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NEW GENERA AND SPECIES (INCERTAE SEDIS) FROM THE UPPER TRIASSIC IN THE WEST CARPATHIANS

(Plate I—VII, Fig. 1—3)

Abstract: Investigating the Upper Triassic Tisovec (Karnic) and Furmanec (Norian) limestones of the Stratenská hornatina (mountains) and Furmanec limestones of the Muránska planina (plateau) we have found thirteen new species and subspecies of three new genera — *Amphorella* nov. gen., *Spiriamphorella* nov. gen. and *Urnulinella* nov. gen. Descriptions will follow.

Резюме: При изучении верхнетриасовых тисовецких (карн) и фурманецких (нор) известняков Стратенских гор и фурманецких известняков Мураньского плато нами установлено 13 новых видов и подвидов, относящихся к трем новым родам — *Amphorella* nov. gen., *Spiriamphorella* nov. gen. и *Urnulinella* nov. gen. — ниже приводим их описание.

Introduction

At the lithological-microfacial research of the Upper Triassic Tisovec (Karnic) and Furmanec (Norian) limestones of the Stratenská hornatina (mountains) and Furmanec limestones of the Muránska planina (plateau) found were sections of fossil microorganisms. Since they have not been described in literature so far, they are described here as new taxa of incertae sedis. Among the new taxa are certain phylogenetic relations and they may be referred to as a natural group. As regards morphology of the group, in the primitive forms (Paratintinnina Borza et Samuel 1977) only one chamber developed, and the test morphology is most resembling to that of the representatives of the group *Tintinnina* Bonet 1956 (caudal projection, shape of collar, general morphology of test).

Of the next evolutionary stage two chambers are characteristic (*Amphorella* nov. gen.), the first being small. In further development the first chamber enlarges, gets longer and the initial stage is planispiral — or trochospiral — (involute, evolute) coiled (*Spiriamphorella* nov. gen.). In forms with the evolute-coiled initial stage the last chamber gets elongated. In these forms only the collar is preserved of the tintinnoid form.

Beginning with two elongated chambers (*Amphorella bilongicamerata* nov. sp.), further evolutionary stages tend to forms with more chambers. Such forms were referred to the genus *Urnulinella* nov. gen. Beginning with forms with symmetrically coiled initial evolutionary stage (*Spiriamphorella carpathica carpathica* nov. ssp.) in the same association the forms with completely involute structure occur. Such forms in their basical diagnostic characters overpass the extent of the genus *Spiriamphorella* nov. gen. This lineage is now subject to a detailed study by the authors.

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The stratigraphy of the limestones studied

The localities under study are in the Tisovec limestones of the Stratenská hornatina (mountains) and in the Furmanec limestones in the Muránska planina (plateau) and in the Stratenská hornatina (mountains).

In the Muránska planina plateau the Lower Karnic dolomites are overlain by light-grey massive limestones that are facially analogous with the Wetterstein limestones of the Ladinian. Their contact with the subjacent dolomite is sharp, only in places there are lenses of limestones in the middle of the upper part of dolomites. The contact with the overjacent Furmanec limestones is less conspicuous. The Karnic limestones gradually pass into the Furmanec limestones. They were referred to as the Wetterstein limestones by Z. Pouba (1951) although he knew about their Upper Triassic age. They were referred to as a separate lithostratigraphical unit — the Tisovec limestones — by J. Bystrický (1959, p. 26) and they were named by V. Andrusovová — Kollárová and J. Bystrický (in V. Andrusovová — Kollárová 1960, p. 106). Formerly the term Tisovec limestones denoted organogenic limestones with dispersed corals, bivalvia and the so-called evinosponges. Among fossils the limestones contain ammonites (J. Bystrický 1959, p. 27; V. Andrusovová — Kollárová 1960, p. 106; V. Kollárová — Andrusovová 1967, p. 272; V. Kollárová — Andrusovová — J. Bystrický 1974, p. 129), dasycladaceans (J. Bystrický 1967), foraminifers (O. Jendrejáková in J. Bystrický 1973, p. 75) corals, problematics (K. Borza 1975).

In the Stratenská hornatina (mountains) in the overlier of dolomites with a horizon of dark layers are light-coloured massive limestones, frequently organogenous, that may be regarded as equivalent to the Tisovec limestones of the Muránska planina plateau. The lower part of the limestones is referred to the Julian-Tuvalian as regards its age. In the basal part of the limestones are Karnic brachiopods and lamellibranchiates (M. Maheľ 1963, 1967, p. 424).

Massive limestones of the Norian age from the Muránska planina plateau were described for the first time by J. Bystrický (1959, p. 28). A year later V. Andrusovová — Kollárová and J. Bystrický (in V. Andrusovová — Kollárová 1960, p. 106) denoted the limestones as the Furmanec limestones. From the facial standpoint (dark organogenic limestones) they correspond to limestones of the Wetterstein type. They overlay the Tisovec limestones, and in some parts of the Muránska planina plateau they are equivalent to the Dachstein bedded limestones. Partially they correspond to the Dachstein reef limestones (J. Bystrický 1972, p. 301) from which they differ in a less conspicuous reef facies. The Furmanec limestones contain dispersed corals, sponges, foraminifers (O. Jendrejáková in J. Bystrický 1973, p. 75), brachiopods (J. Bystrický 1959, p. 28), lamellibranchiats, dasycladaceans (J. Bystrický 1967, p. 268); yet their Norian age is evidenced by ammonites (H. Zapfe in J. Bystrický ,1959, p. 28; V. Andrusovová — Kollárová 1960, p. 106; 1961, p. 223; V. Kollárová — Andrusovová 1967, p. 273; V. Kollárová — Andrusovová — J. Bystrický 1974, p. 130).

In the Stratenská hornatina (mountains) analogous Norian limestones are also denoted as the Furmanec limestones (J. Bystrický 1972, p. 301; 1973,

Fig. 1. Situation map of the profiles studied.

p. 65). Macrofauna from the limestones was described by G. Kolosváry (1963), M. Maheľ (1957, 1967), J. Bystrický (1973, p. 64–65), *Dasycladacea* by J. Bystrický (1975), foraminifers by O. Jendrejáková (in J. Bystrický 1973, p. 63) and problematics (by K. Borza 1975).

Microfacial analysis of limestones in the occurrences studied

1. The Muránska planina (plateau) at the west of Tisovec, NE of the elevation point Rangaska, a cut of a forest path (Fig. 2, loc. 1).

Grey massive organogenic-clastic limestones are composed of limestone fragments in the size up to 6 mm and of recrystallized organic remains well observable on the weathering surface. From the microfacial view they may be regarded as intrasparites and rudites. Intraclasts are vari-sized, frequently imperfectly sorted, vari-shaped. Among organic remains in the limestones are calcareous sponges, Dasycladacea, solenopores, corals, fragments of lamellibranchiate shells, *Baccanella floriformis* Pantić, *Muranella sphaerica* Borza, *Pycnoporidium ? eomesozoicum* Flügel, *Thaumatoporella parvovesiculifera* (Raineri), ostracods, crinoidal segments, gastropods, spines of echinoderms, foraminifers and *Amphorella bicamerata bicamerata* nov. gen., nov. sp. (Pl. I, Fig. 1). The limestone fragments and organic remains are frequently surrounded by crustification sparite. In one sample from this area also "filaments" were found. The results of the analysis are indicative of the reef debris.

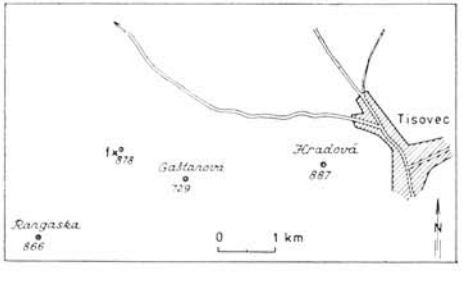

Fig. 2. Detailed situation map of the locality 1.

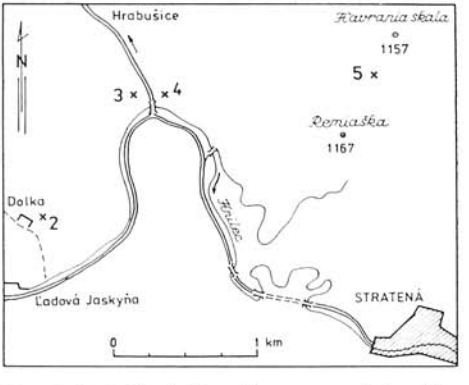

Fig. 3. Detailed situation map of localies 2—5.

J. Bystrický (1967, p. 287, Fig. 3, loc. 3) found macrofauna and flora of dasycladaceans at the locality referred therefore to the Norian.

2. The Dolka quarry (Fig. 3, loc. 2) was described and referred to the Norian on basis of macrofauna by M. Maheľ (1957, p. 62). It was precised as situated in a quarry at the new village near the Dobšiná Ice cave, and later on the ground of dasycladaceans and foraminifers (J. Bystrický 1973, 1975 and O. Jendrejáková in J. Bystrický 1973), it was termed as Dolka. In the quarry are some microfacial types of limestones. One of them are organogenic limestones — biomicrites to biosparites. They contain corals, recrystallized sponges, *Baccanella floriformis* Pantić, *Muranella sphaerica* Borza, *Thaumatoporella parvovesiculifera* (Raineri), hydrozoans, *Tubiphytes obscurus* Maslov, *Microtubus communis* Flügel, foraminifers and *Amphorella lageniformis* nov. sp. (Pl. II, fig. 6–7). It is a reef facies.

3. Other localities to the NE and NW of the crossing of the Stratená-Hrabušice roads (Fig. 3, loc. 3, 4) are referred to the Karnic on the basis of macrofauna (M. Maheľ 1963, 1967, p. 424).

At both localities are light-coloured organogenic limestones. On their weathered surface are well observable recrystallized sponges. They are surrounded by dark micrite rims formed of Algae. The limestones contain intraclasts in the size of 0,2–3 mm. Micrite pellets are frequent, and ooids are rare. On the basis of the ratio of individual components of biosparites, biointrasparites and pelsparites may by distinguished in the limestones. Among organic remains are — besides sponges — corals, *Baccanella floriformis* Pantić, *Muranella sphaerica* Borza, *Thaumatoporella parvovesiculifera* (Raineri), *Tubiphytes obscurus* Maslov, foraminifers, ostracods, crinoidal segments, fragments of lamellibranchiate shells, bryozoans, gastropods, sponges of echinoderms, serpules; and among problematics: *Amphorella bicamerata bicamerata* nov. ssp. (Pl. I, fig. 3–5), *Amphorella bicamerata intermedia* nov. ssp. (Pl. I, fig. 9–12), *Amphorella bilongicamerata bilongicamerata* nov. ssp. (Pl. I, fig. 13–16, Pl. II, fig. 1), *Amphorella bilongicamerata minuta* nov. ssp. (Pl. II, fig. 2, 4), *Amphorella subsphaerica* nov. sp. (Pl. II, fig. 10–14), *Spiriamphorella carpathica carpathica* nov. ssp. (Pl. III, fig. 1–6), *Spiriamphorella carpathica gemerica* nov. ssp. (Pl. III, fig. 9–16, Pl. IV, fig. 1), *Spiriamphorella rectilineata rectilineata* nov. gen.,

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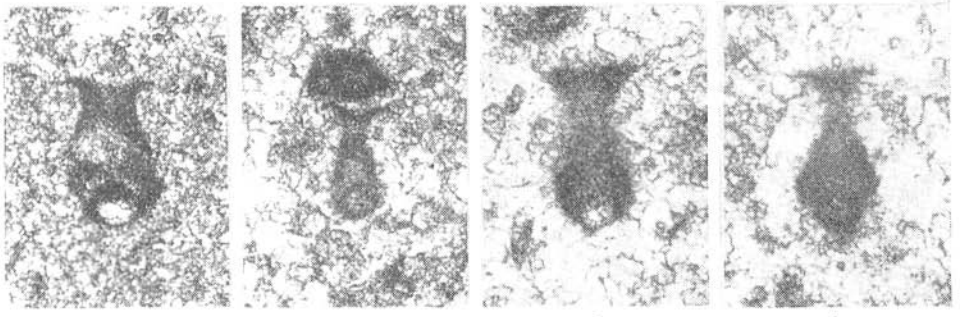
Plate I

Fig. 1—8. *Amphorella bicamerata bicamerata* nov. ssp. — Fig. 1. NE of the elevation point Rangaska, thin-section Nr. 5639. — Fig. 2. NE of the cross-road between Stratená and Hrabušice, thin-section Nr. 5610. — Fig. 3—4. NW of the cross-road between Stratená and Hrabušice, thin-section Nr. 6299. — Fig. 5. NW of the cross road between Stratená and Hrabušice, thin-section Nr. 6336. — Fig. 6. SW of the elevation point Havrania skala, thin-section Nr. 6277. — Fig. 7. SW of the elev. point Havrania skala, thin-section Nr. 6303. — Fig. 8. Re-illustration after E. Jablonský (1973), Pl. 3, fig. 4 (cf. synonymy).

Fig. 9—12. *Amphorella bicamerata intermedia* nov. ssp. NW of the cross-road between Stratená and Hrabušice. — Fig. 9: thin-section Nr. 6297. — Fig. 10: thin-section Nr. 6294. — Fig. 11: thin-section Nr. 6296. — Fig. 12: thin-section Nr. 6298.

Fig. 13—16. *Amphorella bilongicamerata bilongicamerata* nov. ssp. NW of the cross-road between Stratená and Hrabušice. — Fig. 13: thin-section Nr. 6293. — Fig. 14: thin-section Nr. 6292. — Fig. 15: thin-section Nr. 6299. — Fig. 16: thin-section Nr. 6294. Magn. 115 ×. Photographed by K. Borza.



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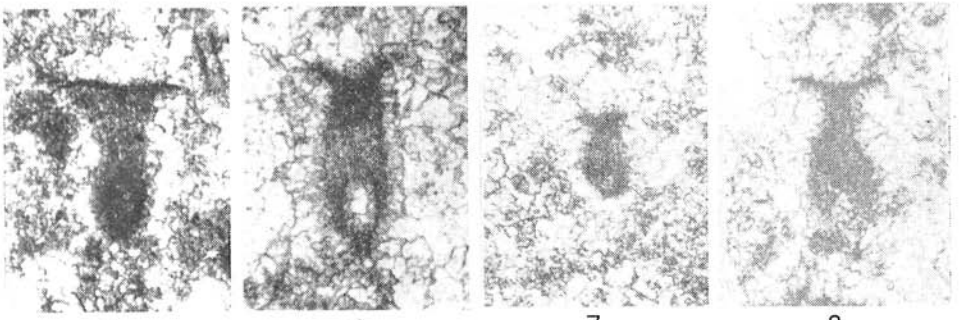

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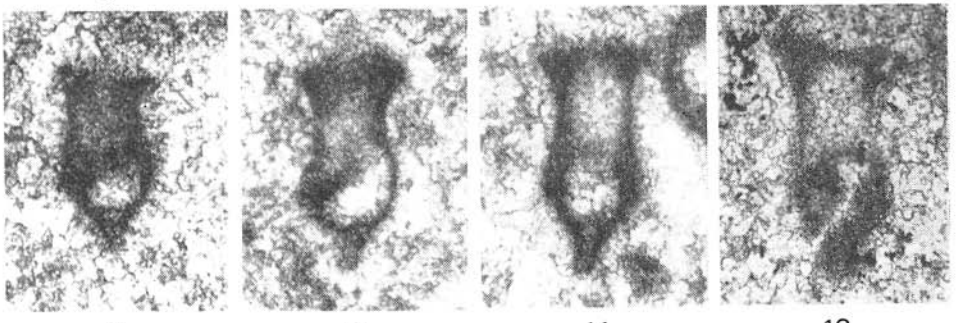

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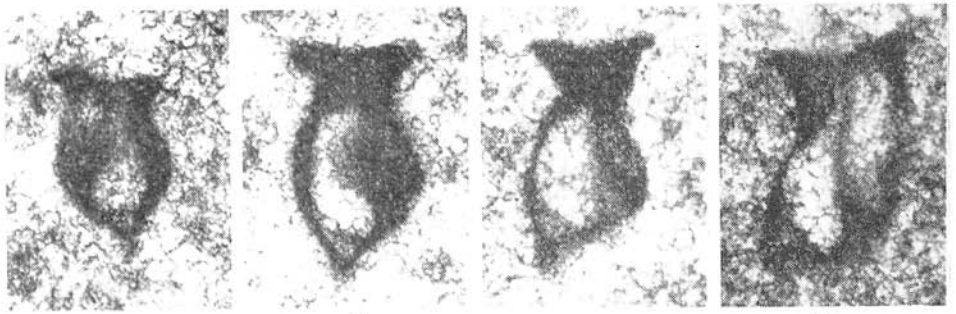

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nov. asp. (Pl. IV, fig. 4–6, 8), *Spiriamphorella rectilineata districta* nov ssp., *Spiriamphorella ovata* nov. sp. (Pl. V, fig. 5), *Spiriamphorella irregularis* nov. sp. (Pl. VI, fig. 1–4, 6–8), *Urnulinella andrusovi* nov. sp. (Pl. VII, fig. 1–6). It is a reef facies.

4. At the southwest of Havrania skala northward of the village Stratená (Fig. 3, loc. 5) in a road cut are grey organogenic limestones — the Tisovec limestones. The locality is referred to the Karnic according to its position — overjacent dolomites and subjacent dark limestones referred to the Norian-Rhaetic on the basis of macrofauna (M. M a h e l' 1957, p. 61). On the weathering surface are plentiful organic remains, considerably recrystallized. Most of them belong among sponges. Frequently they are surrounded by dark micrite rims composed of *Algae*. The limestones are biosparite, biopelsparite and intrabiosparite. Among organic remains are — besides sponges — corals, *Baccanella floriformis* P a n t i ć, *Muranella sphaerica* B o r z a, *Thaumatoporella parvovesiculifera* (R a i n e r i), foraminifers, crinoidal segments, ostracods, fragments of lamellibranchiate shells, spines of echinoderms. Among problematics are: *Amphorella bicamerata bicamerata* nov. ssp. (Pl. I, fig. 6, 7), *Amphorella bilongicamerata minuta* nov. ssp. (Pl. II, fig. 3, 5), *Amphorella lageniformis* nov. sp. (Pl. II, fig. 8, 9), *Spiriamphorella rectilineata rectilineata* nov. ssp. (Pl. IV, fig. 7), *Spiriamphorella rectilineata districta* nov. ssp. (Pl. IV, fig. 9–11, Pl. V, fig. 1–3), *Spiriamphorella ovata* nov. sp. (Pl. V, fig. 4, 6–9), *Spiriamphorella irregularis* nov. sp. (Pl. VI, fig. 5). It is a reef facies.

Ecology

It follows that the newly described genera and species are associated with the new reef sponge facies; they were infrequent in the reef debris and in pelagic sediments (filaments, microfacies of the „Tisovec" limestones) at the north of Muránska Huta. The new genera and species are most abundant in biopelsparites in an association with *Muranella sphaerica* B o r z a, *Baccanella floriformis* P a n t i ć and with ostracods. Most probably they are benthonic microorganisms.

Paleontological description

Amphorella nov. gen.

D e r i v a t i o n o m i n i s: from Latin amphora — according to the shape of an ancient Greek vessel.

G e n e r o t y p e: *Amphorella bicamerata* nov. gen., nov. sp.

D i a g n o s i s: bicameral belly-shaped test, with a funnel-shaped collar in its oval part and with a short caudal projection in the proximal part. The test wall is thin, composed of micrite calcite.

Amphorella bicamerata nov. gen., nov. sp.
Amphorella bicamerata bicamerata nov. ssp.
Pl. I, fig. 1–8

1973 *Cucurbita infundibuliforme* n. g. et sp. — E. J a b l o n s k ý: Mikroproblematika aus der Trias etc., p. 420, Pl. 3, fig. 4.

Table 1
Dimensions of holotype and of paratypes of *Amphorella bicamerata bicamerata* nov. ssp. in μ.

Ts Nr.	Ns	locality	L	Wt	C	Wc	Pl., fig.
5639	13	1 NE of elev. point Rangaska (W of Tisovec)	178	107	63	115	I, 1
5610	7	4 NE of cross-road between Stratená and Hrabušice	136	66	27	80	I, 2
6299	30	3 NW of cross-road between Stratená and Hrabušice	185	93	62	108	I, 3
6299	30	do	192	95	32	110	I, 4
6336	24	do	175	63	61	154	I, 5
6277	1	5 SW of elev. point Havrania skala	190	75	60	115	I, 6
6303	1	do	95	48	31	50	I, 7

Ts Nr. — Thin-section Nr.; Ns — Number of sample; L — Length; Wt — Width of test; C — Collar; Wc — Width of collar.

Holotype: the specimen depicted in Pl. I, fig. 1, deposited in the collection of the Geological Institute of the Slovak Academy of Sci. in Bratislava, thin-section Nr. 5639.

Paratypes: Pl. I, fig. 2–8.

Derivatio nominis: from Latin words bi = two, and camera – chamber.

Stratum typicum: the Norian, the Furmanec limestones.

Locus typicus: the Muránska planina plateau, at the west of Tisovec, NE of the elevation point Rangaska, a cut of the forest path (Fig. 2, loc. 1).

Material: 15 cross-sections from thin-sections.

Diagnosis: A small, bicameral test. The proximal part of the test is oval to suboval, without the caudal projection; a collar in the distal part. The wall is thin, composed of micrite calcite.

Description: A small, bicameral, oval test. The first chamber is small, spherical or subsphaerical, occupying about $^1/_5$ of the test diameter. In some forms the first chamber enlarges. The proximal part of the test is oval to suboval. The test is broadest at about $^1/_3$ of its height, then it gets thinner to pass into the neck. No caudal projection observed. The section of the test is circular. In the distal part of the neck is a collar slightly overlapping the width of the test. The aperture is broad, terminal. The test wall is fine, thin, smooth on the outer side. It is composed of dark micrite calcite. Morphological variability of the test is poor, only its size is changed, and length and width of the neck.

The tests dimensions are in Table 1.

Occurrence: in the Furmanec limestones at the NE of the elev. point Rangaska (Fig. 2, loc. 1) and in the Tisovec limestones near the cross-road between Stratená and Hrabušice (Fig. 3, loc. 3, 4) and SW of the elev. point Havrania skala (Fig. 3, loc. 5).

Remark: *Amphorella bicameraia bicamerata* nov. ssp. It recalls test of the species *Paratintinnina tintinniformis* Borza et Samuel 1977 from which it differs in two chambers.

Table 2
Dimensions of holotype and of paratypes of *Amphorella bicamerata intermedia* nov. ssp. in μ.

Ts Nr.	Ns	locality	L	Wt	C	Wc	Pl., fig.
6297	30	3 NW of the cross-road between Stratená and Hrabušice	192	115	82	115	I, 9
6294	30	do	235	105	80	120	I, 10
6296	30	do	260	115	92	118	I, 11
6298	30	do	258	124	93	158	I, 12

Amphorella bicamerata intermedia nov. ssp.
Pl. I, fig. 9—12

Holotype: the specimen depicted in Pl. I, fig. 9, deposited in the collections of the Geological Institute of the Slovak Academy of Sci. in Bratislava, thin-section Nr. 6297.

Paratypes: Pl. I, fig. 10—12.

Derivatio nominis: from the Latin intermedius — transitory.

Stratum typicum: the Karnic, Tisovec limestones.

Locus typicus: the Stratenská hornatina (mountains), NW of the cross-road between Stratená and Hrabušice (Fig. 3, loc. 2).

Material: 10 cross-sections of thin-sections.

Diagnosis: the test is small, bicameral, oval. In the proximal part of the test is a conspicuous caudal projection. In the distal part is a collar. The test wall is thin, composed of micrite calcite.

Description: the test is small, oval; consisting of two chambers, the first of them occupies about $^2/_3$ of the test length. It is spherical to subsphaerical in form. The second chamber is more or less oval, ending in the distal part into apertural (terminal) opening which is terminated by a funnel-shaped collar. The test is broadest in about $^1/_3$ of its length. It is circular to subcircular in section. Its proximal part is suboval, with a low caudal projection. The

Plate II

Fig. 1. *Amphorella bilongicamerata bilongicamerata* nov. ssp. NW of the cross-road between Stratená and Hrabušice; thin-section Nr. 6291.
Fig. 2—5. *Amphorella bilongicamerata minuta* nov. ssp. — Fig. 1, 3. NW of the cross-road between Stratená and Hrabušice, thin-section Nr. 6299. — Fig. 2. SW of the elevation point Havrania skala, thin-section Nr. 6303. — Fig. 4. Like fig. 2, thin-section Nr. 6307.
Fig. 6—9. *Amphorella lageniformis* nov. sp. — Fig. 6. The Dolka Quarry, thin-section Nr. 5993. — Fig. 7. Like fig. 6, thin-section Nr. 5992. — Fig. 8. SW of the elevation point Havrania skala, thin-section Nr. 6307. — Fig. 9. Like Fig. 8, thin-section Nr. 6318.
Fig. 10—14. *Amphorella subsphaerica* nov. sp. NW of the cross-road between Stratená and Hrabušice. — Fig. 10, 13, 14: thin-section Nr. 6327. — Fig. 11: thin-section Nr. 6328. — Fig. 12: thin-section Nr. 6326. Magn. 115 ×. Photographed by K. Borza.


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test wall is like that of the nominal species. The collar diameter surpasses the test width.

The tests dimensions are in Table 2.

Occurrence: In the Tisovec limestones (Karnic) in the Stratenská hornatina (mountains) at the NW of the cross-road between Stratená and Hrabušice (Fig. 3, loc. 3).

Remark: The species differs from the nominal species *Amphorella bicamerata bicamerata* nov. ssp. in a larger first chamber ($^2/_5$—$^1/_2$ of the test length), in a broader and more elongated neck, and low caudal process.

Amphorella bilongicamerata nov. sp.
Amphorella bilongicamerata bilongicamerata nov. ssp.
Pl. I, fig. 13—16; Pl. II, fig. 1

Holotype: The specimen depicted in Pl. I, fig. 13, deposited at the Geological Institute of the Slovak Academy of Sci. in Bratislava, thin-section Nr. 6293.

Paratypes: Pl. I, fig. 14—16, Pl. II, fig. 1.

Derivatio nominis: from Latin longus = long, elongated; according to the structure of two elongated chambers.

Stratum typicum: the Tisovec limestones, Karnic.

Locus typicus: the Stratenská hornatina (mountains), at the NW of the cross-road between Stratená and Hrabušice (Fig. 3, loc. 3).

Material: 16 sections from thin-sections.

Diagnosis: the test is suboval, composed of two elongated chambers. In the proximal part of the test is a low caudal process. In the distal part is a broad funnel-shaped collar. The test wall consists of dark micrite calcite.

Description: the test is small, suboval, it is broadest at $^1/_2$ of the test length. In the proximal part is a short caudal projection. In the distal part is a broad funnel-shaped collar. The aperture is broad, terminal. The test consists of two elongated chambers of more-or-less equal size. The chambers are spiral-like placed around the longitudinal axis. The section is subcircular. The test wall is thick, particularly at the twinning of chambers. The wall consists of dark micrite calcite.

The tests dimensions are in Table 3.

Occurrence: in the Tisovec limestones of the Stratenská hornatina (mountains), at the NW of the cross-road between Stratená and Hrabušice (Fig. 3, loc. 3).

Remark. The species differs from *Amphorella bicamerata intermedia* nov. ssp. in elongated and slightly twisted chambers around the longitudinal axis.

Amphorella bilongicamerata minuta nov. ssp.
Pl. II, fig. 2—5

Holotype: the specimen depicted in Pl. II, fig. 2, deposited at the Geological Institute of the Slovak Academy of Sci. in Bratislava, thin-section Nr. 6299.

Paratypes: Pl. II, fig. 3—5.

Derivatio nominis: from Latin minutus = small.

Table 3
Dimensions of holotype and of paratypes of *Amphorella bilongicamerata bilongicamerata* nov. ssp. in μ.

Ts Nr.	Ns	locality	L	Wt	C	Wc	Pl., fig.
6293	30	3 NW of the cross-road between Stratená and Hrabušice	194	135	105	196	I, 13
6292	30	do	275	150	93	154	I, 14
6299	30	do	265	140	78	142	I, 15
6294	30	do	264	146	125	175	I, 16
6291	30	do	200	112	93	162	II, 1

Stratum typicum: the Tisovec limestones, Karnic.

Locus typicus: the Stratenská hornatina (mountains), NW of the cross-road between Stratená and Hrabušice (Fig. 3, loc. 3).

Material: 13 sections of thin-sections.

Diagnosis: a small test composed of two elongated chambers. It is oval in its proximal part and provided with a funnel-shaped collar in the distal part. The test wall composed of dark micrite calcite.

Description: a small test, oval to suboval. It consists of two elongated chambers coiled around the vertical axis. The test is broadest at $^1/_4$–$^1/_3$ of the test length. It is suboval and subangular in its proximal part. No caudal projection observed. The section is subcircular. In the distal part is a funnel-shaped collar. The aperture is broad, terminal. The test wall is thick, composed of dark micrite calcite.

The tests dimensions are in Table 4.

Occurrence: the Tisovec limestones in the Stratenská hornatina at the NW of the cross-road between Stratená and Hrabušice (Fig. 3, loc. 3) and at the SW of the elevation point Havrania skala (Fig. 3, loc. 5).

Remark. It differs from the nominal species *Amphorella bilongicamerata bilongicamerata* nov. ssp. in smaller size and in more elongated test, and smaller coiling angle.

Table 4
Dimensions of holotype and of paratypes of *Amphorella bilongicamerata minuta* nov. ssp. in μ.

Ts Nr.	Ns	locality	L	Wt	C	Wc	Pl., fig.
6299	30	3 NW of the cross-road between Stratená and Hrabušice	173	104	63	96	II, 2
6299	30	do	154	92	33	77	II, 4
6303	1	5 SW of the elev. point Havrania skala	185	78	35	94	II, 3
6307	1	do	170	73	42	50	II, 5

Table 5
Dimensions of holotype and of paratypes of *Amphorella lageniformis* nov. sp. in μ.

Ts Nr.	Ns	locality	L	Wt	C	Wc	Pl., fig.
5993	25	2 Dolka quarry	206	93	37	63	II, 6
5994	27	detto	193	86	45	77	II, 7
6307	1	5 SW of the elev. point Havrania skala	170	85	29	69	II, 8
6318	2b	detto	208	115	62	85	II, 9

Amphorella lageniformis nov. sp.
Pl. II, fig. 6–9

Holotype: the specimen depicted in Pl. II, fig. 6 deposited in the Geological Institute of the Slovak Academy of Sci. in Bratislava, thin-section Nr. 5993.

Paratypes: Pl. II, fig. 7–9.

Derivatio nominis: from the morphological form of the genus Lagena (Foraminifera).

Stratum typicum: the Furmanec limestones, Norian.

Locus typicus: the Stratenská hornatina (mountains), the quarry Dolka (Fig. 3, loc. 2).

Material: 9 sections from thin-sections.

Diagnosis: a small, oval test with a long, narrow neck. It consists of two chambers. The test wall is composed of micrite calcite. A small funnel-shaped collar.

Description: the test is small, oval, elongated; subcircular in section: suboval to subangular in its proximal part. In some forms are indications of a small caudal projection. The test consists of two elongated, slightly twisted chambers. The second chamber passes into a longer narrow neck terminated with a small collar. The aperture is terminal. The test wall is composed of dark micrite calcite.

The test dimensions are in Table 5.

Plate III

Fig. 1—5. *Spiriamphorella carpathica carpathica* nov. ssp. NW of the cross-road between Stratená and Hrabušice. — Fig. 1, 2: thin-section Nr. 6288. — Fig. 3: thin-section Nr. 6297. — Fig. 4: thin-section Nr. 6293. — Fig. 5: thin-section Nr. 6291. — Fig. 6. Intermediary form between *Spiriamphorella carpathica carpathica* nov. ssp. and *Spiriamphorella carpathica gemerica* nov. ssp. NW of the cross-road between Stratená and Hrabušice, thin-section Nr. 6299. — Fig. 7. Like fig. 6, thin-section. Nr. 6303. — Fig. 8. *Spiriamphorella sp.* A cross-section through the area of coiling. NW of the cross-road between Stratená and Hrabušice, thin-section Nr. 6287. Fig. 9—16. *Spiriamphorella carpathica gemerica* nov. ssp. NW of the cross-road between Stratená and Hrabušice. — Fig. 9: thin-section Nr. 6293. — Fig. 10: thin-section Nr. 6294. — Fig. 11: thin-section Nr. 6299. — Fig. 12: thin-section Nr. 6288. — Fig. 13: thin-section Nr. 6299. — Fig. 14: thin-section Nr. 6289. — Fig. 15: thin-section Nr. 6296. — Fig. 16: thin-section Nr. 6299. Magn. 115 ×. Photographed by K. Borza.

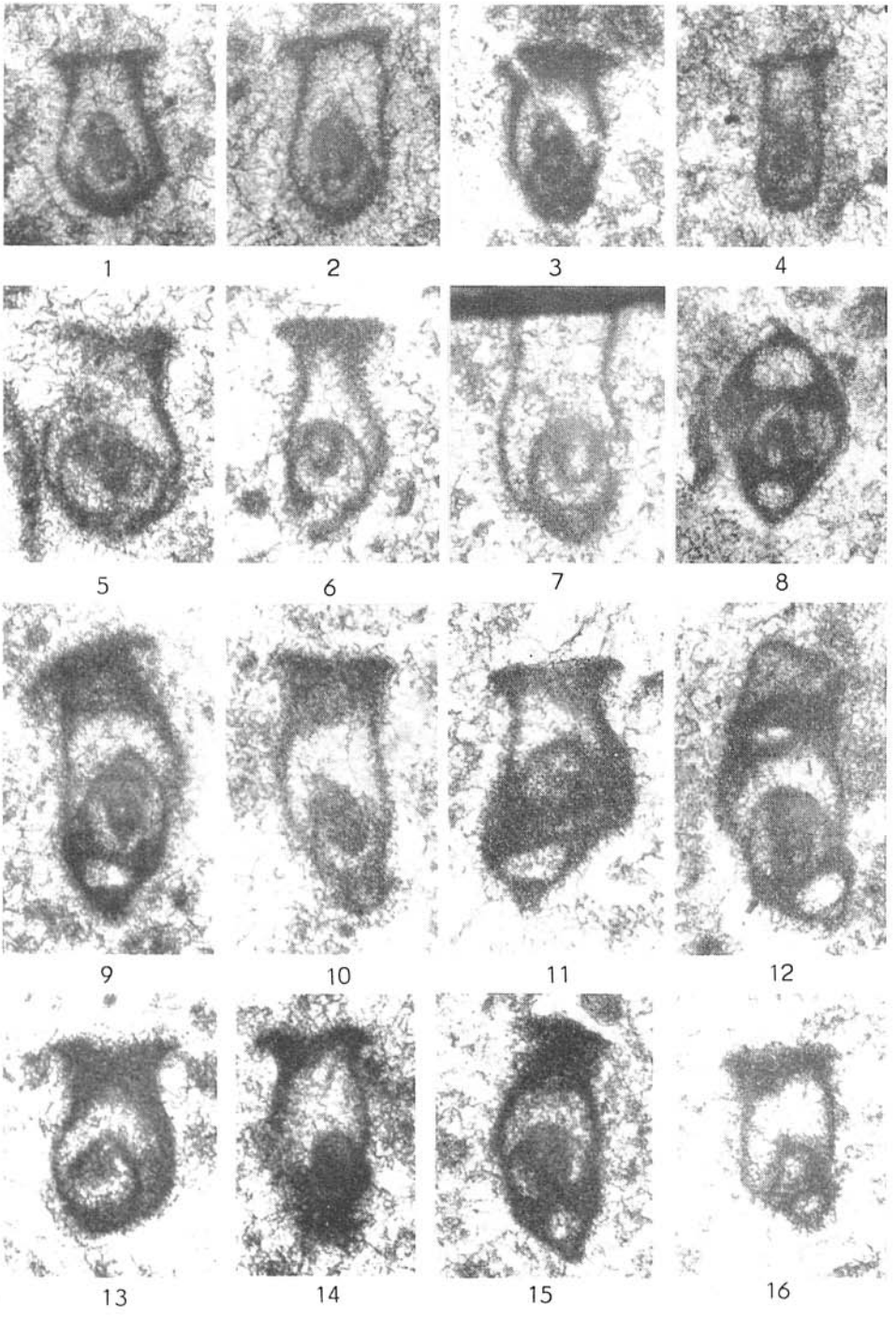
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Table 6
Dimensions of holotype and of paratypes of *Spiriamphorella carpathiac carpathica* nov. ssp. in μ.

Ts Nr.	Ns	locality	L	Wt	C	Wc	Pl., fig.
6288	30	3 NW of the cross-road between Stratená and Hrabušice	200	135	93	L37	III, 1
6288	30	do	234	112	99	139	III, 2
6297	30	do	216	120	100	154	III, 3
6293	30	do	192	81	74	115	III, 4
6291	30	do	196	180	115	158	III, 5
6299	30	do	224	125	80	130	III, 6

Occurrence: in the Furmanec limestones of the Stratenská hornatina (mountains) in the quarry Dolka (Fig. 3, loc. 2) and in the Tisovec limestones at the SW of Havrania skala (Fig. 3, loc. 5).

Remark. The newly described species differs from *Amphorella bilongicamerata bilongicamerata* nov. ssp. in smaller dimensions, in elongated test, narrow neck and narrow collar.

Amphorella subsphaerica nov. sp.
Pl. II, fig. 10—14

Holotype: the specimen depicted in Pl. II, fig. 10, deposited at the Geological Institute of the Slovak Academy of Sci. in Bratislava, thin-section Nr. 6327.

Paratypes: Pl. II, fig. 11—14.

Derivatio nominis: from Latin sub — almost, sphaera — ball; according to the typical morphological form of the test.

Stratum typicum: the Tisovec limestones, Karnic.

Locus typicus: the Stratenská hornatina (mountains), NW of the cross-road between Stratená and Hrabušice (Fig. 3, loc. 3).

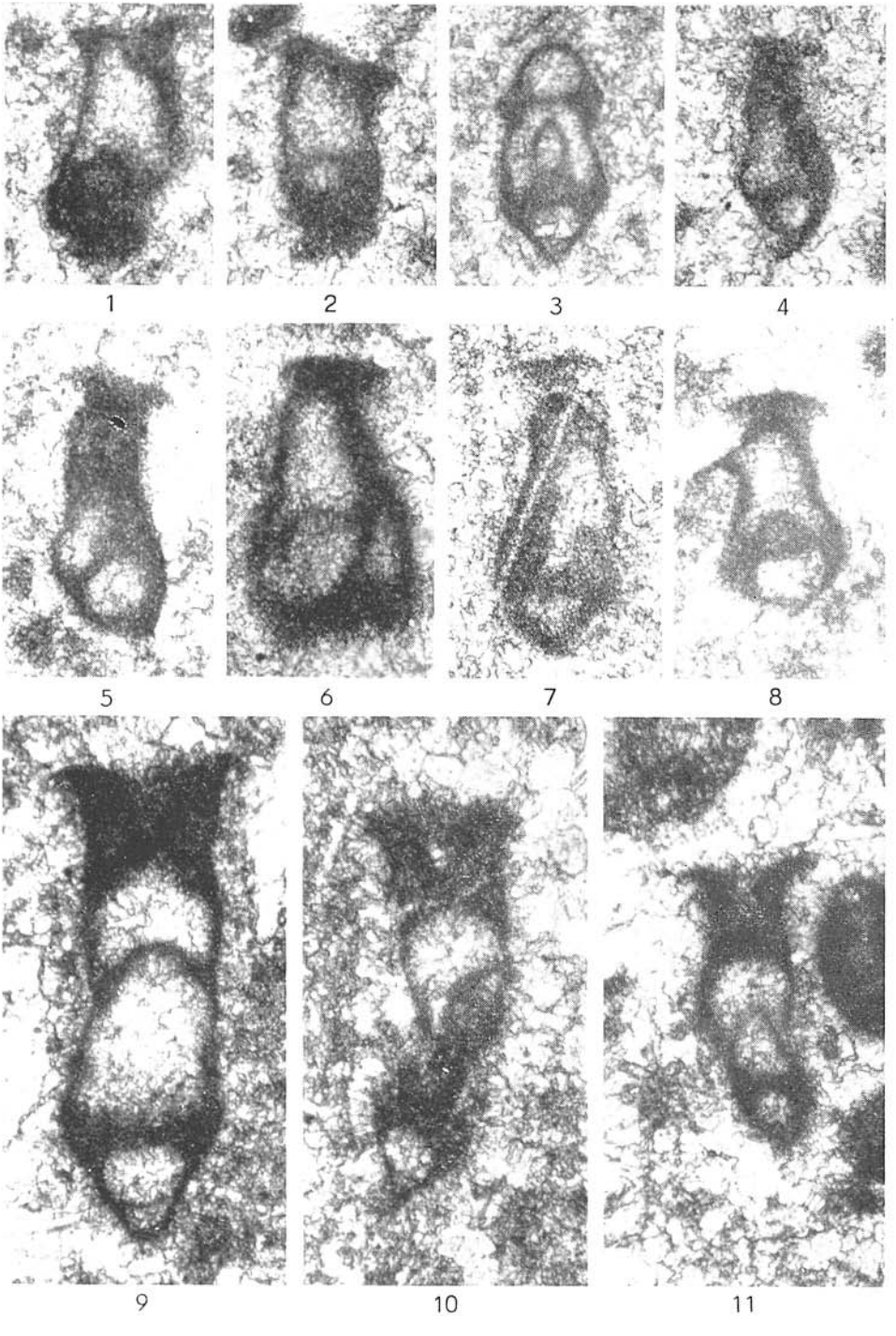
Material: 15 sections from thin-sections.

Plate IV

Fig. 1—2. *Spiriamphorella carpathica gemerica* nov. ssp. NW of the cross-road between Stratená and Hrabušice. — Fig. 1: thin-section Nr. 6297. — Fig. 2: thin-section Nr. 6288. — Fig. 3. *Spiriamphorella sp.* A cross-section. NW of the cross-road between Stratená and Hrabušice, thin-section Nr. 6289.

Fig. 4—8. *Spiriamphorella rectilineata rectilineata* nov. ssp. — Fig. 4—6, 8. NW of the cross-road between Stratená and Hrabušice. — Fig. 4: thin-section Nr. 6295. — Fig. 5: thin-section Nr. 6292. — Fig. 6: thin-section Nr. 6288. — Fig. 8: thin-section Nr. 6299. — Fig. 7. SW of the elevation point Havrania skala, thin-section Nr. 6309.

Fig. 9—11. *Spiriamphorella rectilineata districta* nov. ssp. NW of the elevation point Havrania skala. — Fig. 9—10: thin-section Nr. 6282. — Fig. 11: thin-section Nr. 6277. Magn. 115 X. Photographed by K. Borza.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Diagnosis: a subsphaerical test with a broad collar. The test consists of two chambes: a small elongated one and the second larger, embracing the first. The test wall is thin, composed of dark micrite calcite.

Description: the test is spherical to subspherical, circular or subcircular in section; composed of two embracing chambers. The aperture is small, terminal. The collar is broad, convex, surpassing the test width. No caudal projection observed. The test wall is thin, composed of dark micrite calcite.

Dimensions of holotype: the test length — 385 μ, the test width — 309 μ, collar — 232 μ, the collar width — 508 μ.

Occurrence: in the Tisovec limestones of the Stratenská hornatina (mountains), NW of the cross-road between Stratená and Hrabušice (Fig. 3. loc. 3).

Remark. The species differs from other species of the genus *Amphorella* in its large sphaerical to subsphaerical test and in a broad convex collar.

Spiriamphorella nov. gen.

Derivatio nominis: from Latin spire = spiral, amphora — an ancient Greek vessel; according to its characteristic morphology.

Generotype: *Spiriamphorella carpathica carpathica* nov. gen., nov. ssp.

Diagnosis: an oval test with a funnel-shaped collar in its distal part. The first chamber is small, sphaerical, the second — tubular, spiral-coiled, passing into a broad rectilinear chamber terminated with a neck in the distal part. The test wall consists of micrite calcite.

Spiriamphorella carpathica nov. gen., nov. sp.
Spiriamphorella carpathica carpathica nov. ssp.
Pl. III, fig. 1—5

Holotype: the specimen depicted in Pl. III, fig. 1 deposited at the Geological Institute of the Slovak Academy of Sci. in Bratislava, thin-section Nr. 6288.

Paratypes: Pl. III, fig. 2—5.

Derivatio nominis: after the Carpathians (mountains).

Stratum typicum: the Tisovec limestones, Karnic.

Locus typicus: the Stratenská hornatina (mountains), NW of the cross-road between Stratená and Hrabušice (Fig. 3, loc. 3).

Material: 17 sections of thin-sections.

Diagnosis: the test is oval, subsphaerical in its proximal part; broad, with a low neck and a conspicuous funnel-shaped collar, in the distal part. The juvenile, planispiral-coiled stage of the test passes into its rectilinear belly-shaped part. The test wall consists of dark micrite calcite.

Description: the test is belly-shaped, subsphaerical to oval in the proximal part; and passing into a broad neck terminated with a small collar, in the distal part. Circular to subcircular in section. The test consists of two chambers: the first one — sphaerical, and the second — tubular, evolute-coiled in the juvenile stage. In the initial stage (1—1,5) the tubular chamber slightly enlarges to broaden rapidly in the next stage — the belly-shaped rectilinear stage. In the distal part the test gets narrower and passes into a neck ter-

Table 7
Dimensions of holotype and of paratypes of *Spiriamphorella carpathica gemerica* nov. ssp. in μ.

Ts Nr.	Ns	locality	L	Wt	C	Wc	Pl., fig.
6293	30	3 NW of the cross-road between Stratená and Hrabušice	324	150	99	160	III, 9
6294	30	do	308	140	120	156	III, 10
6299	30	do	300	180	108	160	III, 11
6299	30	do	232	148	107	150	III, 13
6289	30	do	250	141	105	147	III, 14
6296	30	do	280	140	85	124	III, 15
6299	30	do	232	110	95	140	III, 16
6297	30	do	305	150	108	146	IV, 1

minated with a small collar. The test wall is dark, composed of micrite calcite.

The tests dimensions are in Table 6.

Occurrence: in the Tisovec limestones of the Stratenská hornatina (mountains), NW of the cross-road between Stratená and Hrabušice.

Remark. It differs from *Amphorella lageniformis* nov. sp. in a larger test, a broader neck and in spiral-coiled juvenile part of the test.

Spiriamphorella carpathica gemerica nov. ssp.
Pl. III, fig. 9–16, Pl. IV, fig. 1–2

Holotype: the specimen depicted in Pl. III, fig. 9 deposited at the Geological Institute of the Slovak Academy of Sci. in Bratislava, thin-section Nr. 6293.

Paratypes: Pl. III, fig. 10–16, Pl. IV, fig. 1–2.

Derivatio nominis: after the tectonic unit Gemericum.

Stratum typicum: the Tisovec limestones, Karnic.

Locus typicus: the Stratenská hornatina (mountains), NW of the cross-road between Stratená and Hrabušice (Fig. 3, loc. 3).

Diagnosis: the test is suboval; subangular in the proximal part; broad in the distal part and terminated with a conspicuous collar. The juvenile planispiral-coiled stage is declined from the vertical axis, the adult stage is rectilinear. The test wall is dark, composed of micrite calcite.

Description: the test is elongated suboval; subcircular in section. In the proximal part the test is subangular to suboval. In the forms with subangular proximal part is a small pseudo-caudal projection. The juvenile stage is evolute, with 3–4 whorls. The embryonal chamber is tubular, slightly enlarging in the first two whorls, then grows rapidly to pass into the rectilinear stage. The neck is broad; the aperture – terminal. The funnel-shaped collar does not surpass the neck width. The equatorial plane of the juvenile stage is diagonal to the vertical axis of the test. The test wall consists of dark micrite calcite. In the place of twinning of the chamber it is thickened.

The tests dimensions are in Table 7.

Occurrence: in the Tisovec limestones of the Stratenská hornatina (mountains), NW of the cross-road between Stratená and Hrabušice.

Remark. The species differs from the above described *Spiriamphorella carpathica carpathica* nov. ssp. in more elongated test, in evolute coiling and the juvenile stage diagonal to the vertical axis of the test.

Spiriamphorella rectilineata nov. sp.
Spiriamphorella rectilineata rectilineata nov. ssp.
Pl. IV, fig. 5–8

Holotype: the specimen depicted in Pl. IV, fig. 5 deposited in the collections of the Geological Institute of the Slovak Academy of Sci., Bratislava, thin-section Nr. 6292.

Paratypes: Pl. IV, fig. 4, 6–8.

Derivatio nominis: from Latin rectus – straight, right; lineal = line; according to characteristic morphology of the test.

Stratum typicum: the Tisovec limestones, Karnic.

Locus typicus: the Stratenská hornatina (mountains), NW of the cross-road between Stratená and Hrabušice (Fig. 3, loc. 3).

Material: 17 sections from thin-sections.

Diagnosis: the test is belly-shaped, with a long neck terminated with a collar. The juvenile stage is spiral-coiled. The wall is composed of micrite calcite.

Description: the test is belly-shaped. In the proximal part it is oval to subangular. The test is broadest at about $^1/_3$ of its length, then it gets narrower and passes into a long, more-or-less cylindrical neck, terminated with a collar in the distal part. The aperture is broad, terminal. The juvenile part consists of 2–3 evolute whorls. The embryonal chamber is small, spherical, the next one is tubular, long, evolute in the initial stage. In the first whorl the tubular chamber enlarges slightly, in the second it gets rapidly broader. In the adult stage it passes into a direct line and at $^1/_3$ of the test length it gets narrower again. In the distal part is a small collar. The test wall is composed of dark micrite calcite.

The test dimensions are in Table 8.

Occurrence: in the Tisovec limestones in the Stratenská hornatina (mountains), NW of the cross-road between Stratená and Hrabušice (Fig. 3, loc. 3) and SW of Havrania skala (Fig. 3, loc. 5).

Remark. It differs from *Spiriamphorella carpathica gemerica* nov. ssp. in a more elongated neck and indications of constructions of the test.

Plate V

Fig. 1—3. *Spiriamphorella rectilineata districta* nov. ssp. SW of the elevation point Havrania skala. — Fig. 1: thin-section Nr. 6301. — Fig. 2: thin-section Nr. 6310. — Fig. 3: thin-section Nr. 6313.

Fig. 4—9. *Spiriamphorella ovata* nov. sp. — Fig. 4, 6-9. SW of the elevation point Havrania skala. Fig. 4: thin-section Nr. 6307. — Fig. 6: thin-section Nr. 6317. — Fig. 7: thin-section Nr. 6311. — Fig. 8: thin-section Nr. 6305. — Fig. 9: thin-scetion Nr. 6277. — Fig. 5. NE of the cross-road between Stratená and Hrabušice, thin-section Nr. 5610. Magn. 115 ×. Photographed by K. Borza.

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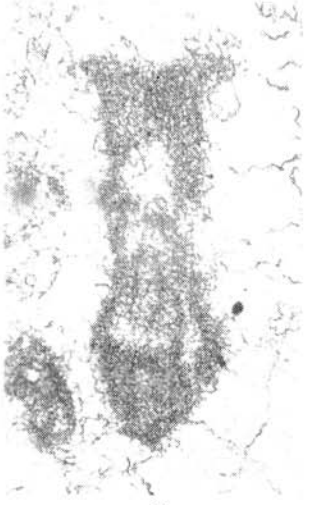

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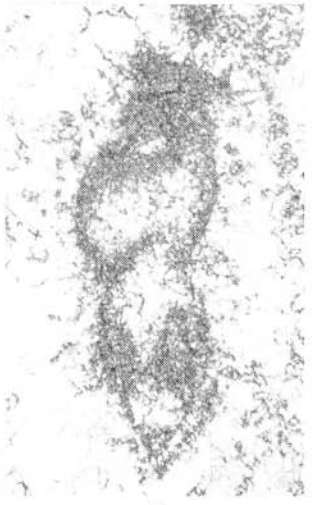

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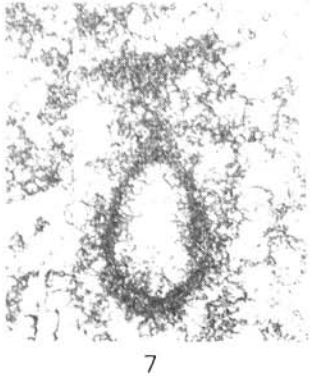

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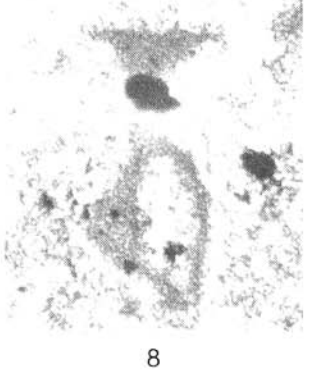

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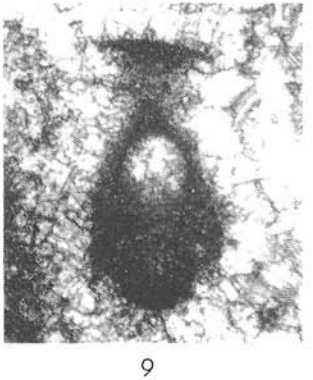

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Table 8
Dimensions of holotype and of paratypes of *Spiriamphorella rectilineata rectilineata* nov. ssp. in μ.

Ts Nr.	Ns	locality	L	Wt	C	Wc	Pl., fig.
6295	30	3 NW of the cross-road between Stratená and Hrabušice	262	126	63	123	IV, 4
6292	30	do	306	148	82	140	IV, 5
6288	30	do	350	208	93	138	IV, 6
6299	30	do	261	154	81	142	IV, 8
6309	1	5 SW of the elev. point Havrania skala	359	157	80	105	IV, 7

Spiriamphorella rectilineata districta nov. ssp.
Pl. IV, fig. 9—11, Pl. V, fig. 1—3

Holotype: the specimen figured in Pl. IV, fig. 9 deposited at the Geological Institute of the Slovak Academy of Sci. in Bratislava, thin-section Nr. 6282.

Paratypes: Pl. IV, fig. 10—11, Pl. V, fig. 1—3.

Derivatio nominis: from Latin districtio = division.

Stratum typicum: the Tisovec limestones, Karnic.

Locus typicus: the Stratenská hornatina (mountains), SW of the elev. point Havrania skala (Fig. 3, loc. 5).

Material: 19 sections from thin-sections.

Diagnosis: a large straight test; subangular in the proximal part; broad and terminated with a distinct collar in the distal part. The juvenile stage is evolute, the adult is straight, with marked division.

Description: the test is large. The spiral part is gently declined from the vertical axis. The proximal part is subangular to angular in some forms, with indication of pseudo-caudal projection. The juvenile part consists of 2,5—3,5 evolute whorls occupying as much as $^1/_2$ of the test diameter. In some forms the spiral stage is more-or-less symmetrical, in contrast to others with the spiral stage declined from the vertical axis of the test. At about $^1/_2$ of its length the test is narrowed with indication of division. The neck is long, more-or-less cylindrical and terminated with a distinct funnel-shaped collar. The test wall is composed of dark micrite calcite.

Plate VI

Fig. 1—8. *Spiriamphorella irregularis* nov. sp. — Fig. 1—4, 6—8. NW of the cross-road between Stratená and Hrabušice. — Fig. 1: thin-section Nr. 6328. — Fig. 2: thin-section Nr. 6327. — Fig. 3: thin-section Nr. 6299. — Fig. 4: thin-section Nr. 6292. — Fig. 6: thin-section Nr. 6328. — Fig. 7: thin-section Nr. 6299. — Fig. 8: thin-section Nr. 6289. — Fig. 9: SW of the elevation point Havrania skala, thin-section Nr. 6311. Magn. 115 ×. Photographed by K. Borza.

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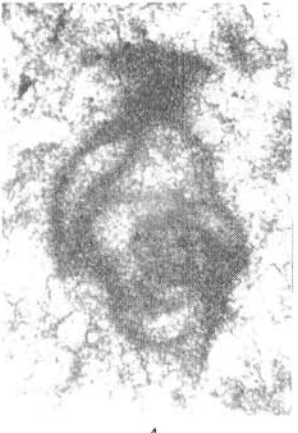

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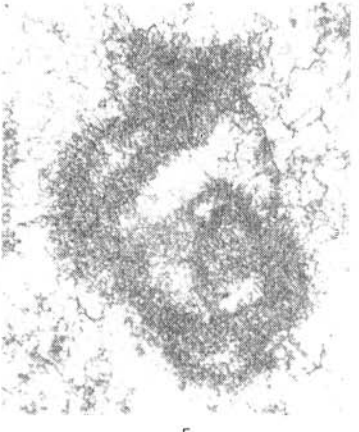

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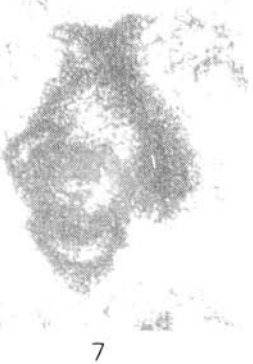

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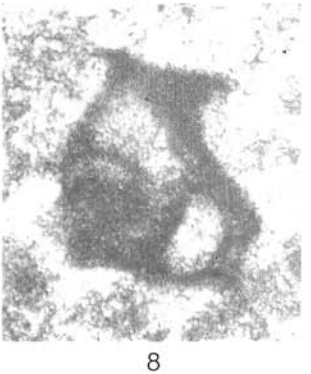

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Dimensions: the test length — 540 μ, the test width — 184 μ, collar — 148 μ, the collar width — 223 μ.

Occurrence: in the Tisovec limestones of the Stratenská hornatina (mountains), SW of the elevation point Havrania skala (Fig. 3, loc. 5); in the Tisovec limestones NW of the cross-road between Stratená and Hrabušice (Fig. 3, loc. 3).

Remark. The species differs from the nominal species *Spiriamphorella rectilineata rectilineata* nov. ssp. in a larger evolute stage, in conspicuous division of the test and in larger test.

Spiriamphorella ovata nov. sp.
Pl. V, fig. 4—9

Holotype: the specimen figured in Pl. V, fig. 4, deposited at the Geological Institute of the Slovak Academy of Sci. in Bratislava, thin-section Nr. 6307.

Paratypes: Pl. V, fig. 5—9.

Derivatio nominis: from Latin ovatus = egg-shaped.

Stratum typicum: the Tisovec limestones, Karnic.

Locus ttypicus: the Stratenská hornatina (mountains), SW of the elevation point Havrania skala (Fig. 3, loc. 5).

Material: 9 sections from thin-sections.

Diagnosis: an egg-shaped test, provided with a long neck and broad funnel-shaped collar. After the small initial evolute stage the test is straight.

Description: the test is egg-shaped, in the proximal part suboval to subangular. The initial stage is evolute, the adult stage is straight, egg-shaped. The neck is long, narrow, terminated with a large funnel-shaped collar. The aperture is broad, terminal. The test wall is composed of dark micrite calcite.

Dimensions of holotype: the test length — 446 μ, the test width — 142 μ, neck — 68 μ, the collar width 160 μ.

Occurrence: in the Tisovec limestones of the Stratenská hornatina (mountains), NE of the cross-road between Stratená and Hrabušice (Fig. 3, loc. 4) and SW of the elevation point Havrania skala (Fig. 3, loc. 5).

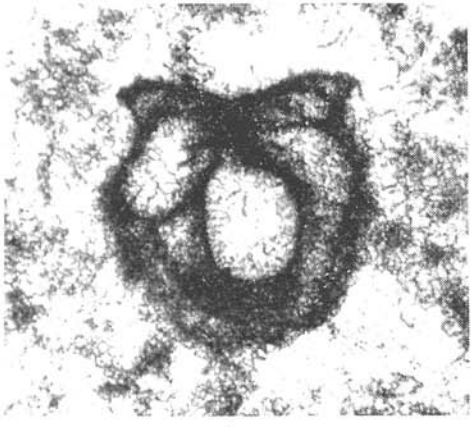
Remark. The newly described species is morphologically resembling to the species *Amphorella lageniformis* nov. sp. It differs in its initial evolute stage, a long neck and broad collar.

Spiriamphorella irregularis nov. sp.
Pl. VI, fig. 1—8

Holotype: the specimen figured in Pl. VI, fig. 1 deposited in the collection of the Geological Institute of the Slovak Academy of Sci. in Bratislava thin-section Nr. 6328.

Plate VII

Fig. 1—6. *Urnulinella andrusovi* nov. sp. NW of the cross-road between Stratená and Hrabušice. — Fig. 1: thin-section Nr. 6326. — Fig. 2: thin-section Nr. 6328. — Fig. 3: thin-section Nr. 6330. — Fig. 4: thin-section Nr. 6328. — Fig. 5: thin-section Nr. 6327. — Fig. 6: thin-section Nr. 6326. Magn. 115 ×. Photographed by K. Borza.



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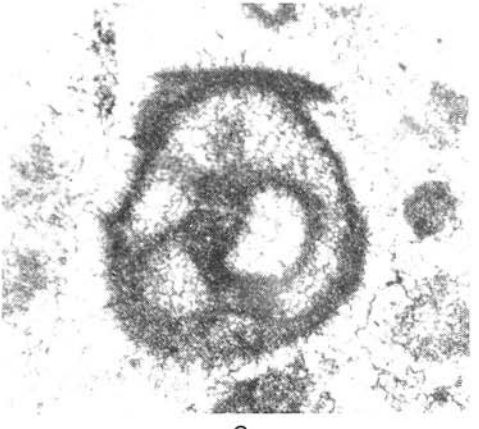

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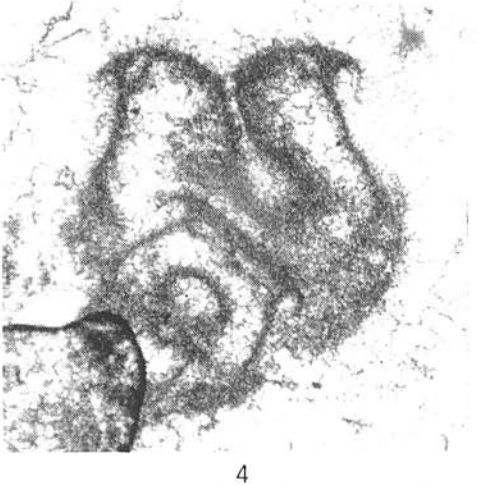

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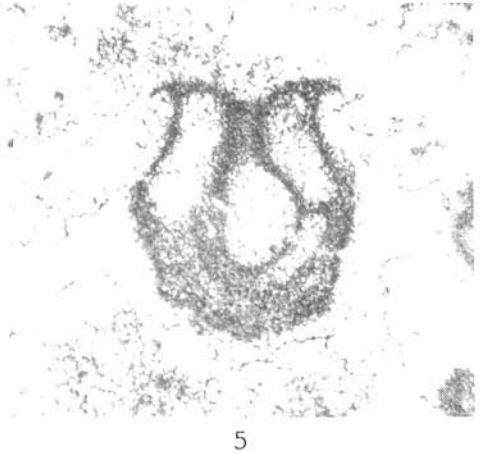
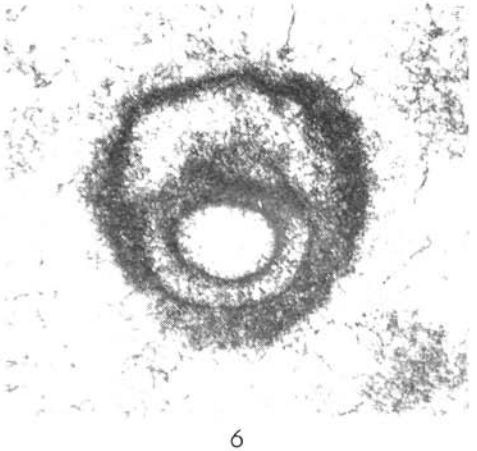


5



6

Paratypes: Pl. VI, fig. 2–8.

Derivatio nominis: from Latin irregulare = irregular.

Stratum typicum: the Tisovec limestones, Karnic.

Locus typicus: the Stratenská hornatina (mountains), NW of the cross-road between Stratená and Hrabušice (Fig. 3, loc. 3).

Material: 21 sections from thin-sections.

Diagnosis: a belly-shaped test, asymmetrical in its proximal part; with a narrow collar in the distal part. The aperture is broad, terminal. The initial stage is trochospiral. The test wall consists of dark micrite calcite.

Description: the test consists of the initial trochospiral stage passing in some cases into irregularly coiled forms. The ultimate chamber is large, belly-shaped. The neck is short, the collar narrow. The aperture is broad, terminal. The test wall consists of dark micrite calcite.

Dimensions of holotype: the test length — 508 μ, the test width — 462 μ, the neck width — 170 μ, the collar width — 232 μ.

Occurrence: in the Tisovec limestones of the Stratenská hornatina (mountains), NW of the cross-road between Stratená and Hrabušice (Fig. 3, loc. 3) and SW of the elevation point Havrania skala (Fig. 3. loc. 5).

Remark. The species differs from the previous species of the genus *Spiriamphorella* nov. sp. in trochospiral juvenile stage, in extreme cases even irregularly coiled.

Urnulinella nov. gen.

Derivatio nominis: from Latin urnula = a small vessel.

Generotype: *Urnulinella andrusovi* nov. sp.

Diagnosis: a belly-shaped test, multicameral, with broad terminal aperture and a fine collar. The test wall is composed of micrite calcite.

Urnulinella andrusovi nov. gen., nov. sp.
Pl. VII, fig. 1–6

Holotype: the specimen depicted in Pl. VII, fig. 1 in the depository of the Geological Institute of the Slovak Academy of Sc. in Bratislava, thin-section Nr. 6326.

Paratypes: Pl. VII, fig. 2–6.

Derivatio nominis: in honour of the late Academician Andrusov, founder of Slovak geology.

Stratum typicum: the Tisovec limestones, Karnic.

Locus typicus: the Stratenská hornatina (mountains), NW of the cross-road between Stratená and Hrabušice (Fig. 3, loc. 3).

Material: 9 sections from thin-sections.

Diagnosis: a belly-shaped test, broad, multicameral; with a broad terminal aperture and a fine collar.

Description: the test is belly-shaped, subsphaerical, circular to subcircular in section. Its proximal part is subspherical, the distal part is terminated with a broad aperture with a fine collar. The width and height of the test are almost equal. The inner part of the test consists of large — in section oval —

initial chamber and of 2—3 lateral chambers. The test consists of dark micrite calcite.

Dimensions of holotype: the test length — 310 μ, the test width — 305 μ, the neck width 220 μ, the collar width — 277 μ; the size of the central chamber: 108 × 138 μ.

Occurrence: in the Tisovec limestones of the Stratenská hornatina (mountains), NW of the cross-road between Stratená and Hrabušice.

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