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A Rare Ammonoid Genus *Brightia* from the Jurassic of the Central Regions of the East European Platform

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Abstract—The taxonomy of the Callovian-Oxfordian ammonoids of the genus *Brightia* is revised. Two subgenera, *Brightia* Rollier, 1922 and *Glyptia* subgen. nov. are established. The new species *B. (B.) nodosiformis, B. (B.) gzhelensis, B. (B.) boikai, B, (B.) arnae,* and *B. (G.) tenuicostata* are described. All *Brightia* species recognized from the central regions of the East European Platform are figured.

INTRODUCTION

The genus *Brightia* has been known for a long time from the central regions of European Russia. Fisher de Waldheim (1830-1837), in one of the first papers on Russian fossils, figured the ammonoid *Ammonites freislebenii* [=*Brightia* cf. *brightii* (Pratt)]. Later representatives of this genus until recently were repeatedly described from the East European Platform under different species names (Gerasimov *et al.,* 1996; Repin and Rashvan, 1996). Not more than half of all confirmed species of the genus *Brightia* from the Callovian of the East European were described and figured.

The Oxfordian species of this genus until recently were not found in the central regions of the Russian Platform. However, I have an imprint of *Brightia (Glyptia)* cf. *glypta.* (Buckman, 1926) that was apparently recovered (judging from its lithology) from the Lower Oxfordian of the Peski Quarry.

The genus *Brightia* apparently belongs to hecticoceratins with a disputable taxonomy. Rollier (1922) established this genus without designating a type species. He indicated a typical feature of the new genus, i.e., presence of the median furrow and nodes near the mid-flanks. In addition, he indicated two ammonoid species that in his view could typify this genus: *Ammonites hecticiis nodosus* Quenstedt. 1849 *or Ammonites brightii auctor.* (non Pratt). He did not indicate the characteristic features of the latter subspecies and did not mention any other species that could be assigned to the new genus.

This resulted in further debates concerning the taxonomy and characteristic features of the genus under consideration.

Gerard and Contaut (1936) described the genus *Brightia* and designated a type species *B. quenstedti* (Tsytovitch, 1911). They mentioned the presence of a gap between the inner (in the inner part of the flanks) and outer (external part of the flanks) ribs, rather than a furrow. Later Jeannet (1951) noted that representatives of the genus *Brightia* possess a depression or furrow in the mid-flank region. Jeannet (1951) considered *Ammonites brightii* Pratt as the type species of the genus *Brightia.*

Haas (1955) studied the taxonomy of the genus *Brightia* in his paper on the Jurassic ammonoids of Syria. Hass revised the previous papers and concluded that the genus *Brightia* should include species both with and without the median furrow, and with well-developed inner and weakly developed outer ribs, e.g., *B. socini* (Noetling, 1859). Zeiss (1956) presented a diagnosis for this genus and indicated the presence of a median furrow and included in *Brightia* the species with inner ribs that lacked nodes, e.g., *B. subsolinophora* (Tsytovitch, 1911) and even those without inner ribs, e.g., *B. canaliculata* (Quenstedt, 1849.) These workers regarded *Ammonites hecticus nodosus* Quenstedt, 1849 as the type species of the genus *Brightia.*

Thus, at present the genus *Brightia* is a very broad taxon that includes the species with a median furrow and those without it, and those with or without nodes. This is an example of how the genus became a much broader taxon than it was previously considered in the original description.

At present, two subgenera and 12 genera of the genus *Brightia* are known from the East European Platform. One subgenus and five species are new, whereas four species, *Brightia* cf. *syriaca* (Haas, 1955), *B. davitaschvilii* Lominadze, 1975, *B. salvadori* (Tsytpvich, 1911) and *B. canaliculata* (Quenstedt, 1858) were not previously known from this region. Below are the descriptions of the new taxa (other recorded taxa are figured).

MATERIAL

Ammonoids were collected in the Moscow Region (quarries near the village of Peski, Voskresensk District, and the village of Gzhel', Ramenskii District, natural outcrop on the Oka River near the village of Alpat'evo, Lukhovitskii District, in the Ryazan' Region

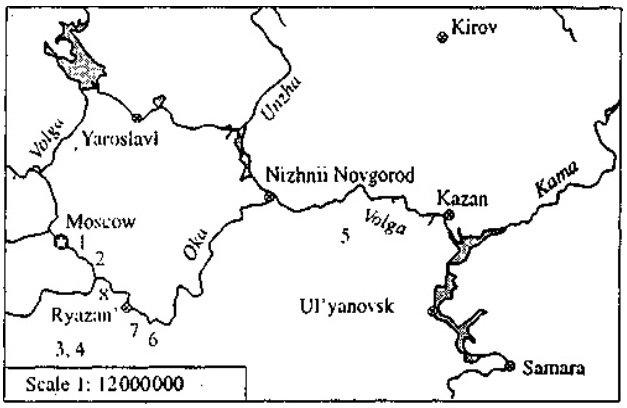


Fig. 1. Ammonoid localities; 1—quarry near the village of Gzhel', 2—quarry near the village of Peski, 3—quarry Mikhailovtsement, 4—quarry Gorenki, 5—quarry near the village of Uzhevka, 6—bank of the Oka River near the village of Nikitino, 7—bank of the Raka River near the village of Boloshnevo, 8—bank of the Oka River near the village of Alpat'evo.

(quarries of the factories Mikhailovtsement and Spartak neat the town of Mikhailov (Mikhalov District) and natural outcrops on the Oka River (near the village of Nikitino (Spassk District) and on the Raka River near the village of Boloshnevo, Ryazan' District and Nizhnii Novgorod Region (quarry near the village of Uzhevka, Pochinkovskii District) (Fig. 1).

The material includes specimens I have collected and also those donated by RE. Morozov and I.V. Il'yasov - (Moscow City Station of Young Naturalists), V.V. Mitta (All-Russia Research Institute of Oil and Gas), M.S. Boiko (presently at the Paleontological Institute, Russian Academy of Sciences) and D.N. Kiselev (PhD student at the Paleontology Department of Moscow State University).

The material is housed in the Paleontological Institute, Russian Academy of Sciences, collection no. 4771.

SYSTEMATIC PALEONTOLOGY

Family Oppeliidae Bonarelli, 1894

Subfamily Hecticoceratinae Spath, 1925

Genus *Brightia* Rollier, 1922

Type species. *Ammonites hecticus nodosus* Quenstedt, 1849, Middle-Upper Callovian; Germany, Wurtemberg.

Diagnosis. Shell discoid, from small (1-1.5 cm) to quite large (10-15 cm), with semi-evolute to semi-involute whorls. Umbilicus from moderately narrow to moderately wide. Venter rounded or with variously developed keel. In outer part of flanks ribbing densely spaced, sickle-shaped, sometimes appearing only at diameter of 3 mm. In inner part of flanks ornament represented by ribbing, nodes or growth lines. Median furrow represented by thin spiral line or by wide spiral gap up to 3 mm thick, often with traces of apertures. Suture simple. Sutural ontogeny (Palframan, 1969; Lominadze, 1982) similar to that of other hecticoceratin genera. Sutural formula: VUU^1 : ID—VUU^1 : I_2I_1D—$VUU^1U^2U^3U^4$:I_2I_1D. Lobe U^5 appears later and may lie external to the umbilical seam.

Composition. Two subgenera: *Brightia* Rollier, 1922 and *Glyptia* subgen. nov.

Comparison. The genus *Brightia* is similar to *Putealiceras* Buckman, 1922 in the shape of the nodes, but differs in the thinner and more numerous ribs in the external part of the flank and in the presence of the median furrow. It is distinguished from the closely similar and probably ancestral genus *Chanasia* Rollier, 1922 in the absence of nodes at the terminations of the ribs near the venter.

Remarks. Elmi (1967) considered the genus *Brightia* to include only microconchs, although he had no knowledge of real dimorphs. Later Palframan (1969), based on the species *B. brighti* (Pratt, 1841), studied dimorphism in this genus. The sexual differences appear in microconchs at the shell diameter ca. 1 cm and in macroconchs at the shell diameter of ca. 2 cm. They are also seen in the character of the ornament (it is coarser in macroconchs). In other *species of Brightia* dimorphs are not known.

Subgenus *Brightia* Rollier. 1922

Brightia: Rollier, 1922, p. 360; Gerard and Contaunt, 1936, p. 41; Jeannet, 1951, p. 61; Lominadze, 1975, p. 81.

Hecticoceras (Brightia): Roman, 1938, p. 159; Haas, 1955, p. 45; Zeiss, 1956, p. 20; Arkell *et al.,* 1957. p. 276; Azaryan, 1982, p. 75.

Lunuloceras (Brighlia): Amanniyazov, 1971, p. 101.

Type species. *Ammonites hecticus nodosus* Quenstedt, 1849; Middle-Upper Callovian; Germany. Wurtemberg.

Diagnosis. Shell discoid, from small to large, from semi-evolute to semi-involute. Umbilicus from moderately narrow to moderately wide. In inner part of flanks ribbing (and nodes) coarser than in outer part of flanks. Outer ribs densely spaced (2-6 outer ribs for each inner rib) and sickle-shaped (from median furrow they first incline backward; near the venter they sharply bend forward). The median furrow may differ in different species.

Composition. At least 12 species: *B. (B.) nodosa* (Quenstedt, 1849) from the Middle and Upper Callovian of Western Europe, Northern Caucasus and Turkmenistan, Upper Callovian of the Russian Platform and Mangyshlak (Pl. 5, fig. 14), *B. (B.) salvadori* (Parana et Bonarelli, 1895) from the Middle and Upper Callovian of Western Europe, Northern Caucasus and Russian Platform (Pl. 5, fig. 12), Middle and Upper Callovian and Lower Oxfordian of Switzerland, *B. (B.) subsolinophora* (Tsytovitch, 1911) from the Callovian of France, *B. (B.) navensis* (Roman, 1924) from the Middle (possibly Lower) Callovian of France, *B. (B.) brightii* (Pratt,

1841) from the Middle and Upper Caliovian of Western Europe, Poland, and Bulgaria, Caucasus, Russian Platform, Indonesia (PI. 5, figs. 1, 2), *B. (B.) difformis* (Tsytovitch, 1911) from the Callovian of France, *B. (B.) nodosiformis* sp. nov. from the Upper Callovian *athleta* Zone of the Ryazan' Region, *B. (B.) gzhellensis* sp. nov. from the Upper Callovian of Moscow and Ryazan' Regions, *B. (B.) annae* sp. nov. from the Upper Callovian of Ryazan' Region, *B. (B.) buckmani* (Petitclerc, 1915) from the Callovian of France, *B. (B.) davhashvilii* Lonunadze, 1975 from the Middle Callovian of the Northern Caucasus, Transcaucasia, and Russian Platform (PI. 5, fig. 3), *B. (B.) khimschiaschvilii* Lominadze, 1975 from the Middle Callovian of the Northern Caucasus, *B. (B.) boikoi* sp. nov. from the Callovian of Germany and Russian Platform.

Comparison. This subgenus is similar to the subgenus *Glyptia* in the presence of the median furrow and sickle-shaped outer ribbing. However, it is distinguished by the presence of ribs or nodes in the inner part of the flank that are either present up to the body chamber or disappear together with the outer ribs. The species of the subgenus *Brightia* are more extensively distributed in space and time. They are more diverse in shell shape and in ornamentation than species of the subgenus *Glyptia.*

Brightia (Brightia) gzhellensis Rogov, sp. nov.

Plate 5, figs. 10 and 11

Etymology. From the village of Gzhel'.

Holotype. PIN. no. 4771/1: Moscow Region, village of Gzhel', waste of the quarry; Upper Callovian, *athleta* Zone.

Shell shape. The shell is discoid, with a very acute, keeled cross-section (Fig. 2j), and semi-evolute. At the terminal body chamber the cross-section becomes subrectangular, the venter becomes rounded (Fig. 2k). The aperture has outgrowths on the flanks ad a constriction. The umbilicus is moderately wide.

Dimensions in mm and ratios in %:

Specimen no imen no	Dm	WH	WW	UW	WH/Dm	WW/Dm	UW/Dm
Holotype 4771/1	33.9	10.9	7.1	3.1	32.1	20.9	38.6
4771/2	31	11.2	6.3	10.8	36	20.3	34.8

Ornamentation. The ornament in the external part o flanks is formed by the nodes that elongate towards the aper Two-three thin ribs extend from the nodes. The ribs are strongly inclined backward. In the body chamber in the apertural part, the nodes are connected by a small furrow.

Suture. The suture is not observed.

Comparison. This species differs from the other species of the subgenus *Brightia* in the very weak ornamentation (especially in the inner part of the flanks) and in the very acute venter of the phragmocone,

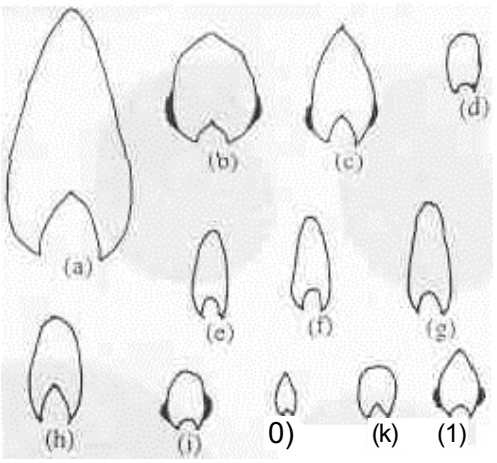


Fig. 2. The shape of the cross-section in the genus *Brightia,* xl: (a)B. *(B.)annaesp.* nov., (b) *B. (B.) nodosa* (Quenstedt, 1849), (c) *B. {B.) boikoi* sp. nov., (d) *B. (G.)* cf. *svriacum* (Haas, 1955), (e) *B. (G.) tenuicostata* sp. nov., (f) *B. '(B.) brig/m/*(Pratt, 1841), *(g)B.(G.)canaliculaia* (Quenstedt, 1858), (h) *B. (B.)* jaAWor/(Parana et Bonarelli, 1895), (i)B. *(B.) da*vzYo5c/iv(7n"Lominadze, 1975,(j,^)S- *(B.) gzhellensis* sp. nov.: (j) phragmocone. (k) body chamber, *(\')B. (B.)nodosiformis* sp. nov.

Occurrence. Upper Callovian, *alhleta* Zone; Moscow and Ryazan' Regions.

Material. Four specimens: 1 specimen from Gzhel[1], 1 specimen from the Oka River near the village of Alpat'evo (my collection), 1 specimen from the Peski Quarry (collected by M.S. Boiko), 1 specimen from the quarry of the factory Mikhailovtsement.

Brightia (Brightia) nodosiformis Rogov, sp. nov.

Plate 5, figs, 6 and 7

Etymology. From *B. nodosa* (Quenstedt, 1849) and from *Latin form is* (similar).

Holotype. PIN, no. 4771/14; Ryazan' Region, quarry Mikhailovtsement; Callovian.

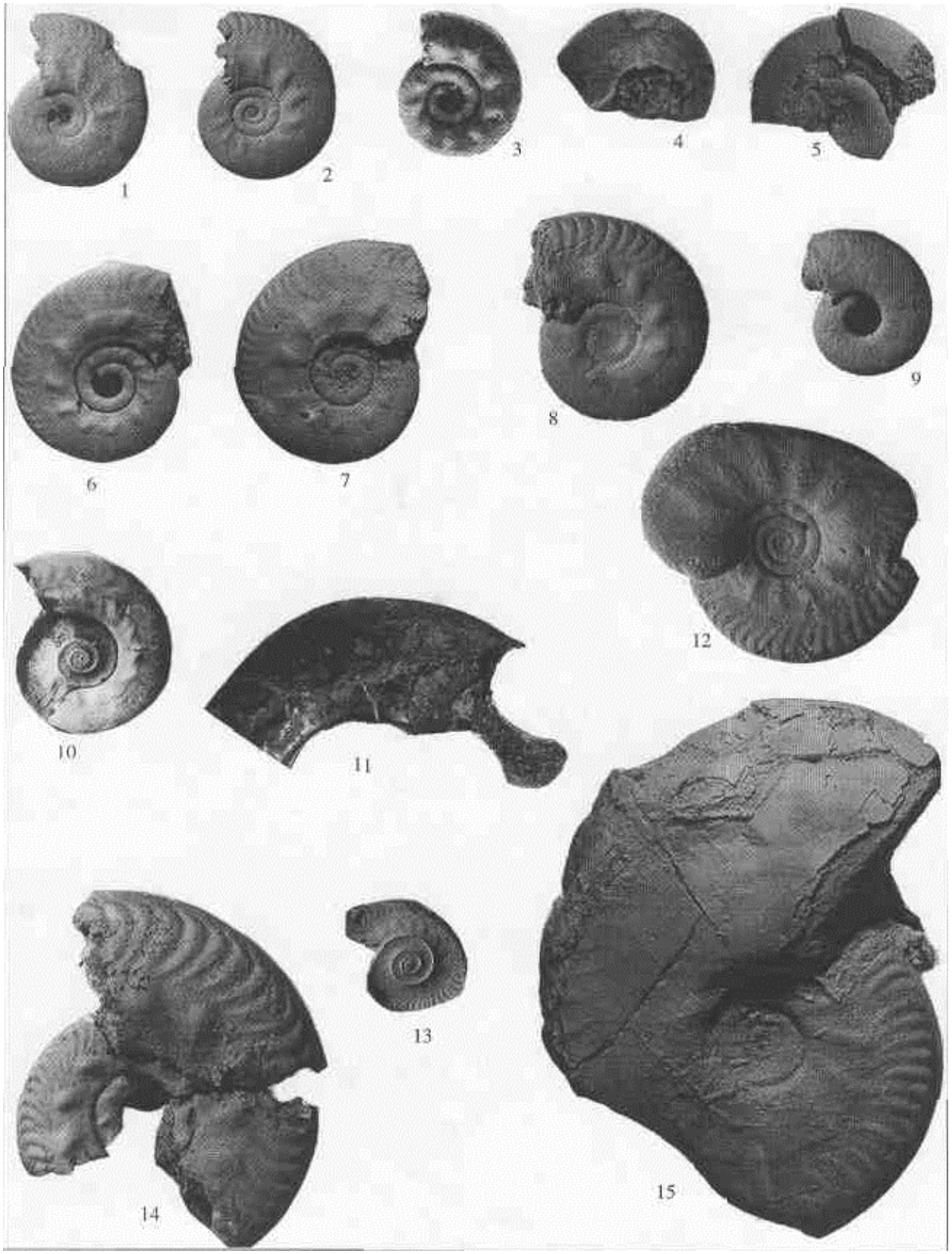
Shape. The shell is discoid with an acute cross-section (Fig. 21), semi-involute. The umbilicus is moderately narrow and bowl-shaped.

Dimensions in mm and ratios in %:

Specimen no	Dm	WH	WW	UW	WH/Dm	WW/Dm	UW/Dm
Holotype 4771/14	37.5	14.4	9.5	15.1	38.4	25.3	40.2
4771/16	41.4.	16.9	11.9	12.8	40	28.7	31
4771/15	32.1	11.5	8.8	12.3	35.8	27.4	38.3

Ornamentation. The ornament in the inner part of the flanks is formed by the nodes inclined toward the aperture. From a diameter of ca. 2.5 cm the nodes in their external parts are connected by a small furrow. From the same diameter, the ornamentation appears in the internal part of the flanks represented by weak sickle-shaped ribs. Five nodes and 28 ribs are found in half a whorl.

Plate 5



Explanation of Plate 5

All sizes except for 11 are natural.

Fig. 1 and 2. *Brightia (Brighiia) brightii* (Pratt, 1841); (1) specimen no. 4771/9, quarry "Mikhailovtsement"; Callovian; (2) specimen no 4771/10; locality and age are the same (Collected by M.S.Boiko).

Fig. 3. *Brightia (Brighiia) davitashvilii* Lominadze, 1975; specimen no. 4771/11, quarry "Mikhailovtsement"; Callovian (Collected by myself).

Fig. 4. *Brightia (Glyptia) canaliculata* (Quenstedt, 1849); specimen no. 4771/12, quarry Peski; Upper Callovian (Collected by P.E. Morozov).

Fig. 5. *Brightia (Glyptia) cf. syriaca* (Haas, 1955); specimen no. 4771/13, quarry Uzhevka; Middle Callovian (Collected by D.N.Kiselev).

Fig. 6 and 7. *Brightia (Brightia) nodosiformis* sp.nov.; (6) holotype no. 4771/14; quarry "Mikhailovtsement"; Callovian (Collected by I.V.Il'yasov); (7) specimen no. 4771/16; quarry "Spartak"; Upper Callovian, *Peltoceras athleta* Zone (Collected by myself).

Fig. 8. *Brightitt (Brightia) boikoi* sp. nov.; holotype no. 4771/4; quarry "Mikhaiiovtsement"; Callovian (Collected by M.S. Boiko).

Fig. 9. *Brightia (Glyptia) tenuicostata* sp. nov.; holotype no. 4771/8; quarry "Mikhailovtsement"; Upper Callovian (Collected by myself).

Fig. 10 and 1J. *Brightia {Brightia) gzhellensis* sp. nov.; holotype no. 4771/1; abandoned quarry near the village of Gzhel'; Upper Callovian; (10) natural size; (11),x2: structure of the aperture is seen (Collected by myself).

Fig. 12. *Brightia (Brightia) salvadori* (Parona et Bonarelli, 1895); specimen no. 4771/18; bank of the Raka River near the village of Boloshnevo; Upper Callovian (Collected by myself).

Fig. 13. *Brightia (Glyptia)* cf. *glypta* (Buckman, 1926); specimen no. 4771/3; quarry Peski; ?Lower Oxfordian (Collected by myself).

Fig. 14. *Brighiia {Brightia) nodosa* (Quenstedt, 1849); specimen no. 4771/17; quarry Gorenki; Upper Callovian. *Peltoceras athleta* Zone (Collected by myself).

Fig. 15. *Brightia (Brightia) annae sp.* nov,; hdotypeno. 4771/6; bank of the Oka River, near the village of Nikitino; Upper Callovian (Collected by myself).

Suture. The suture was not observed.

Comparison. This species differs from *B. (B.). nodosa* in the more compressed whorls, weaker ornament in the outer part of the flanks, and its later appearance in ontogeny. From the species *B, (B.) brightii* it is distinguished in the much more depressed whorls and in the coarser ornament in the inner part of the flanks.

Occurrence. Upper Callovian, *athleta* Zone, Ryazan' Region.

Material. 3 specimens from the quarry "Mikhailovtsement" (collected by myself together with I.V. Il'yasov. and V.V. Mitta).

***Brightia (Brightia) boikoi* Rogov, sp. nov.**

Plate *5.* fig. S

Hectiicoeras (Brightia) aff. *difforme:* Zeiss, 1956, p. 21, pl. 2, fig. 13; pl. 4. Fig.1.

Etymology. After M.S. Boiko who donated a large collection of oppeliids including the holotype of the species under description.

Holotype. PIN, no. 4771/4, Ryazan' Region, Mikhailovskii Region, quarry "Mikhailovtsement"; Callovian.

Shell shape. The shell is semi-involute, with a moderately narrow umbilicus. The umbilical wall is gently sloping. The whorl cross-section is highly-oval, with an acute venter (Fig. 2c).

Dimensions in mm and ratios in %:

Specimen no	Dm	WH	WW	UW	WH/Dm	WW/Dm	UW/Dm
Holotype 4771/4	38.9	15.7	10.4	11.7	40.3	26.7	30
4771/5	28	10.1	8.1	10.3	36	28.9	36.7

Ornamentation. The ornament is weakly developed up to the diameter of ca. 1 cm. Later the weak ribs appear in the external part of the flanks, and weak nodes in the internal. At the diameter of 1 .5-2 cm well-developed nodes in the internal part of the Hanks appear. The nodes are connected in the external parts by a small furrow. Coarse and densely spaced ribs are extended from the nodes. Ribs are inclined backward. There are four-five ribs per node. At a smaller diameters there are 7 ribs per node. The space between the ribs is one-third that of the rib thickness. Near the keel the ribs begin to bend orad and then abruptly disappear.

The suture was not observed.

Comparison. This species differs from *B. (B.) nodosa* and *B, (B.) nodosiformis* in the narrower umbilicus, and in the coarser ribs that are directed backward in the outer flanks. From the species *B. (B.) annae* it is distinguished by the coarser ornament and by the more depressed whorls.

Occurrence. Callovian of Germany and the Russian Platform.

Material. 2 specimens from the quarry "Mikhailovtsement" (collected by M.S. Boiko and I.V. Il'yasov).

***Brightia (Brightia) annae* Rogov, sp.nov.**

Plate 5, fig.15

Hecticoceras pseudopunctatum: Gerasimov et al., 1996, pl.31, fig.8.

Etymology. After my wife Anna

Holotype. PIN, no. 4771/6; Ryazan' Region, Spassk Region, the bank of the Oke River near the village of Nikitino; Upper Callovian .

Shell shape. The shell is discoid, with a moderately narrow umbilicus (in the holotype UW/Dm = 1 .9) with semi-involute whorls. The cross-section is oval, In the middle of the venter there is a pronounced keel (Fig. 2a). Judging from the growth lines on the body chamber the aperture was apparently simple.

Dimensions in mm and ratios in %:

Specimen no	Dm	WH	WW	UW	WH/Dm	WW/Dm	UW/Dm
Holotype 4771/6	96.5	48.4	27	18.9	50.1	27.9	19.5
4771/7	53.1	25.1	14.8	12.7	47.2	27.8	23

Ornamentation. The ornament is represented by coarse, node-shaped ribs that are inclined orad. The outer part of the flank possesses numerous sickle-shaped ribs separated by the ribs in the inner flank by a small furrow. At shell diameter of about 10 cm the ribbing weakens and is gradually replaced by growth lines.

Suture. The suture was not observed.

Comparison. This species differs from the closely resembling species *B. (B.) salvadori* in being twice as large at the final stage, in the coarser ornament and in the narrower umbilicus (in *B. (B.) salvadori* the UW/Dm ratio is 0.3, while in *B. (B.) annae* it is 0.2-0.22).

Occurrence. Upper Callovian of the Ryazan' Region.

Material. Two specimens: one from the bank of the Oka River, near the village of Nikitino, another from the quarry "Mikhailovtsement" (collected by mvself).

Subgenus *Glyplia* Rogov, subgen. nov.

Etymology. From the species name *Brightia (Glyptia) glypta* (Buckman, 1926).

Type species. *Ammonites hecticus canaliculatus* Quenstedt, 1849; Middle Jurassic Callovian; Germany. Thalheim.

Diagnosis. Shell medium-sized (5-10 cm) ranging from semi-evolute to semi-involute. Umbilicus from moderately narrow to moderately wide. Median furrow usually well developed. Ribs in outer flanks thin, numerous, sickle-shaped. Inner flank ornament represented by thin growth lines. Only in two species *B. (C.) levis* and *B. (G.) glypta* inner whorls (diameter up to 2-2.5 cm) possess small oblique ribs.

Species composition. At least nine species: *B. (G.) glypta* (Buckman, 1926} from the Callovian of Germany and Mangyshlak, Lower Oxfordian of England and Upper Callovian-Lower Oxfordian of the Russian Platform, *B. (G.) canaliculata* (Quenstedt, 1849) from the Middle and Upper Callovian of Western Europe, Middle Callovian and Lower Oxfordian of the Northern Caucasus and Upper Callovian of the Russian Platform (PI. 5. fis. 4). *B. (G.) levis* Lommadze, 1975 from the Middle Callovian of the Northern Caucasus, *B. (G.) syriaca* (Haas, 1955) from the Lower Oxfordian of Syria and Middle Callovian of the Russian Platform (cf; Pl 5, fig. 5), *B. (G.) tenuinodosa* (Zeiss, 1956) from the Callovian of Germany and Mangyshlak, *13. (G.) romani* (Lemoine, 1932) from the Middle Upper Callovian of Germany and France, *B. (G.) tenuicostata* sp. nov. from the Upper Callovian of Moscow and Ryazan' Regions (pi. 5, fig. 9), *B. (G.) chanoni* (Petitclerc, 1915) from the Lower-Middle Callovian of France; *B. (G.) scaphitoide* (Tsytovitch, 1911) from the Callovian of France.

Comparison. For comparison with the subgenus *Brightia* see below.

***Brightia (Glyptia) tenuicostaia* Rogov, sp. nov.**

Plate 5, fig.9.

Etymology. From Latin *tenuis* (thin) and *costa* (rib).

Holotype. PIN, no. 4771/8; Ryazan' Region, Mikhailov Region, quarry "Mikhailovtsement", Upper Callovian.

Shell shape. The shell is discoid and semi-involute. The umbilicus is moderately narrow. The umbilical wall is steep, cross-section oval, and the flanks are flattened (Fig. 2e).

Dimensions in mm and ratios in %:

Specimen no	Dm	WH	WW	UW	WH/Dm	WW/Dm	UW/Dm
Holotype 4771/8	26.9	11.4	6.3	8.3	42.3	23.4	30.8

Ornamentation. The ornament is represented by a thin furrow in the mid-flank and very thin ribs in the outer part of the flanks and begins from a diameter of about 1.5-2 cm.

Well-preserved specimens sometimes possess a thin spiral ornament.

Suture. The suture was not observed.

Comparison. This species differs from *B. (G.) canaliculata* in the weaker ribbing and furrow, from *B. (G.) syriaca* in the narrower umbilicus and in the weaker and more widely spaced ribs in the outer part of the flanks.

Occurrence. Upper Callovian of the Moscow and Ryazan' Regions.

Material. 1 specimen from the quarry Peski and 1 specimen from the quarry "Mikhailovtsement" (collected by myself).

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