

The First Find of Heteromorph Ammonites in the Lower Callovian of European Russia

D. B. Gulyaev

Paleontology Department, Faculty of Geology, Moscow State University, Vorob'evy gory, Moscow, 119899 Russia

e-mail: paleont@geol.msu.ru

Received June 6, 2001

Abstract—Middle Jurassic heteromorph ammonites *Parapatoceras tuberculatum* (Baugier et Sauze) have been found for the first time in the Lower Callovian *koenigi* Zone of European Russia (Kostroma Region, Kologrivskii District).

INTRODUCTION

Middle Jurassic heteromorph ammonites represent a bizarre, apparently artificial group possessing a gyroconical, cyrtocircular, or orthoconical shell, either with singular ribs with pointed lateral and ventral spines, or almost completely lacking ornamentation. Such biomorphs are usually considered epiplanktonic and possibly pseudoplanktonic microphages mainly inhabiting thick beds of seaweed (Dietl, 1978; Westermann, 1996). However, there is an alternative view, according to which the Middle Jurassic heteromorphs were benthic (Munk, 1979). The view that they at least were not fast swimmers is supported by an unusually high intraspecific variability of their shell shape, as seen in the degree of coiling and the displacement of the whorls in respect to the axis of coiling, sometimes resulting in screw-coiled orthocones.

The Middle Jurassic heteromorph ammonites are subdivided into two interrelated groups. One of these, including the single genus *Spiroceras* Quenstedt (= *Apsorroceras* Hyatt, *Patoceras* Meek, *Rhabdoites* Buckman, *Plagiamites* Buckman) occurs in the Upper Bajocian (Dietl, 1978, 1988; Besnossov and Kutuzova, 1990), and according to Torrens (1971) also in the *zigzag* Zone of the Lower Bathonian. Another group, comprising *Parapatoceras* Spath (= *Metapatoceras* Schindewolf, *Infrapatoceras* Ochoterena, *Criocoonites* Buckman), *Paracuariceras* Schindewolf, and *Acuariceras* Spath, occurs from the Upper Bathonian to the lower part of the Middle Callovian (Dietl, 1978; Munk, 1979).¹ Both groups occur throughout the world; however, they usually play only a subordinate role in ammonite assemblages.

Because of their exotic appearance, Middle Jurassic heteromorphs have been a focus of attention for a long

time and are quite well studied. However, their origin, taxonomic position, and classification have remained uncertain. Debate on the above subjects including various arguments (shell shape, ornamentation, suture, sexual dimorphism, and geographic and stratigraphic distribution) has continued for over 100 years, but no widely accepted agreement has been achieved. Dietl's (1978; 1988) opinion appears the least contradictory, although not without its critics. According to Dietl, the Upper Bajocian (*Spiroceras*) and Upper Bathonian-Middle Callovian (*Parapatoceras*, *Paracuariceras*, and *Arcuariceras*) heteromorph ammonites represent two independent iterative lineages in the family Parkinsoniidae. Hence, it is more reasonable to consider them as subfamilies (Spiroceraatinae Hyatt and Parapatoceraatinae Buckman) within this family.

As mentioned above, Middle Jurassic heteromorph ammonites occur almost globally (from Madagascar and western India to Argentina and Alaska). However, in the Bathonian-Callovian of European Russia, they have not been previously found, although the Upper Bajocian *Spiroceras* are reported from the Donets Basin and the northern Caucasus (Besnossov and Mitta, 1993).

During the field work in the basin of the Unzha River (Fig. 1) that was conducted by myself and A. V. Guzhov (Paleontological Institute, Russian Academy of Sciences) in 2000, *Parapatoceras tuberculatum* (Baugier et Sauze) was found in the Lower Callovian near the villages of Ileshevo and Burdovo (Kostroma Region, Kologrivskii District).

The Callovian deposits in this region were first studied by Nikitin (1885). These beds overlie the eroded surface of the greenish marly Lower Triassic clay and are represented by a series of sands with subdominant clay interbeds in the lower part. The total thickness of the Callovian is over 20 m. This series is dated from the *C. elatmae* Biohorizon (Lower Callovian *C. elatmae* Zone) to the *phaenium* Subzone (Upper Callovian *Athleta* Zone). The Callovian beds are with an unconformity overlain by the Upper Oxfordian clay. The hetero-

¹ Reported occurrences of heteromorph ammonites in the Toarsian, Aalenian, and Upper Oxfordian were not verified, whereas the supposed Lower Bathonian genus *Sulcohamites* Wetzel is difficult to interpret, since it is represented by a single small fragment of a phragmocone (Donovan *et al.*, 1980).

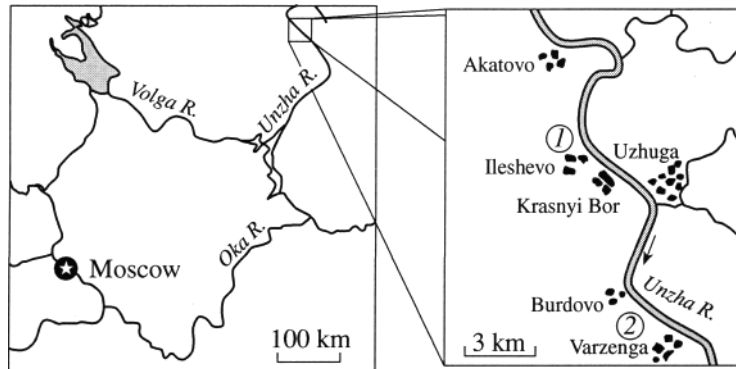


Fig. 1. Localities of *Parapatoceras tuberculatum* in European Russia. (1) outcrop in a gully in the northern vicinity of the village of Ileshevo; (2) outcrop on the steep right bank of the Unzha River immediately downstream of the village of Burdovo.

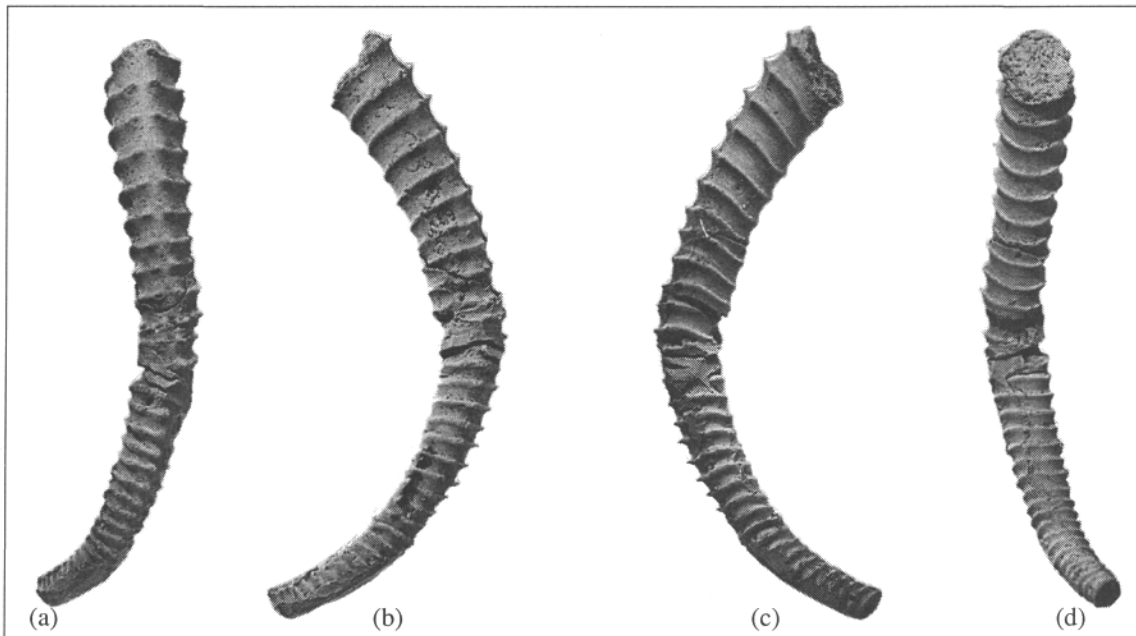


Fig. 2. *Parapatoceras tuberculatum* (Baugier et Sauze), specimen MGU, no. 3/1485, x2; Kostroma Region, Kologrivskii District, village of Ileshevo; Lower Callovian, *koenigi* Zone, *curtilobus* Subzone: (a) ventral view, (b) right view, (c) left view, and (d) dorsal view.

morph ammonites are recovered from the horizon of gray phosphatized sandstone occurring approximately in the middle of the Callovian beds. The ammonite assemblage also contains *Keplerites* (*Gowericeras*) *curtilobus* (Buckman), *Toricellites curticornutus* Buckman, *Rondiceras? sokolovi* (Kiselev), *Cadoceras* (*Cadoceras?*) *tolype* Buckman, *Pseudocadoceras* spp., and *Proplanulites* spp. This composition certainly indicates the *K. curtilobus* Biohorizon of the *Koenigi* Subzone (Lower Callovian *Koenigi* Zone); stratigraphy is after Gulyaev (2001).

Below is the description of the heteromorph ammonites found in the beds listed. Material is housed at the Paleontology Department, Moscow State University (MGU).

SYSTEMATIC PALEONTOLOGY

Family Parkinsoniidae Buckman, 1920

Subfamily Parapatoceratinae Buckman, 1926

Genus *Parapatoceras* Spath, 1924

Parapatoceras tuberculatum (Baugier et Sauze, 1843)

Parapatoceras tuberculatum: Dietl, 1978, p. 44, pi. 7, figs. 11 and 12; pi. 8, figs. 1-5 (see synonymy); Munk, 1979, p. 223, figs. 6A, 6B, and 6D; Pandey *et al.*, 1994, p. 66, figs. 2-7.

Holotype. Specimen figured by Baugier and Sauze (1843), p. 11, pi. 4, figs. 1 and 2. This specimen is apparently lost (Dietl, 1978). France, Niort; Lower Callovian.

Description (Fig. 2). The shell is small or medium-sized, cyrtconical, and posteriorly more curved. The whorl section is oval and laterally com-

pressed. The ribs on the anterior end of the shell (at whorl heights less than 1 mm) are hardly noticeable, later becoming more discernible. On the dorsum, they are gently curved backward and slightly weakened; on the flanks, they slant forward with a shallow sinus, rise and become acute. In the upper part of the flanks, elongated lateral nodes are formed, and, on the venter, spinelike ventral nodes develop. In between the nodes, the ribs are smoothened, forming a narrow ventral furrow.

Dimensions, mm:

Specimen MGU, no. 3/1485. The length of the preserved shell fragment (along the curve) is 45; the whorl height at the posterior end is 2; the whorl height (WH) and width (WW) near the anterior end are 5.2 and 4.45, respectively (WW/WH = 0.86).

Specimen MGU, no. 3/1486. The length of the preserved shell fragment (along the curve) is 9; the whorl heights at the posterior and anterior ends are 0.8 and 1.2, respectively.

Specimen MGU, no. 3/1487. The length of the preserved shell fragment is 2.5; the whorl height is 1.5-1.6.

Comparison. This species differs from the most morphologically similar *P. tenue* (Baugier et Sauze) in the more prominent and widely spaced ribs and from *P. distans* (Baugier et Sauze) in the cyrtconical shell and regularly raised ribs.

Remarks. The specimens *P. tuberculatum* described are distinguished from the classical west-European representatives of this species by the more developed sinus formed by ribs on the flanks and by slightly more widely spaced ribs. Therefore, it is possible that the specimens from central Russia represent a separate geographical subspecies. However, more material is needed for a positive conclusion.

Occurrence. Middle part of the Lower Callovian-lower part of the Middle Callovian of Europe (Germany, France, England, Spain, Italy, and central Russia) and South America (northern Argentina).

Materia 1. A mold of the anterior part of the body chamber with a cast of the remaining two-thirds of the shell (without the posterior end) in the shell matrix (specimen MGU, no. 3/1485) and a cast of the posterior end of the shell in the shell matrix (specimen MGU, no. 3/1486) from the outcrop near the village of Ile-

shevo; a small fragment of the mold (MGU, no. 3/1487) from the outcrop near the village of Burdovo.

REFERENCES

- Baugier, A. and Sauze, M., Notice sur quelques coquilles de la famille des ammonoïdes, *Mém. Soc. Statist. Niort.*, 1843, pp. 1-16.
- Besnossov, N.V. and Kutuzova, V.V., Systematics of the Middle Jurassic Heteromorph Ammonites, *Paleontol. Zh.*, 1990, no. 4, pp. 23-30.
- Besnossov, N.V. and Mitta, V.V., *Pozdnebaïoskie i batskie ammonitidy Severnogo Kavkaza i Srednei Azii* (Late Bajocian and Bathonian Ammonitids of the Northern Caucasus and Central Asia), Moscow: Nedra, 1993.
- Dietl, G., Die heteromorphen Ammoniten des Dogger (Stratigraphie, Taxonomie, Phylogenie, Ökologie), *Stuttgarter Beitr. Naturk., Ser. B.*, 1978, no. 33, pp. 1-97.
- Dietl, G., Der Hamiten-Ton (Ober-Bajocium, Mittl. Jura) in Bauauf Schlüssen der Bundesautobahn A8: Streckenabschnitt Aichelberg-Gruibingen, *Jh. Ges. Naturk. Württemberg*, 1988, no. 143, pp. 59-77.
- Donovan, D.T., Callomon, J.H., and Howarth, M.K., Classification of the Jurassic Ammonitina, *The Ammonoidea*, London-New York: Acad. Press, 1980, pp. 101-155 (System. Assoc. Spec. vol. 18).
- Gulyaev, D.B., Infrazonal Ammonite Scale for the Upper Bathonian-Lower Callovian of Central Russia, *Stratigr. Geol. Korrelyatsiya*, 2001, vol. 9, no. 1, pp. 68-96.
- Munk, C., Heteromorphe Ammoniten aus dem Unter Callovien ("Macrocephalen-Schichten") von Westrand der Nordlichen Frankenalb (S-Deuschland), *Paläontol. Z.*, 1979, vol. 53, no. 3/4, pp. 220-229.
- Nikitin, S.N., *Obshchaya geologicheskaya karta Rossii. List 71* (General Geological Map of Russia, Sheet 71), *Tr. Geol. Köm.*, 1885, vol. 2, no. I, pp. 1-217.
- Pandey, D.K., Callomon, J.H., and Fursich, FT., On the Occurrence of the Callovian Ammonite *Parapatoceras tuberculatum* (Baugier et Sauze, 1843) in Kachchh, Western India, *Paläontol. Z.*, 1994, vol. 68, no. 1/2, pp. 63-69.
- Torrens, H.S., New Names for Microconch Ammonite Genera from the Middle Bathonian (Jurassic) of Europe and Their Macroconch Counterparts, *Boll. Soc. Palaeontol. Ital.*, 1971, vol. 9, pp. 136-148.
- Westermann, G.E.G., Ammonoid Life and Habitat, in *Ammonoid Paleobiology*, New York: Plenum Press, 1996, pp. 607-707 (Topics in Geobiol., vol. 13).