

Pseudogzheloceras—a new genus of Carboniferous nautilids (Cephalopoda) from Europe and North Africa

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abstract

Analysis of morphology, stratigraphic and geographic distribution of the group of nautilid species, mainly from the Westphalian of Western Europe, and the Bashkirian and Moscovian of the Donets Basin (Eastern Ukraine) made it possible to establish a new genus *Pseudogzheloceras* Dernov, gen. nov. This genus includes tainoceratids with an evolute discoidal conch. The umbilical perforation is present. Cross section of the adult whorls is sub-square or almost rectangular. Surface ornamentation is represented by large transverse ribs on the flanks. Siphuncle is sub-central or is situated between the venter and the centre of the whorl (the position of the siphuncle is not known for the most species). Suture line has ventral, lateral and dorsal lobes; sometimes a lobe or saddle is present on the umbilical area. The new genus differs from the genus *Gzheloceras* by the sub-square or almost rectangular whorls cross section and coarser surface ornamentation. *Pseudogzheloceras* Dernov, gen. nov. is distinguished from the genus *Parametacoceras* Miller et Owen, 1934 (Pennsylvanian of North America, Westphalian of Western Europe, Moscovian of the Donets Basin and Moscow Syncline) by the presence of transverse ribs on the flanks of the body chamber. The new genus includes the following species: *Pseudogzheloceras costatum* (Hind, 1905) comb. nov., *Ps. falcatum* (Sowerby in Prestwich, 1840) comb. nov., *Ps. rotifer* (Salter, 1864) comb. nov., *Ps. postcostatum* (Bisat, 1930) comb. nov., *Ps. donetzense* (Kruglov in Librovitch, 1939) comb. nov., *Ps. orthocostatum* (Kruglov in Librovitch, 1939) comb. nov., *Ps. tacitum* (Shimansky, 1957) comb. nov., and, possibly, *Ps. maklai* (Shimansky, 1967) comb. nov. These species had previously belonged to the genera *Pleuro-nautilus*, *Metacoceras*, *Huanghoceras*, and *Gzheloceras*. The new genus is known from the Westphalian of Western Europe and North Africa, Pennsylvanian of the Donets Basin and Moscow Syncline, and possibly the Upper Pennsylvanian of the Fergana Depression. The research results have a great importance for studying the relationships between nautilid faunas of Carboniferous palaeobasins, as well as clarifying the taxonomy and phylogeny of non-ammonoid Carboniferous cephalopods.

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Pseudogzheloceras — новий рід наутілід (Cephalopoda) з карбону Європи та Північної Африки

Віталій Дернов

Резюме. Аналіз морфології, стратиграфічного та географічного поширення групи видів наутілід переважно з вестфалу Західної Європи, а також башкирського та московського ярусів Донецького басейну (Східна Україна) дозволив встановити новий рід *Pseudogzheloceras* Dernov, gen. nov. Цей рід включає тайноцератид з еволютною дисковидною черепашкою. Умбілікальний отвір присутній. Поперечний перетин дорослого завитку прямокутний або майже квадратний. Скульптура представлена масивними поперечними ребрами на латеральних сторонах. Сифон субцентрального або розташованого між вентральною стороною та центром завитку (положення сифону не відоме для більшості видів). Лопатева лінія з вентральною, латеральною та дорсальною лопатами; інколи присутня лопать або сідло на умбілікальній стінці. Рід *Pseudogzheloceras* відрізняється від роду *Gzheloceras* прямокутною або майже квадратною формою поперечного перерізу завитку та більш грубою скульптурою. Новий рід відрізняється від роду *Parametacoceras* Miller et Owen, 1934 (пенсильваній Північної Америки, вестфал Західної Європи, московський ярус Донецького басейну та Московської синеклізи) наявністю поперечних ребер на латеральних сторонах житлової камери. Новий рід включає наступні види: *Pseudogzheloceras costatum* (Hind, 1905) comb. nov., *Ps. falcatum* (Sowerby in Prestwich, 1840) comb. nov., *Ps. rotifer* (Salter, 1864) comb. nov., *Ps. postcostatum* (Bisat, 1930) comb. nov., *Ps. donetzense* (Kruglov in Librovtich, 1939) comb. nov., *Ps. orthocostatum* (Kruglov in Librovtich, 1939) comb. nov., *Ps. tacitum* (Shimansky, 1957) comb. nov., та, можливо, *Ps. maklai* (Shimansky, 1967) comb. nov. Раніше дані види включалися до складу родів *Pleuromutilus*, *Metacoceras*, *Huanghoceras* та *Gzheloceras*. Новий рід відомий з вестфалу Західної Європи та Північної Африки, пенсильванію Донбасу та Московської синеклізи та, можливо, верхнього пенсильванію Ферганської западини. Результати дослідження мають важливе значення для вивчення зв'язків між фаунами наутілід карбонівих палеобасейнів, а також для уточнення систематики та філогенії неамоноїдних цефалопод карбону.

Ключові слова: карбон, головоногі молюски, наутіліди, Європа, Північна Африка.

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Introduction

The collection of cephalopod remains from the lower and middle Pennsylvanian of the Donets Basin (Eastern Ukraine) have been studied in the past few years. An analysis of the morphology of a number of nautilid species, described mainly from the Westphalian of Western Europe, made it possible to erect a new genus—*Pseudogzheloceras* Dernov, gen. nov. This genus is described below.

History of Research

A number of nautilids are known from the Westphalian of Western Europe, which during the original description and later were assigned to the genera *Pleuromutilus* and *Metacoceras* ('*Pleuromutilus falcatus* Sowerby or '*Metacoceras falcatus* (Sowerby), '*M. costatum* (Hind), and '*M. postcostatum* Bisat) (Hind 1905; Librovtich 1939; etc). The surface ornamentation, the conch shape, and other signs suggest that they do not belong to these genera. Leonid S. Librovtich (1939) attributed species close to '*Pleuromutilus falcatus* Sowerby (for example, '*Metacoceras postcostatum* Bisat) to the genus *Huanghoceras* Yin, 1933.

Viktor N. Shimansky in the handbook 'Fundamentals of Palaeontology' (Shimansky 1962) considered the genus *Huanghoceras* as independent. Later, he included *Huanghoceras tacitum* Shimansky, which was figured in the 'Fundamentals of Palaeontology' (Shimansky 1962: pl. XXXV, fig. 2), to the genus *Gzheloceras*. He attributed to this genus also some species mentioned earlier by Leonid S. Librovtich (*Huanghoceras nikitini*, *H. orthocostatum*, *H. falcatum*, and *H. falcatum* var. *donetzense*) (Librovtich 1939). Viktor N. Shimansky considered that the genus *Huanghoceras* is the younger synonym of the genus *Pleuromutilus* Mojsisovics, 1882 (Shimansky 1979). In his monograph (Shimansky

1967), he determined the content of the genus *Gzheloceras* and cautiously suggested that the species 'Huanghoceras' *falcatum* Sowerby refers to the genus *Gzheloceras*. I do not support this view (see justification below).

I am prone to attribute some of the aforementioned species to a new genus *Pseudogzheloceras* Dernov, gen. nov., which is described below.

Material and Methods

This study is based on the analysis of the morphology of nautilid conchs from the Westphalian of Europe and North Africa, attributed by different authors to the genera *Pleuromutilus*, *Metacoceras*, *Huanghoceras*, *Gzheloceras*, and some others. Results of the study of the collection of Pennsylvanian nautilids from the Donets Basin (collection IGSU-4) were also used. These materials are stored in the Department of Stratigraphy and Palaeontology of Palaeozoic Sediments at the Institute of Geological Sciences of the National Academy of Science of Ukraine, Kyiv. The study of this collection made it possible to elucidate some unclear features of the conch morphology of a new genus.

Original plates of the atlas manuscript (Librovitch 1939), which figured the nautilids 'Huanghoceras' *falcatum* (Sowerby) var. *donetzensis* (Kruglov) and 'Huanghoceras' *orthocostatum* (Kruglov), were obtained with the help of Vladyslav I. Poletaev (Kyiv). I studied these taxa in more detail based on original pictures due to the poor quality of the photos in the work (Librovitch 1939), which does not allow finding out the details of the conch morphology of these nautilids. Type series of these species, apparently, were lost during World War II. Therefore, the only way to form an idea on these species is studying the photos.

Systematic Palaeontology

Class Cephalopoda Cuvier, 1797

Subclass Nautiloidea Agassiz, 1847

Order Nautilida Agassiz, 1847

Superfamily Tainoceratoidea Hyatt, 1883

Family Tainoceratidae Hyatt, 1883

Genus *Pseudogzheloceras* Dernov, gen. nov.

Fig. 1 a–j; Fig. 2 b–e

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Nautilus: Prestwich, 1840, p. 492; Morris, 1854, p. 308 (p.p.; cited by Foord, 1891).

Discites: Salter, 1864, p. 65.

Pleuromutilus: Foord, 1891, p. 134 (p.p.); Hind, 1905, p. 540; Hind, 1920, p. 405 (p.p.).

Metacoceras: Bisat, 1930, p. 84 (p.p.); Miller, Dunbar, Condra, 1933, p. 168 (p.p.); Currie, Duncan, 1937, p. 435; Delépine, 1937, p. 43.

Huanghoceras: Librovitch, 1939, p. 132; Shimansky, 1962, p. 121 (p.p.).

Gzheloceras: Shimansky, 1967, p. 73–74 (p.p.).

Etymology. Genus name comes from Greek 'pseudo' = lie and generic name *Gzheloceras*.

Type species. *Pleuromutilus costatum* Hind, 1905: Westphalian of Britain and the Netherlands, Moscovian of the Donets Basin (Ukraine) and North Africa. *Pleuromutilus costatum* was chosen as the type species for several reasons. Firstly, this species was fully described and figured (Hind 1905). Secondly, the type series of this species is not lost and is available for study (GB3D Type Fossils). Thirdly, it is the oldest fully described species of the new genus (the species *Nautilus falcatum* Sowerby is only figured, but not described; its holotype was not specified). Fourthly, the validity of this species is generally recognized and it is relatively often cited in the literature.

Diagnosis. Conch is evolute and discoidal. The umbilical perforation is present. The cross section of adult whorls is sub-square or almost rectangular. The surface ornamentation is presented by large transverse ribs on the flanks. The siphuncle is subcentral or situated between the venter and the centre of the whorl (the position of the siphuncle is not known for the most species). The suture line has ventral, lateral and dorsal lobes; sometimes a lobe or saddle is located on the umbilical area.

Remarks. The new genus differs from the genus *Gzheloceras* by the sub-square or almost rectangular form of the whorls cross section and coarser surface ornamentation. The new genus differs from the genus *Parametacoceras* Miller et Owen, 1934 (Pennsylvanian of North America, Westphalian of Western Europe, Moscovian of the Donets Basin and Moscow Syncline) by the presence of transverse ribs on the flanks of the body chamber. *Pseudogzheloceras* differs from *Mosquoceras* Ruzhencev et Shimansky, 1954 by the presence of transverse ribs on the flanks and by the absence of nodes on the ventrolateral shoulders.

The genus *Pseudogzheloceras* is very similar to the genus *Pleuromutilus* Mojsisovics, 1882 from the Late Carboniferous to Triassic (Shimansky 1967) by the surface ornamentation and the form of the conch. Nevertheless, the new genus lacks the annular lobe, which is typical for the genus *Pleuromutilus* (Shimansky 1967).

The taxonomy of the genera *Gzheloceras*, *Foordiceras*, *Pleuromutilus* and some others is rather confusing (Dzik 1984). Viktor N. Shimansky (1979) considered the genera *Huanghoceras* Yin, 1933 and *Pseudofoordiceras* Ruzhencev et Shimansky, 1954 to be junior synonyms of *Pleuromutilus*, a view which I support. Jerzy Dzik (1984) considered the genus *Pleuromutilus* to be a polyphyletic group uniting several lineages independently originated from *Gzheloceras*. Bernhard Kummel (1953) made a cautious assumption that the ancestor of the genus *Pleuromutilus* may be the genus *Parametacoceras* Miller et Owen, 1934. Nataliya P. Schastlivtseva (1988) considers the genus *Metacoceras* to be the ancestor of *Pleuromutilus*; Jerzy Dzik (1984) attributed some North American representatives of the genus *Foordiceras* to *Pleuromutilus*.

The significant morphological similarity between the genera *Foordiceras*, *Pleuromutilus*, and *Pseudogzheloceras* by the conch's form and surface ornamentation should be noted. The suture line of *Pleuromutilus* and *Pseudogzheloceras* is different. In addition, as noted earlier, *Pleuromutilus* has an annular lobe of the suture line (Shimansky 1967). It is not yet clear what caused such a significant morphological similarity — convergence, direct relationship, mistakes of taxonomists, or all the reasons together. The rank of the *Pseudogzheloceras* might be overestimated in this study and might be only a subgenus of the genus *Pleuromutilus*.

Pleuromutilus sp. is mentioned from the Upper Carboniferous of the Fergana Depression (Shimansky 1967). If the Late Carboniferous nautilids described in (Shimansky 1967; Zhang *et al.* 1994) are indeed representatives of the genus *Pleuromutilus*, then, possibly, the Asian origin of this genus should be recognized.

The systematic position of the nautilids *Huanghoceras obliquicostatum* Young, *H. bryani* Young, and *H. collinum* Young described from the Pennsylvanian of New Mexico (Young 1942; 1945) is rather confusing too. These species were assigned to the genus *Metacoceras* Hyatt, 1883 (Sturgeon *et al.* 1982). A new species *Metacoceras clinocostatum* Sturgeon *et al.*, 1982, which is very similar to the above species, was described in the same article. Massive transverse ribs on the flanks of the conchs of these nautilids are not typical for the genus *Metacoceras*. It is possible that these species, as many other Permian representatives of the genus 'Metacoceras' bearing transverse ribs on the flanks of the conch, should be attributed to the genus *Foordiceras* (Miller & Younquist 1949). According to the photo of the conchs of *Metacoceras clinocostatum* Sturgeon *et al.*, 1982 (not a type series) posted on the site of the Fossils of Parks Township (<https://fossil.15656.com/2021/05/17/metacoceras-clinocostatum/>), this and the above species may also belong to the genus *Gzheloceras* and/or *Pseudogzheloceras*.

Included species (Table 1 and Fig. 1). A number of species from the Westphalian of Britain, such as *Pseudogzheloceras costatum* (Hind, 1905) comb. nov., *Ps. falcatum* (Sowerby in Prestwich, 1840) comb. nov., *Ps. rotifer* (Salter, 1864) comb. nov., and *Ps. postcostatum* (Bisat, 1930) comb. nov., which are described in rather old works (Hind, 1905; Prestwich, 1840; Salter, 1864; Bisat, 1930), are morphologically very close to each other. Apparently, some of them are synonyms. It is impossible to resolve this issue without studying the original material. The status of these species is not addressed in this article.

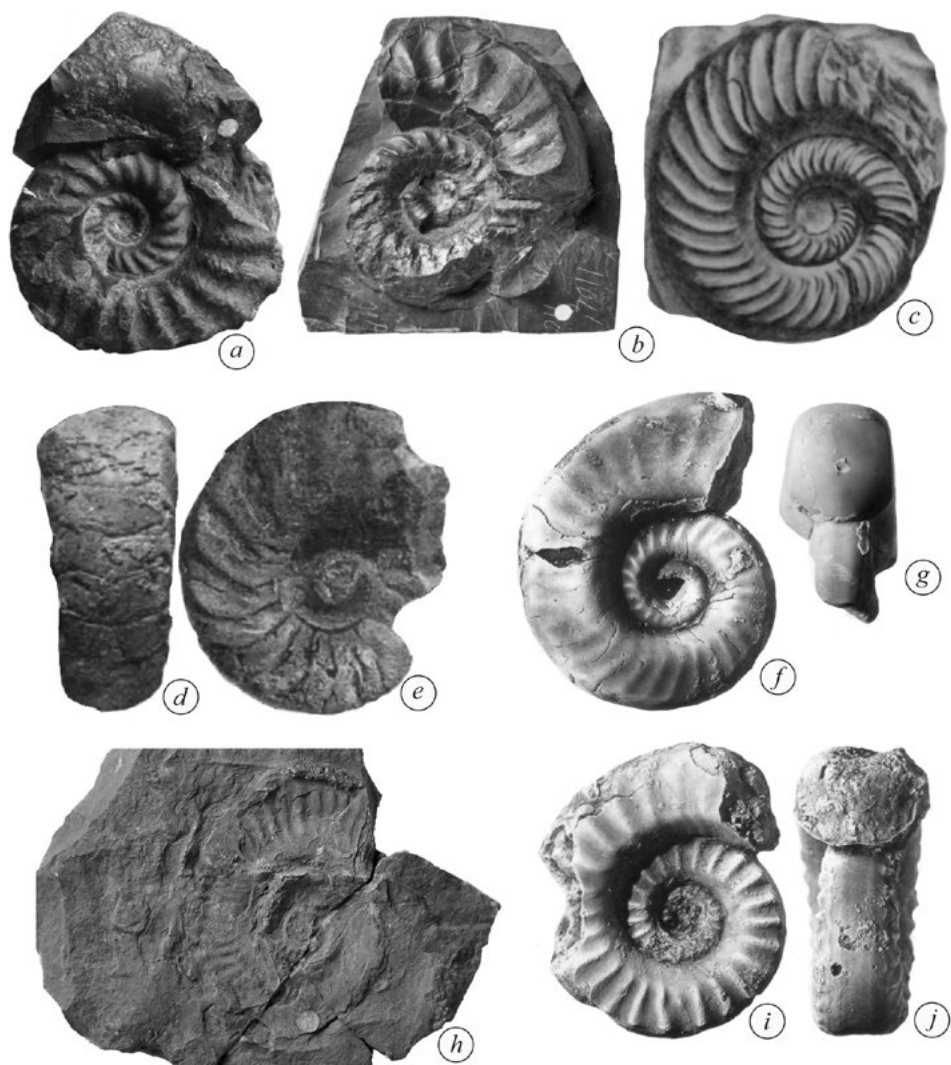


Fig. 1. Some species of the genus *Pseudogzheloceras* Dernov, gen. nov. *a*—*Pseudogzheloceras costatum* (Hind, 1905) comb. nov., lateral view, specimen BGS GSM71006 (syntype) (GB3D Type Fossils); *b*—*Pseudogzheloceras postcostatum* (Bisat, 1930) comb. nov., lateral view, specimen BGS GSM49261 (holotype) (GB3D Type Fossils). *c*—*Pseudogzheloceras falcatum* (Sowerby in: Prestwich 1840) comb. nov., lateral view, after (Prestwich 1840); *d, e*—*Pseudogzheloceras tacitum* (Shimansky, 1957) comb. nov., holotype: *d*—ventral view, *e*—lateral view, after (Shimansky 1962); *f, g*—*Pseudogzheloceras donetzense* (Kruglov in: Librovtich 1939) comb. nov., holotype: *f*—lateral view, *g*—ventral view (original photo from the manuscript of the work Librovtich 1939); *h*—*Pseudogzheloceras rotifer* (Salter, 1864) comb. nov.: lateral view, specimen BGS GSM11371 (syntype) (GB3D Type Fossils); *i, j*—*Pseudogzheloceras orthocostatum* (Kruglov in: Librovtich 1939) comb. nov., holotype: *i*—lateral view, *j*—ventral view (original photo from the manuscript of the work Librovtich 1939). Abbreviations: BGS—Britain Geological Survey.

Рис. 1. Деякі види роду *Pseudogzheloceras* Dernov, gen. nov. *a* — *Pseudogzheloceras costatum* (Hind, 1905) comb. nov., вигляд збоку, екз. BGS GSM71006 (синтип) (GB3D Type Fossils); *b* — *Pseudogzheloceras postcostatum* (Bisat, 1930) comb. nov., вигляд збоку, екз. BGS GSM49261 (голотип) (GB3D Type Fossils). *c* — *Pseudogzheloceras falcatum* (Sowerby in: Prestwich 1840) comb. nov., вигляд збоку, взято з роботи (Prestwich 1840); *d, e* — *Pseudogzheloceras tacitum* (Shimansky, 1957) comb. nov., голотип: *d* — вигляд з боку вентральної сторони, *e* — вигляд збоку, взято з роботи (Shimansky 1962); *f, g* — *Pseudogzheloceras donetzense* (Kruglov in: Librovtich 1939) comb. nov., голотип: *f* — вигляд збоку, *g* — вигляд з боку вентральної сторони (оригінальне фото з рукопису роботи (Librovitch 1939)); *h* — *Pseudogzheloceras rotifer* (Salter, 1864) comb. nov.: вигляд збоку, екз. BGS GSM11371 (синтип) (GB3D Type Fossils); *i, j* — *Pseudogzheloceras orthocostatum* (Kruglov in Librovtich, 1939) comb. nov., голотип: *i* — вигляд збоку, *j* — вигляд з боку вентральної сторони (оригінальне фото з рукопису роботи (Librovitch 1939)). Скорочення: BGS — Геологічна Служба Британії.

Table 1. Species of the genus *Pseudogzheloceras* Dernov, gen. nov.
Таблица 1. Видовой склад рода *Pseudogzheloceras* Dernov, gen. nov.

Species	Distribution
<i>Pseudogzheloceras costatum</i> (Hind, 1905) comb. nov.	Westphalian of Britain, Netherlands and North Africa, Moscovian of the Donets Basin (Eastern Ukraine).
<i>Pseudogzheloceras falcatum</i> (Sowerby in Prestwich, 1840) comb. nov.	Westphalian of Britain; Upper Bashkirian of the Donets Basin.
<i>Pseudogzheloceras rotifer</i> (Salter, 1864) comb. nov.	Westphalian of Britain.
<i>Pseudogzheloceras postcostatum</i> (Bisat, 1930) comb. nov.	Westphalian of Britain and Spain, Moscovian of the Donets Basin.
<i>Pseudogzheloceras donetzense</i> (Kruglov in Librovtch, 1939) comb. nov.	Upper Bashkirian, Donets Basin.
<i>Pseudogzheloceras orthocostatum</i> (Kruglov in Librovtch, 1939) comb. nov.	Upper Bashkirian, Donets Basin.
? <i>Pseudogzheloceras maklai</i> (Shimansky, 1967) comb. nov.	Upper Gzhelian, Karachaty Mountains (Uzbekistan).
<i>Pseudogzheloceras tacitum</i> (Shimansky, 1957) comb. nov.	Lower Moscovian, European part of Russia.

Nautilus armatus Sowerby figured in the article by Josef Prestwich (Prestwich 1840: pl. XL, fig. 8) is similar in conch's form and surface ornamentation to *Pseudogzheloceras falcatum* (Sowerby in Prestwich, 1840) comb. nov. Wheelton Hind (1910) mistakenly attributed this species to the genus *Pleuonautilus*. I cannot discuss the status of this species since it has not been described and the available images of the conch (picture in Prestwich 1840) do not give an idea of the morphology of this species. Moreover, the species *Nautilus armatus* Sowerby is hardly cited in the literature in contrast to *Nautilus falcatum* Sowerby figured in the same work (Prestwich 1840).

The genus *Pseudogzheloceras* also includes the nautilid figured in the work (Wagner-Gentis 1977: pl. 2, fig. 6). It is defined as *Metacanites* sp. (ammonoid) [sic!]. The author of the definition means *Metacoceras*, so the error is obvious. The fossil is found in the upper Bashkirian of Spain. The nautilid from the Carboniferous of Poland defined as *Metacoceras* sp. (Korejwo & Teller 1972) possibly also belongs to the genus *Pseudogzheloceras*. *Pleuonautilus* cf. *falcatus* (Sowerby) defined by Karl Patteisky (1929; pl. 14, fig. 9) does not belong to the genus *Pseudogzheloceras*.

Alpheus Hyatt (1891) described the nautilid *Temnocheilus crassus* Hyatt, 1891 from the Pennsylvanian of Kansas. This species was attributed to the genera *Metacoceras* (Miller *et al.* 1933), *Parametacoceras* (Miller & Owen 1934), and *Gzheloceras* (Shimansky 1967). '*Temnocheilus*' *crassus* Hyatt does not belong to any of these genera. It is not known whether conchs of this nautilid species have an umbilical perforation. This species is close to the representatives of the genus *Pseudogzheloceras* Dernov, gen. nov. This similarity, however, is not enough to include '*Temnocheilus*' *crassus* Hyatt, 1891 into the genus *Pseudogzheloceras* Dernov, gen. nov.

Distribution (fig 2, a). The genus is found in the Westphalian of Western Europe and North Africa (Bisat 1930; Delépine 1937; 1949; Prestwich 1840; Rakusz 1932), in the Pennsylvanian of the Donets Basin (Librovitch 1939 and unpublished data of the author) and the Moscow Syncline (Shimansky 1967), and possibly in the upper the Pennsylvanian of the Fergana Depression (Shimansky 1967).

Representatives of the genus *Pseudogzheloceras* Dernov, gen. nov. mainly inhabited epicontinental warm seas of the eastern coast of Laurasia. Most of the species are found in sediments formed at low palaeolatitudes (fig. 2, a).

Conclusions

A new nautilid genus *Pseudogzheloceras* Dernov, gen. nov. is described from the Carboniferous of Europe and North Africa. The main distinctive features of the morphology of the new genus are: (1) evolute discoidal conch; (2) sub-square or rectangular form of the conch whorl cross section; (3) massive transverse ribs on the flanks; (4) suture line with ventral, lateral and dorsal lobes; (5) occasional presence of a lobe or saddle on the umbilical area.

The new taxon is widespread in Westphalian sediments of Western Europe and the Donets Basin. The research results have great importance for studying the relationships between nautilid faunas of Carboniferous palaeobasins, as well as clarifying the taxonomy and phylogeny of Carboniferous non-ammonoid cephalopods.

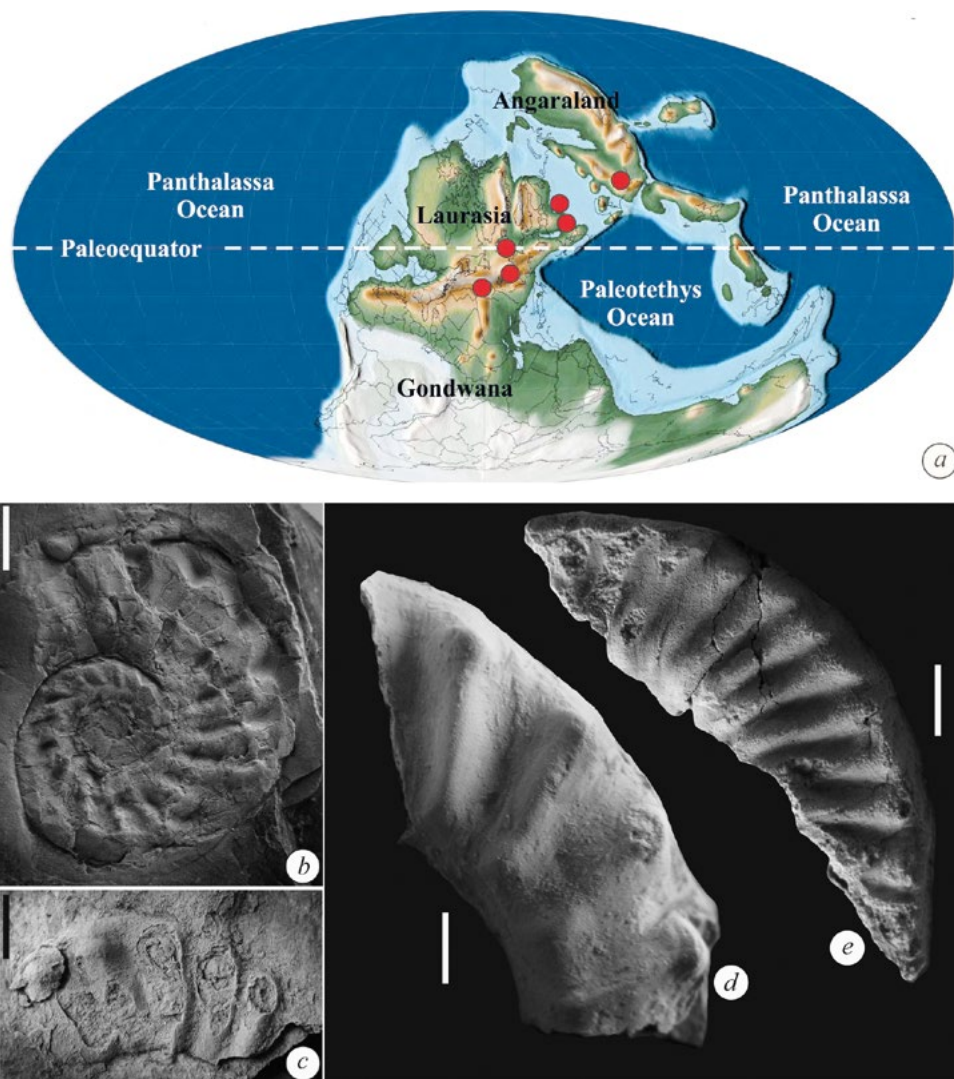


Fig. 2. Geographic distribution of the genus *Pseudogzheloceras* Dernov, gen. nov. (a) and some representatives of the genus *Pseudogzheloceras* Dernov, gen. nov. from the Carboniferous of the Donets Basin (b–e).

a—geographic distribution of the genus *Pseudogzheloceras* Dernov, gen. nov. (red circles); palaeogeographic map after Scotese 2014; b—*Pseudogzheloceras costatum* (Hind, 1905) comb. nov., lateral view (IGSU-4/670), Ukraine, Luhansk, coal mine ‘Mashchynska’ (Moscovian: Almazna Formation, roof shale of the I_6 coal layer); c—*Pseudogzheloceras costatum* (Hind, 1905) comb. nov., lateral view (IGSU-4/427), Ukraine, Luhansk Region, Luhansk District, Makedonivka Village (Upper Bashkirian, upper part of the Mospyne Formation); d—*Pseudogzheloceras costatum* (Hind, 1905) comb. nov., lateral view (IGSU-4/441), the locality is the same as for previous nautilus; e—*Pseudogzheloceras falcatum* (Sowerby in Prestwich, 1840) comb. nov., lateral view (IGSU-4/685), Ukraine, Luhansk Oblast, Luhansk Raion, Makedonivka Village (upper Bashkirian, Mospyne Formation, sandstone 40 m below the G_1^2 limestone). Scale bar: 10 mm.

Рис. 2. Географічне поширення роду *Pseudogzheloceras* Dernov, gen. nov. (фіг. a) та деякі представники роду з карбону Донбасу (фіг. b–e).

a — географічне поширення роду *Pseudogzheloceras* Dernov, gen. nov. (червоні кола); палеогеографічну карту взято з роботи (Scotese 2014); b — *Pseudogzheloceras costatum* (Hind, 1905) comb. nov., вигляд збоку (екз. IGSU-4/670), Україна, Луганськ, шахта «Машинська» (московський ярус: алмазна світа, сланці в покрівлі вугільного шару I_6); c — *Pseudogzheloceras costatum* (Hind, 1905) comb. nov., вигляд збоку (екз. IGSU-4/427), Україна, Луганська область, село Македонівка, (верхній башкир, верхня частина моспінської світи); d — *Pseudogzheloceras costatum* (Hind, 1905) comb. nov., вигляд збоку (екз. IGSU-4/441), місцезнаходження те ж саме, що і для фіг. c; e — *Pseudogzheloceras falcatum* (Sowerby in Prestwich, 1840) comb. nov., вигляд збоку (екз. IGSU-4/685), Україна, Луганська обл., с. Македонівка (верхній башкир, моспінська світа, пісковик в 40 м нижче вапняку G_1^2). Масштабні відрізки: 10 мм.

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