch), in slightly less involute whorls, shallower constrictions and less numerous ribs.

Occurrence. — Polish Jura Chain (Wrzosowa hill, Częstochowa, Żarki and Kotowice hill near Częstochowa): Cordatum Zone — Rotoides horizon of the Antecedens Zone or Tenuicostatum beds.

Nebrodites (*Enayites*) *gygii* sp. n.

(pl. XXXV, fig. 2; text-fig. 2-2)

1907. *Perisphinctes cf. birmensdorfensis* Moesch; Oppenheimer, p. 245, pl. 3, fig. 5.
1974. *Passendorferia birmensdorfensis* (Oppenheimer non Moesch); Brochwicz-Lewiński & Różak, p. 119, pl. 4, fig. 2.
1974. *Passendorferia cf. birmensdorfensis* (Oppenheimer non Moesch); Brochwicz-Lewiński & Różak, pl. 4, fig. 1.

Holotype: The specimen no. Br A19/006, originally described as *Passendorferia birmensdorfensis* (Oppenh. non Moesch) in Brochwicz-Lewiński and Różak (1974, p. 119, pl. 4, fig. 2), refigured here in text-fig. 2-2.

Type locality: Peasant quarry at western slopes of hill situated about 3 km W of Olsztyn village and 0.5 km N of the road from Częstochowa to Olsztyn.

Type horizon: Hypselum Subzone of Bimammatum Zone (Upper Oxfordian).

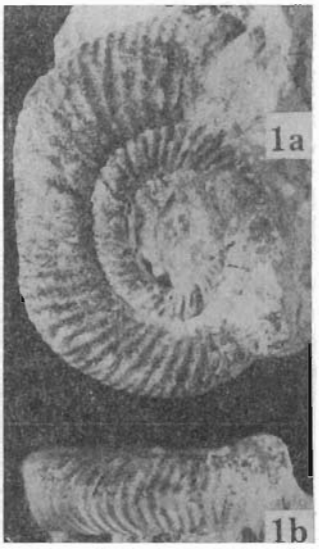
Derivation of the name: In honour of Dr Reinhart Gygi, an outstanding student of Jurassic ammonites.

Diagnosis. — Specimens 60—80 mm in size, highly evolute, with subcircular whorls. Sculpture fairly regular, except for parabolic swellings in the form of infilling of inter-rib space with shell matter. Single ribs numerous especially on inner whorls.

Material. — Three complete and several fragmentary specimens.

Remarks. — *N.* (*E.*) *gygii* sp.n. is very close to *N.* (*E.*) *birmensdorfensis* (Moesch), differing in straighter course of secondaries on body chamber and somewhat heavier,

sharper and less dense ribbing. The specimens, and especially those with single ribs more numerous than biplicate, closely resemble those of *N.* (*Nebrodites*) (compare, e.g., the specimens from pl. XXXV, fig. 2, and Brochwicz-Lewiński & Rożak, 1974, pl. 4, fig. 1 with those figured by Geyssant, 1966). On the other hand some forms assigned to *N.* (*Enayites*) *gygii* sp.n. with reservation (see e.g. pl. XXXVII, fig. 3) seem close to early *Idoceras*, differing in more circular whorl section, secondaries passing



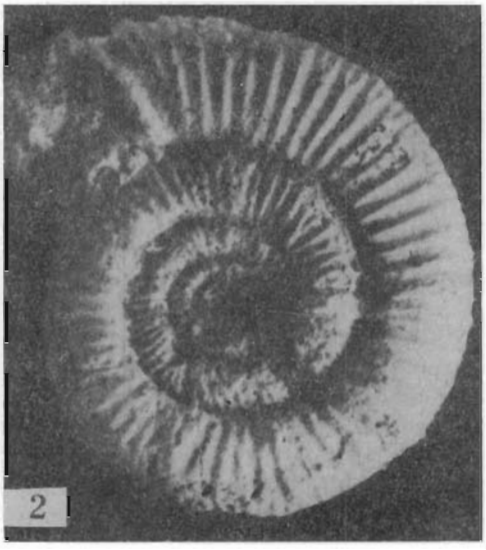


Fig. 2. *1a* — Perisphinctid with *Idoceras*-like ornamentation, 52 mm in size, somewhat distorted, lappeted: Cordatum Zone of Wrzosowa, Częstochowa; *1b* — ventral side with a smooth band; *2* — *Nebrodites (Enayites) gygii* sp.n., holotype (refigured from Brochwicz-Lewiński & Rożak, 1974), complete adult except for lappets, Bimammatum Zone, Hypselum Subzone, Częstochowa area.

straighter through the venter, the lack of ventral smooth band and the presence of relic parabolic swellings. Despite of these differences they may represent ancestral forms of the latter.

Occurrence. — Polish Jura Chain (Kamyk hill and hill about 3 km NE of Olsztyn, Częstochowa area): lower part of Hypselum Subzone, Bimammatum Zone. Czechoslovakia: ?Hypselum Subzone, Bimammatum Zone.

Nebrodites (*Passendorferia*) Brochwicz-Lewiński, 1973

Type species: Nebrodites (*Passendorferia*) *teresiformis* Brochwicz-Lewiński, 1973.

Remarks. — This subgenus is here restricted to the *N.* (*P.*) *teresiformis* group. Diagnosis as for macroconchs of *N.* (*Passendorferia*) in Brochwicz-Lewiński (1973, p. 304).

The new finds include some fragmentary forms from lower Cordatum strata of Częstochowa area, indicating that this subgenus most probably extends downwards to the Lower Oxfordian. One of these is figured here in pl. XXXI, figs 1a—b. Moreover, a representative of this subgenus, *N.* (*Passendorferia*) sp. (pl. XXXIV, pl. XXXV, fig. 1) was found at Bałtów, NE margins of the Holy Cross Mts (central Poland), which along with *N.* (*P.*)cf. *ziegleri* Brochwicz-Lewiński described by Matyja (1976 MS) from SW margins of these mountains mark the northern range of this subgenus.

Plate XXXVIII shows a succesive specimen of the type species, *N. (Passendorferia) teresiformis* Brochwicz-Lewiński found in the type locality of that species, Zawodzie at Częstochowa.

Nebrodites (Mesosimoceras) Spath, 1925

Type species: *Simoceras cavouri* Gemmellaro, 1872.

To this troublesome subgenus (see Brochwicz-Lewiński, 1973, p. 309) may be tentatively assigned a very interesting form from the ?Upper Oxfordian - ?Lower Kimmeridgian of the Polish Jura Chain, originally described as *Perisphinctes* cf. *torquatus* (Sowerby) Waagen by Siemiradzki (1891, p. 67). Relatively good preservation and a specific morphology of that form make it desirable to propose a separate species for it.

Nebrodites (Mesosimoceras) sapunovi sp. n.
(pl. XXXVII, fig. 1)

Holotype: The specimen No. A-I/2/261 (Geol. Mus. PAN Cracow); pl. XXXVII, fig. 1.

Type locality: Brodła near Cracow.

Type horizon: "*Oppelia tenuilobata*" Zone (= Upper Oxfordian or lowermost Kimmeridgian).

Derivation of the name: In honour of Profesor G. Sapunov, an outstanding student of Jurassic ammonites.

Diagnosis. — Specimen 128 mm in size; coiling highly evolute, whorls subquadrate with rounded margins; primaries slightly crescent, bi- and sometimes triplicate on outer whorl; point of furcation situated high on ventral margin, somewhat accentuated; heavy constrictions.

Material. — One specimen.

Remarks. — Siemiradzki (1891, p. 67) described this specimen along with some others insufficiently preserved for any reliable identification under the name *P.* cf. *torquatus (Sowerby)* Waagen. However, the specimen markedly differs from *Ammonites torquatus* Sowerby, the type species of *Torquatisphinctes* Spath, 1924, in all the features which brings it close to *Nebrodites (Mesosimoceras)*, i.e. highly evolute coiling and slightly crescent, radial ribs branching on the venter. It differs from the latter in occasional trifurcate ribs. This feature differs it also from representatives of *N. (Passendorferia)*, which the specimen in question also resembles in whorl outline, coiling and ribbing; tripartite ribs are occasionally found on specimens of *N. (Passendorferia)* characterized by unusually loosely spaced ribs (see pl. XXXVIII) but never on equally densicostate forms.

One part of outer whorl of the specimen is broken-off and another somewhat damaged therefore it is impossible to state whether or not the ventral smooth band was present.

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WOJCIECH BROCHWICZ-LEWIŃSKI & ZDZISŁAW RÓŻAK

UWAGI O OKSFORDZKICH IDOCERASACH (AMMONOIDEA) I ICH STOSUNKU DO PERYSFINKTÓW WŁAŚCIWYCH

Streszczenie

W artykule przedstawiono próbę rekonstrukcji ewolucji amonitów z podrodziny Idoceratinae Spath, 1924 (Perisphinctidae) w oksfordzie (fig. tekstowa 1). Podrodzaj *Nebrodites* (*Mesosimoceras*) prawdopodobnie wywodzi się z *N.* (*Passendorferia*), a *N.* (*Nebrodites*) i, być może, *Idoceras* — z *N.* (*Enayites*) subgen. n. Rodzaje *Nebrodites* i *Idoceras* są pochodzenia europejskiego, a nie amerykańskiego, jak przypuszczano uprzednio (Arkell, 1956). Podział persyfinktów na medyterańskie i submedyterańskie jest wątpliwy ze względu na zbyt duże nakładanie się ich zasięgów geograficznych.

ВОЙЦЕХ БРОХВИЧ-ЛЕВИНЬСКИ & ЗДЗИСЛАВ РУЖАК

ПРИМЕЧАНИЯ НА ТЕМУ ОКСФОРДСКИХ ИДОЦЕРАСОВ (AMMONOIDEA) И ИХ ОТНОШЕНИЯ К НАСТОЯЩИМ ПЕРИСФИНКТАМ

Резюме

В статье представлена попытка реконструкции эволюции аммонитов подсемейства Idoceratinae Spath, 1924 (Perisphinctidae, Ammonoidea) в оксфордское время. Подрод *Nebrodites* (*Mesosimoceras*) происходит вероятно от *N.* (*Passendorferia*), а *N.* (*Nebrodites*) и возможно *Idoceras* — от N. (*Enayites*) subgen. n. Оба рода *Nebrodites* и *Idoceras* относятся к европейским, а не американским родам, как предполагалось ранее (Аркелл, 1956). Подразделение перисфинктов на средиземноморских и субсредиземноморских не обоснован, так как их географическое распространение в большой степени совпадает.

EXPLANATION OF PLATES

Dimensions of specimens are given in explanation to the plates using the following abbreviations: D — shell diameter, DPh — diameter of phragmocone, H/D — whorl height/diameter, T/D — whorl thickness/diameter, U/D — umbilical diameter/diameter, r:D — number of primary ribs at a given diameter.

Plate XXXI

Fig. 1. *Nebrodites* (*Passendorferia*) sp., Br Ko 08, phragmocone; Cordatum Zone, Kotowice hill SE of Żarki, Częstochowa area, *a* side view, *b* ventral side.

Fig. 2. *Nebrodites* (*Enayites*) *czenstochovensis* (Siemiradzki). Br Wr 18, lappeted; lower Cordatum Zone, Wrzosowa hill, Częstochowa, D — 42 mm, H/D — 0.31, U/D — 0.48, r:D — c. 50:42, c. 48:30. *a* side view, *b* ventral side showing smooth band and parabolic nodes resembling swellings;

Fig. 3. Lappeted representative of the *Perisphinctes* (?) *mairei-matheyi* group, Br Wr 20, lower Cordatum Zone, Wrzosowa hill, Częstochowa. D — 32 mm, H/D — 0.33, U/D — 0.44, r:D — c. 55:32. *a* side view, note numerous dischizotomous ribs; *b* ventral side, note smooth band.

Plate XXXII

Kranaosphinctes promiscuus (Bukowski), Kl 16/33, ? lappeted; Rotoides horizon, Antecedens Zone, Żarki near Częstochowa. D — 220 mm, DPh — 140 mm, at D — 170 mm: H/D — 0.25, U/D — 0.56.

Plate XXXIII

Giant (over 330 mm in size) *Kranaosphinctes trifidus* (Sowerby), Kl 16/59; Rotoides or lowermost Buckmani horizon, Antecedens Zone, Żarki near Częstochowa. DPh — 245 mm, at D — 240 mm: H/D — 0.23, T/D — 0.24, U/D — 0.59.

Plate XXXIV

Fig. 1. *Nebrodites* (*Passendorferia*) sp., L Ba 01, phragmocone; Bifurcatus Zone, onkolitic limestones from Zarzecze, Bałtów, Holy Cross Mts. D — c. 165 mm, H/D — 0.24, T/D — 0.24, U/D — 0.58, r:D — 75:c. 115, 73:c. 90. *a* side view, *b* ventral side; see also pl. XXXV, fig. 1.

Plate XXXV

Fig. 1. Plaster cast of *Nebrodites* (*Passendorferia*) sp. from pl. XXIV.

Fig. 2. *Nebrodites* (*Enayites*) *gygii* sp. n., Br 07/040, lower Hypselum Subzone, Bimammatum Zone, Kamyk hill E of Częstochowa; note single ribs.

Fig. 3. *Nebrodites* (*? Enayites*) sp., Rotoides horizon, Antecedens Zone or Tenuicostatum beds, Przybynów near Żarki, Częstochowa area. D — 52 mm, at D — 41 mm: H/D — 0.27, U/D — 0.50, r:D — c. 44:52, c. 39:41; the specimen is somewhat distorted.

Plate XXXVI

Fig. 1. Dwarfish *Nebrodites* (*? Passendorferia*) sp. from the Lower Middle Oxfordian junction beds, Belotinci area, NE Bulgaria; Sofia Univ. Geol. Mus. J 514 (coll. J. Stephanov). *a* side view, *b* ventral view.

Fig. 2. *Idoceras* cf. *planula* (Hehl), uppermost Oxfordian, Plesivec, Belogradčik area, NW Bulgaria; Sofia Univ. Geol. Mus. J 515—516, coll. Yu. Stephanov; *a* side view, *b* whorl fragment (J 515).

Plate XXXVII

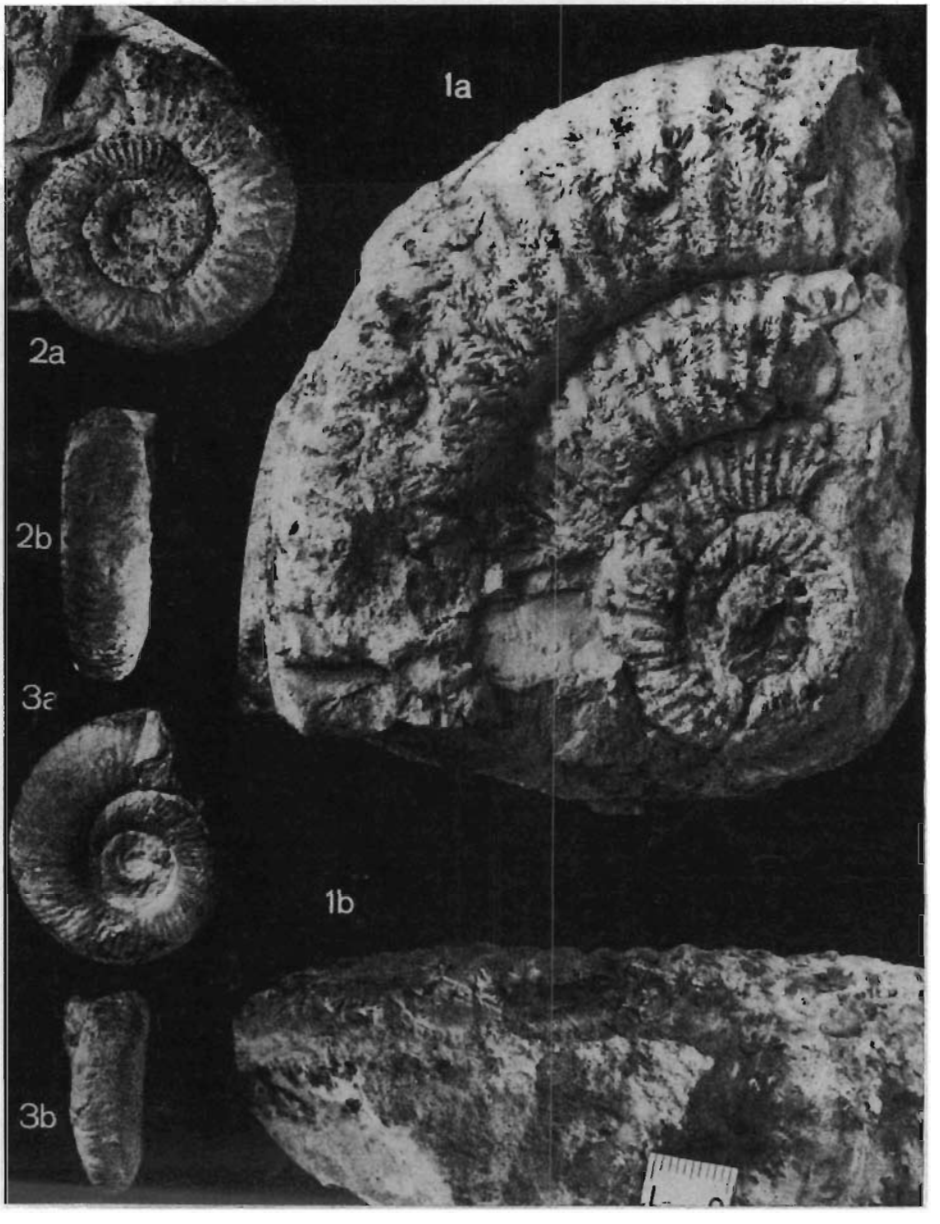
Fig. 1. *Nebrodites* (*Mesosimoceras*) *sapunovi* sp. n., *Oppelia tenuilobata* Zone (= upper Oxfordian or lowermost Kimmeridgian), Brodła near Cracow; Geol. Mus. PAN Cracow, A-I/2/261. D — 128 mm, DPh — 110 mm, H/D — 0.24, U/D — 0.58, at D — 106 mm: H/D — 0.25, T/D — 0.25, U/D — 0.56; r:D — 50:128, 54:110, 55:90, 76:66.

Fig. 2. *Idoceras laxevolutum* (Hehl), Br 30/002, Planula Zone, Liborac hill E of Częstochowa, D — 58 mm, at D — 55 mm: H/D — 0.29, U/D — 0.51, r:D — 36:58, 35:50, 36:30.

Fig. 3. *Nebrodites* (*Enayites*) *cf. gygii* sp. n., Br 7/19, lappeted, with numerous single ribs; lower Hypselum Subzone, Bimammatum Zone, Kamyk hill E of Częstochowa. D — 74 mm, H/D — 0.27, U/D — 0.54, r:D — 44:74, 42:65, c. 38:50, c. 36:40, c. 35:30,31:20.

Plate XXXVIII

Nebrodites (*Passendorferia*) *teresiformis* Brochwicz-Lewiński, Br 02/r/2, Bifurcatus Zone, Zawodzie, Częstochowa. Ribs relatively innumerous, sometimes triplicate on middle whorls. D — 163 mm, DPh — 152 mm, H/D — 0.21, T/D — 0.19, U/D — 0.58, r:D — 39:163, 36:140, 38:120, 39:100, 39:80, c. 46:60.



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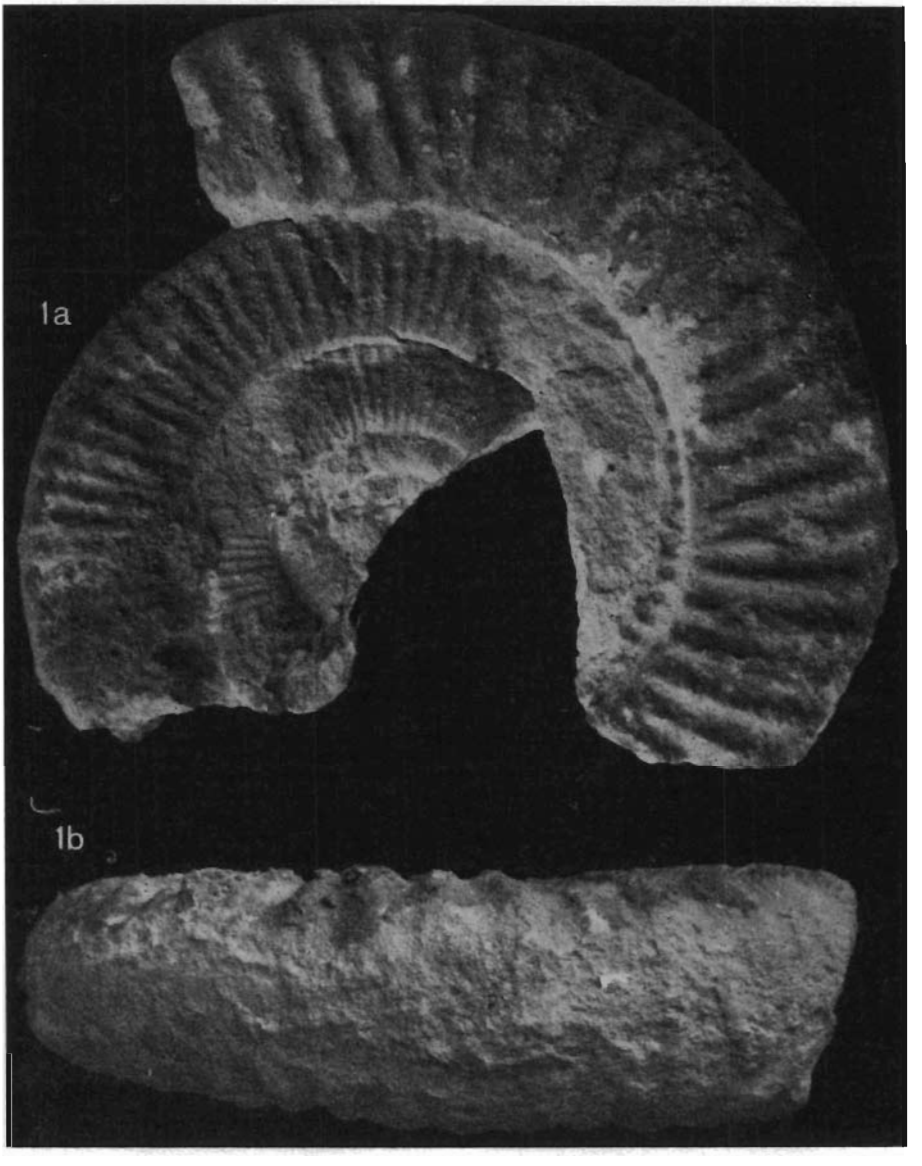

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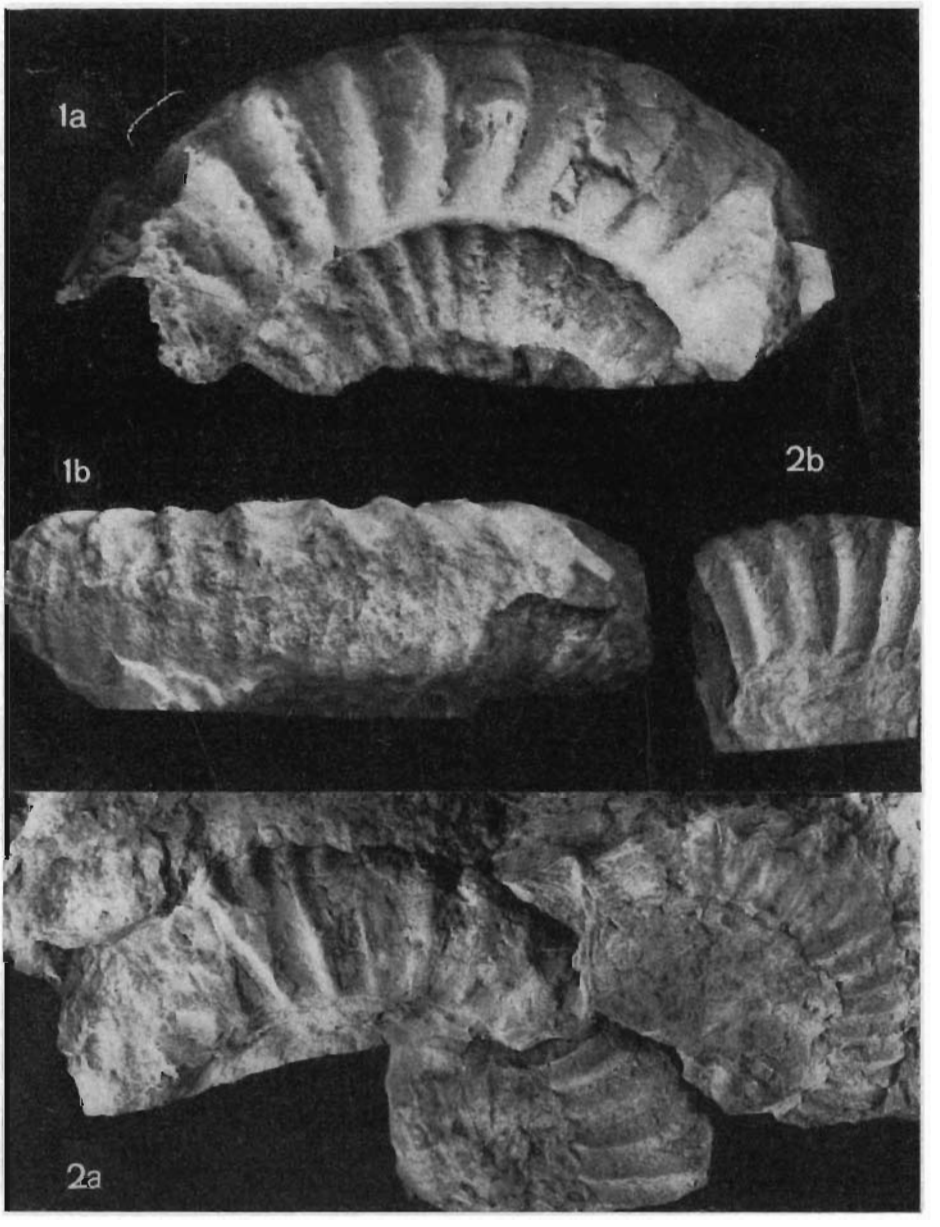

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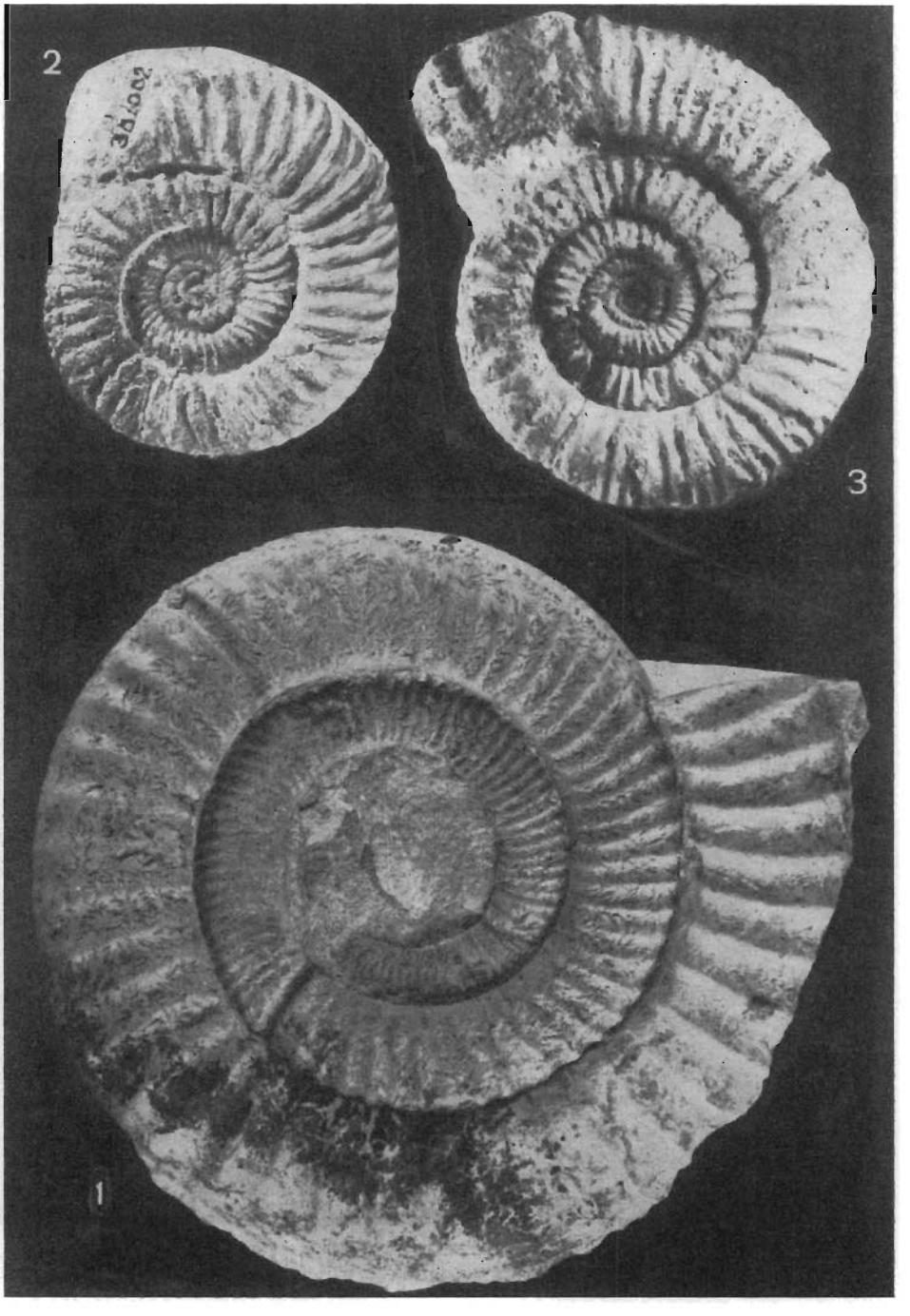

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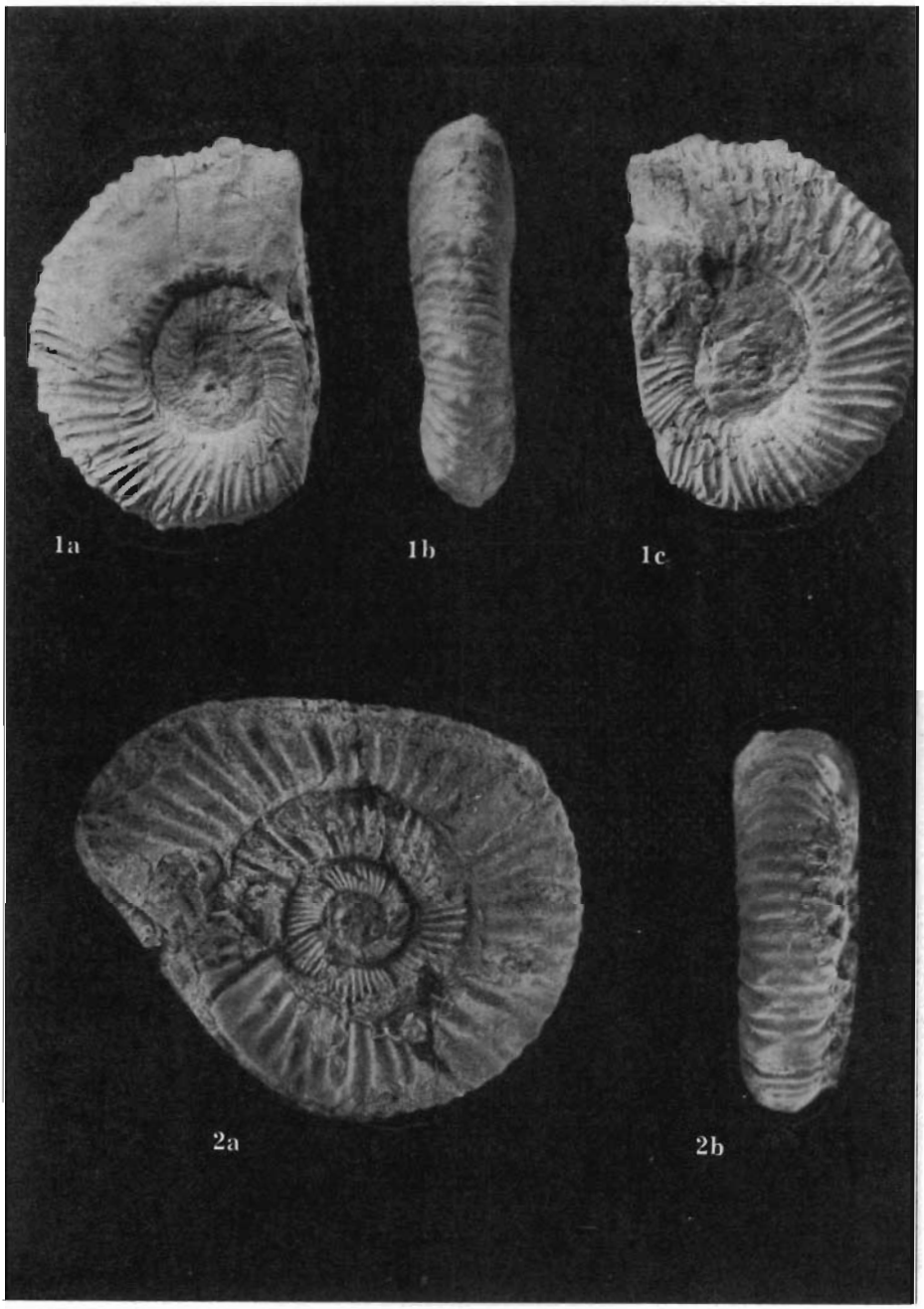

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