REVISION OF CERTAIN PŘIDOLI MONOGRAPTIDS FROM THE CHEŁM KEYSECTION (EEP)

LECH TELLER

Teller, L. 1997. Revision of certain Přidoli monograptids from the Chelm keysection (EEP). *In:* A. Urbanek and L. Teller (eds), Silurian Graptolite Faunas in the East European Platform: Stratigraphy and Evolution. — *Palaeontologia Polonica* 56, 71–85.

A review and revision of important graptolite index species for the Přidoli Series (Silurian) are given. *P. rarus* Teller, *P. chelmiensis* Teller, and *P. samsonowiczi* Teller are herein regarded as chronosubspecies of the single *Istrograptus transgrediens* (Perner) lineage, while some other taxa described in the 1964 paper proved to be merely astogenetic variants of the latter species. *P. bugensius* Teller and *P. aduncus* Teller are now considered junior synonyms of *Colonograptus lochkovensis* Přibyl. The latter species is assigned to a new genus, *Neocolonograptus*, erected in this volume by Urbanek. A revised scheme of the Přidoli zonal subdivision based on graptolites is presented.

Key words: Graptolites, Silurian, Přidoli, biostratigraphy, taxonomy.

Lech Teller, Instytut Paleobiologii PAN, ul. Twarda 51/55, 00-818 Warszawa, Poland.

Received 13 March 1995, accepted 30 June 1995



CONTENTS

Introduction	72
The transgrediens stock	73
Paleontological descriptions	74
Genus Istrograptus TSEGELNJUK, 1976	74
Istrograptus transgrediens rarus (TELLER, 1964)	74
Istrograptus transgrediens chelmiensis (TELLER, 1964)	75
Istrograptus transgrediens samsonowiczi (TELLER, 1964)	75
Istrograptus transgrediens transgrediens (PERNER, 1899)	76
Genus Neocolonograptus (URBANEK, this volume)	77
Neocolonograptus lochkovensis (PŘIBYL, 1949)	77
Acknowledgements	79
References	79

INTRODUCTION

The graptolite fauna from the Chełm IG-1 borehole was recognized in 1956, its description being published four years later (TELLER 1964). The study discussed all the taxa encountered in the core, providing a correlation with the Prague Basin. Evidence was presented of the presence of all Přidoli zones except for the lowest part of the Series which, according to much later findings (JAEGER in KRIŽ *et al.* 1986), corresponds to the *parultimus* Zone. In total, eight new species were described then, making the section of the Přidoli Series more complete.

With the course of time, as the presence of Přidoli graptolites was reported from various parts of the world, even if from fragmentary sections, it became necessary to revise the graptolite fauna from Chełm IG-1, a keyboring for the EEP.

A restudy of the original materials has revealed that such taxa as *Pristiograptus bugensius* TELLER, and *P. aduncus* TELLER are conspecific with *Neocolonograptus lochkovensis* (PŘIBYL). Both the species have been listed as synonyms of *N. lochkovensis* (PŘIBYL), which for the first time in Poland is described herein on the basis of non-isolated material. Its recognition in the Chełm IG-1 section also makes possible to establish the *lochkovensis* Zone, about 70 m thick.

Revision has embraced all the forms having a morphotype similar to that of *dubius*. Some, such as *Istrograptus t. rarus* (TELLER), *Istrograptus t. chelmiensis* (TELLER), *Istrograptus t. samsonowiczi* (TELLER), and *Istrograptus t. transgrediens* (PERNER) created no problems. This allowed the recognition of the *transgrediens* phylogenetic stock, probably initiated in the latest Ludfordian from an unknown ancestor of the *Pristiograptus dubius* group. It continues via chronosubspecies *rarus-chelmiensis-samsonowiczi* and ends up in *transgrediens*.

Moreover such taxa as *P. admirabilis* TELLER, *P. separabilis* TELLER, and *P. perbrevis* TELLER (TELLER 1964) have been redefined as juvenile stages in the astogeny of a typical *I. t. transgrediens* (PERNER) and listed as synonyms of that species.

The revision has resulted in establishing a somewhat modified zonal subdivision of the Přidoli Series for the keysectoin from the Chełm IG-1 borehole and the Polish part of the EEP. From top to bottom, the following Zones are recognized: *transgrediens, perneri, bouceki, samsonowiczi, chelmiensis, lochkovensis, ultimus* (see also the Table 1, p. 62).

The above sequence is almost identical with that in the Prague Basin (PŘIBYL 1940, 1983; JAEGER in KRIŽ *et al.* 1986) and very close to the one established by KOREN' *et al.* (1992) for the Tien Shan sections. Meanwhile individual zones can be correlated with the various sections around the world.

The material illustrated in the present paper is housed at the Institute of Palaeobiology of the Polish Academy of Sciences, Warszawa, Poland, and designated in the collection as ZPAL G.XXI.

THE TRANSGREDIENS STOCK

In spite of the recent more detailed knowledge of the morphology and astogeny of this species, disappearing ultimately in the uppermost Silurian, its phylogeny remains unclear. The *I. t. transgrediens* (PERNER) lineage is linked with the genus *Pristiograptus* which formed the stem group for the evolution of the Upper Silurian forms resembling it in basic morphology but differing in the structure of proximal thecae (KOREN' and URBANEK 1994; URBANEK 1997).

The ancestor of the true *I. t. transgrediens* (PERNER) form should be looked for among those Přidoli species which resemble the *transgrediens* morphotype. The Chełm IG-1 section features three intervals containing such morphotypes (Fig. 1).

The first of them, the *rarus* morphotype, occurs in the Lower Přidoli, in the *N. parultimus* and *N. ultimus* Zones. The form possesses a distinctly beak-like aperture of the first theca. The aperture is made up of two separate ear-like lobes. The successive thecae are tube-like, with straight apertures of the *dubius* type. It is at the very margin of the aperture that a slight roll-like thickening can be seen. The form is now classified as *I. t. rarus* (TELLER).

The subsequent younger form of the stock is *I. t. chelmiensis* (TELLER). It is characterized by possessing beak-like apertures in the first two thecae. Their structure is similar to that observed in *I. t. rarus* (TELLER). Subsequent thecae are of the *dubius* type with straight apertures while, on the whole, the taxon is slimmer than the type species. The occurrence of *I. t. chelmiensis* (TELLER), confined to a closely defined interval above *N. lochkovensis* (PŘIBYL, forms a separate zone about 50 m thick. In the top part of the zone it is



Fig. 1 Chronosubspecies of the *Istrograptus transgrediens* stock. Width visualizes abundance of the taxon within a given interval.

accompanied by *I. t. samsonowiczi* (TELLER) which constitutes the next link in the phylogenetic line. In this form, three subsequent proximal thecae show beak-like apertures resembling the ancestral *rarus*, the remaining thecae being straight, of the *dubius* type. In its general appearance the form is shorter than the preceding one but is more robust. In the Chełm IG-1 section, *I. t. samsonowiczi* (TELLER) marks an independent zone.

The *samsonowiczi* Zone is separated from the overlying *bouceki* Zone by a 23-meter nongraptolitic interval (cf. p. 63 herein). As to the *bouceki* Zone, it has yielded only one rhabdosome devoid of the proximal part but having thecae of the *dubius* type.

I. t. transgrediens (PERNER), the species terminating the *transgrediens* stock, is separated from *I. t. samsonowiczi* (TELLER) not only by the *perneri* Zone but also by one more nongraptolitic interval. The proximal part of this species features four or even five thecae with beak-like apertures. The successive two or three thecae may be in some cases slightly elaborated, but as a rule their apertures are almost straight, of the *dubius* type and rimmed by a roll-like thickening. The rhabdosome is long, wide and robust.

The order of appearance of the *transgrediens* morphotype, as seen in the Chełm IG-1 borehole, may shed light on the problems associated with the presence of this form in the Přidoli sections of the Prague Basin and Tien Shan, reported by JAEGER (in KRIŽ *et al.* 1986) and KOREN' (1992), respectively. In these sequences, the succession of the *transgrediens* morphotypes may well be very similar to that in the Chełm IG-1 section.

Above the *transgrediens* Zone, the Chełm IG-1 Silurian section yields no graptolites, linograptids being the only exception. Monograptids do not appear earlier than the Gedinnian (Lochkovian).

PALEONTOLOGICAL DESCRIPTIONS

Family Monograptidae LAPWORTH, 1873 Subfamily Pristiograptinae JAEKEL, 1889 Genus Istrograptus TSEGELNJUK, 1976 Istrograptus transgrediens rarus (TELLER, 1964) (Pl. 1: 1)

1964. Pristiograptus rarus sp. n.; TELLER, p. 38, pl. 1: 1–3, pl. 9: 10–12, text-fig. 3a–c. 1976. Skalograptus rarus (TELLER); TSEGELNJUK, p. 102, pl. 32: 6–9.

Holotype: Form described by the present author in 1964 and illustrated there in Pl. 1: 1 and Pl. 9: 10 from the depth of 1610.5-1611.1 m.

Material. — Four well and several rather poorly preserved rhabdosomes from the Přidoli section of the Chełm IG-1 borehole, depth 1607.4 and 1611.1 m.

Remarks. — No considerable changes need to be introduced in the holotype description except for the part which concerns the first proximal theca. The beak-like appearance of its aperture is accounted for by the fact that two lateral lobes have been elaborated and separated by a ventral notch. They widen slightly towards the end forming ears. All this creates an illusion of a beak-like structure of the thecal aperture. The illusion is particularly strong in flattened specimens embedded in the matrix. The successive thecae have a regular dubius tube-like shape. Their apertures are slightly convex, with a roll-like thickening at the margin. The thecal structure and the rhabdosome shape manifest a close similarity between this taxon and I. t. transgrediens, although the former is much shorter and has only one beak-like theca, whereas the latter may feature three, four or even as many as five such thecae. The above great similarity supports for classifying the taxon as a subspecies of *I. t. transgrediens* and recognizing it as the initial form of the transgrediens stock. It leads via chelmiensis and samsonowiczi to the type taxon of the lineage (compare the description of transgrediens). TSEGELNJUK (1976) assigns the above taxon to his new genus Skalograptus. URBANEK (p. 156, this volume). questions the validity of his decision. What is important however, is the fact that TSEGELNJUK acknowledges the great similarity between I. t. rarus, I. t. chelmiensis and I. t. samsonowiczi, assigning the last two forms to the same species. His supposition has proved to be correct, but in respect to a different species.

Stratigraphic position. — The form has only been documented from the bottom part of the Chełm IG-1 section, the *ultimus* Zone, and maybe from the upper part of the *parultimus* Zone. Its stratigraphic position is similar in the nearby Gushcha-4015 boring (TSEGELNJUK 1976).

Geographic distribution. — Species recognized in the EEP. Its presence in Central Asia seems reasonable.

Assemblage. — Neocolonograptus ultimus, Pristiograptus ex gr. dubius, and Linograptus posthumus posthumus (Reinhard RICHTER).

Istrograptus transgrediens chelmiensis (TELLER, 1964) (Pl. 1: 8–9)

1964. Pristiograptus chelmiensis sp. n.; TELLER, p. 45, pl. 3: 5-6, pl. 4: 1, 6-8, pl. 7: 1-7, pl. 13: 6, text-fig. 7a-c. 1978. Pristiograptus chelmiensis TELLER; JACKSON, LENZ, and PEDDER, p. 21, pl. 3: 10.

Holotype: Form described by the present author in 1964 and illustrated there in Pl. 3: 5; Pl. 7: 3 from the depth of 1514.1 m.

Material. — A dozen or so well-preserved rhabdosomes from the Přidoli section of the Chełm IG-1 borehole, depth 1463.65–1529.7 m.

Remarks. — The holotype was described by the present author (TELLER 1964) as *Pristiograptus* chelmiensis. To complete the initial description it should be added that the first two proximal thecae possess paired lateral ear-like lobes separated by a ventral notch. Slight widening of the lobes towards the end gives a deceptive beak-like impression, especially in flattened material or in the specimens embedded in the matrix.

Subsequent thecae lack lateral lobes, being similar to straight tube-like shapes typical of the *dubius* group. When seen laterally their apertures are slightly concave with the margin rimmed by a roll-like thickening.

I. t. chelmiensis (TELLER) strongly resembles *I. transgrediens transgrediens* (PERNER). The following characters distinguish it from the type species: (a) much lesser width of the rhabdosome and slower increase in width. This makes the subspecies discussed look distinctly slimmer; (b) the presence of elaborated lateral lobes in no more than the first two, rarely three, proximal thecae, whereas in *I. t. transgrediens* (PERNER) such lobes are a regular feature of the first three, commonly four and, rarely, five thecae; (c) *I. t. chelmiensis* (TELLER) is confined to a closely defined stratigraphic interval, always below *M. bouceki* (PŘIBYL), whereas the type *I. t. transgrediens*, has only been recorded above *M. perneri* (BOUČEK). The above distinguishing features are not sufficient to allow *I. t. chelmiensis* (TELLER) to be recognized as a separate species. It is, however, a link in the continuous line of the *transgrediens* morphological evolution and may be identified as a temporal subspecies.

Stratigraphic position. — A separate zone whose lower and upper boundaries are marked by the top of the *lochkovensis* Zone and the bottom of the *samsonowiczi* Zone, respectively. It lies at a depth of 1480.0–1530.0 m and is 50 m thick.

Geographic distribution. — A cosmopolitan species. In E Poland it has been recognized in the Chełm IG-1 section and in other boreholes penetrating the Přidoli Series. Its presence has also been reported from Arctic Canada, the Porcupine River, Yukon, and is not unlikely in Central Asia.

Assemblage. — The bottom of the interval contains *Neocolonograptus lochkovensis* (PŘIBYL), and the top, *I. t. samsonowiczi* (TELLER) and *Linograptus posthumus posthumus* (Reinhard RICHTER).

Istrograptus transgrediens samsonowiczi (TELLER, 1964) (Pl. 1: 6–7)

1964. Pristiograptus samsonowiczi sp. n.: TELLER, p. 43, pl. 4: 2-5, 9, pl. 6: 9, pl. 8: 20, pl. 11: 9-10, text-fig. 6a-d.

Holotype: Form described by the present author (TELLER 1964) as *P. samsonowiczi* and illustrated there in Pl. 4: 3; Pl. 6: 7 from a depth between 1462.1–1462.2 m.

Material. — A dozen or so well-preserved rhabdosomes from the Přidoli of the Chełm IG-1 section at a depth of 1459.85–1480.80 m.

Remarks. — The 1964 description of the form requires a more detailed analysis in the part concerning the first three proximal thecae which, not unlike some proximal thecae in *I. t. chelmiensis* and *I. t. transgrediens*, are slightly beak-like. The apertures of these thecae have elaborated paired lateral ear-like rounded lobes separated by a ventral notch. The ear-like shape and roundness of the lobes give a deceptive beak-like impression, especially strong in the case of specimens embedded in the matrix.

Successive thecae, possessing no lateral lobes, are straight and tube-like as is typical of the *dubius* group. Their apertures are slightly concave, with the margin rimmed by a roll-like thickening.

Although *I. t. samsonowiczi* strongly resembles *I. t. transgrediens* and *I. t. chelmiensis*, it possesses several distinguishing features: (a) *I. t. samsonowiczi* widens much faster so that its mature form is never as long as that of the type species; (b) as a rule, *I. t. samsonowiczi* has three proximal thecae with elaborated lateral lobes, that is one more than the earliest subspecies *I. t. chelmiensis*, a generally longer and slimmer form. The type species possesses four, more rarely, three, and frequently even five thecae with lateral lobes; (c) the new subspecies always occurs below the *bouceki* Zone and above the *chelmiensis* Zone, in an interval between 1480.80–1459.85 m, marking the *samsonowiczi* Zone 21 m thick; (d) *I. t. samsonowiczi* is one more link in the final phase of the *I. t. transgrediens* phylogenetic stock initiated by *I. t. rarus*.

Stratigraphic position. — Separate zone whose upper and lower boundaries are marked by the top of the *chelmiensis* and the bottom of the *bouceki* Zone, respectively, depth 1459.0–1480.0 m (21 m thick).

Geographic distribution. — E Poland, Chełm GI-1 and other boreholes penetrating the Přidoli. The presence of this subspecies in Central Asia is not unlikely.

Assemblage. — I. t. chelmiensis (TELLER) in the lower part of the level.

Istrograptus transgrediens transgrediens (PERNER, 1899) (Pl. 2: 1–11)

1899. Monograptus transgrediens sp. n.; PERNER, p. 13, pl. 17: 24.

1940. Pristiograptus transgrediens var. proximus var. n.; PŘIBYL, p. 69, text-fig. 1/6.

1940. Pristiograptus transgrediens var. n.; PŘIBYL, p. 69, text-fig. 1/5.

1964. Pristiograptus transgrediens (PERNER); TELLER, p. 52, pl. 2: 3, pl. 3: 1-4, pl. 7: 8-12, text-fig. 11a-c.

1964. Pristiograptus admirabilis sp. n.; TELLER, p. 47, pl. 5: 1-4, pl 8: 4-7, text-fig. 8a-c.

1964. Pristiograptus separabilis sp. n.; TELLER, p. 49, pl. 2: 2,10, pl. 7: 16-17, text-fig. 9a-c.

1964. Pristiograptus perbrevis sp. n.; TELLER; p. 50, pl. 1: 7-10, pl. 5: 6-9, pl. 8: 8-10, text-fig. 10a-c.

1986. Monograptus transgrediens PERNER; JAEGER, p. 326, pl. 1: 15, 17-18, pl. 2: 12, 16-17, 19, 22, 25, text-fig. 41a-c.

Material. — A few hundred well-preserved rhabdosomes, either in full relief or pyritized, showing different stages of astogeny.

Derivation. — Chełm IG-1 borehole, depth 1362.1–1396.4 m.

Stratigraphic position. — Upper Přidoli, transgrediens Zone.

Description. — Rhabdosome (Pl. 2: 1–3) straight, with a slight ventral curvature starting from th_{7–8}. Maximum length of the adult form attains 4.4 cm, but the majority of the rhabdosomes encountered are about 4 cm long. Rhabdosome width increases gradually from 0.9–1.0 (0.6–0.7) mm at th₁ to 1.8–2.0 (1.2–1.7) mm at th₁₀ to as many as 2.2–2.25 (1.9–2.1) mm at th₂₀. Virgula robust.

Sicula. — Narrow (Pl. 2: 9–11), 2.3–2.4 mm long. Its apex usually reaches as far as the base of th₄, sometimes a little higher than the base or even not further than th₃. It widens gradually towards the aperture, attaining a width of 0.4–0.5 mm. Aperture can be: (a) wide, almost straight, having a hardly visible and slightly widened dorsal process, and a roll-like margin merging with the virgella (Pl. 2: 9, 11). The aperture of the sicula may be flared, although this is not a distinguishing feature, that feature being also present in *Bohemograptus bohemicus* and *Monograptus hercynicus*; (b) concave, showing a distinct wing-like dorsal process directed downwards (Pl. 2: 10) and a thick marginal roll merging with the virgella.

Dorsal process length is 0.2-0.3 mm. Rarely, one or two metasicular rings are present.

Thecae. — Biform. As a rule, the first three or, quite frequently, four and even five thecae (Pl. 2: 1, 2, 7) feature well-developed paired lateral lobes. At the first theca, lobes are elongated, forming a kind of tongue slightly curved downwards (Pl. 2: 5, 8). Ventral wall between the lobes is notched (Pl. 2: 7, 8). In successive th₂, th₃, and th₄, lateral lobes (Pl. 2: 7, 8) straighten up, with the notch gradually disappearing so that th₅ or th₆ acquires the shape of a tube looking almost the same as those in representatives of the *dubius* group. Subsequent distal thecae are uniform, differing only in length, which increases from 1.5–1.8 mm (th₁₀) to 1.9–2.3 mm (th₁₅) to 2.2–2.4 mm (th₃₀) (Pl. 2: 1, 2, 4). Thecal width is stable 0.5 mm. Th₁ buds as a rule at a distance of 0.2–0.3 mm from the sicular aperture. A line drawn across the rhabdosome in its distal part normally cuts through only one interthecal septum. All apertural margins are provided with a roll-like thickening that becomes thicker with the aging of the colony and is quite distinct in adult specimens (Pl. 2: 6). There are 9 thecae per 10 mm in the proximal part and 10–11 thecae in the distal part of rhabdosome.

Remarks. — *I. t. transgrediens* (PERNER) has always stimulated interest of the researchers, and recently a detailed description of its morphology has been presented (JAEGER in KRIŽ *et al.* 1986).

PŘIBYL (1940, 1943), following PERNER (1899), described this form from the Prague Basin. At that time he recognized three subspecies (*Pristiograptus t. praecipius* PŘIBYL, *P. t. proximus* PŘIBYL, and *P. t. concretus* PŘIBYL). According to JAEGER, all of them ought to be regarded as astogenetic varieties of the type species. JAEGER's criticism is fully justified in respect of the first two subspecies. In contrast, *P. t. concretus*, distinguished by PŘIBYL in 1943 (p. 32) as a subspecies, was based on misinterpretation. Having studied the holotype preserved in the Prague National Museum collection as sample No. L. 1965, the present author was able to conclude that the specimen consisted of two superimposed rhabdosomes. Separately, each of them could be an *I. transgrediens*.

By 1964, *I. t. transgrediens* (PERNER) were reported from Morocco (WATERLOT 1945) and Germany (MÜNCH 1962). In Poland this taxon was not known until 1956 when it was encountered in the Chełm IG-1 section (TOMCZYK and TELLER 1956); its detailed description was published later (TELLER 1964). Along with the true *I. t. transgrediens*, three new allied species were recognized (*P. admirabilis* TELLER, *P. separabilis* TELLER, and *P. perbrevis* TELLER). Two of them were used as index species for establishing respective graptolite zones (TELLER 1964).

In the current revision of the above species, the present author considers them to be juvenile stages of the type species *I. t. transgrediens* (PERNER), and as such they are listed in the present paper as synonyms.

Since 1964, the type species *I. t. transgrediens* has been recognized in many sections world over, except for the Antarctic and South America. A general review of its occurrences has been provided by JAEGER (in KRIŽ *et al.* 1986: p. 328).

Geographic distribution. — A cosmopolitan species recognized in all Upper Přidoli sections throughout the world.

Assemblage. — Form basically monospecific, although the vertical range of the Prague Basin displays occasional dendroids. Scarce *Linograptus posthumus posthumus* (Reinhard RICHTER) can also co-occur.

Genus Neocolonograptus (URBANEK, this volume) Neocolonograptus lochkovensis (PŘIBYL, 1949) (Pl. 3: 1–9)

1940. Monograptus (Pristiograptus) lochkovensis sp. n.; PŘIBYL, p. 69, pl. 1: 6.

1964. Pristiograptus aduncus sp. n.; TELLER, p. 42, pl. 1: 4-6, pl. 2: 1-6, pl. 7: 18-19, pl. 9: 4-9, text-fig. 5a-d.

1964. Pristiograptus bugensius sp. n.; TELLER, p. 40, pl. 2: 4, 5, 9, pl. 7 13-15, pl. 9: 1-3, text-fig. 4a-e.

1977. Monograptus lochkovensis PŘIBYL; JAEGER, p. 340, text-fig. 3a-c.

1983. Saetograptus (Colonograptus) lochkovensis (PŘIBYL); PŘIBYL, pl. 4: 10.

1986. Monograptus lochkovensis PňIBYL; JAEGER, p. 324, pl. 1: 16, pl. 3: 16-17, text-fig. 30a-b.

1986. Monograptus branikensis sp. n.; JAEGER, p. 325, pl. 2: 10, 12, 14, text-fig. 40.

non 1986. Monograptus lochkovensis PŘIBYL; KOREN', p. 99, pl. 21: 1-6, text-fig. 17.

Material. — Several thousand well-preserved rhabdosomes either in half relief or pyritized, representing various stages of the astogeny.

Derivation. — E Poland, Chełm IG-1 borehole, depth 1530.5–1582.5 m.

Stratigraphic position. — Přidoli, lochkovensis Zone.

Description. — Rhabdosome (Pl. 3: 1–2, 4–5) fairly narrow, straight with a slight ventral curvature starting from th_{5-6} in the proximal part. The rest of the rhabdosome straight. Maximum recorded length of mature forms attains 3.3 cm, but most of the adult colonies are 2.3–2.7 cm long. The rhabdosome widens gently from 0.8–0.9 mm at th₁ to 1.3–1.4 mm at th₁₀, attaining maximum width of 1.5–1.6 mm at the level of th_{12-13} , and remaining constant thereafter.

Sicula. — Narrow (Pl. 3: 3, 6, 9), 2.1–2.2 mm long. Its apex, as a rule, reaches the base of th_3 or a little higher but never beyond th_3 . Sicular aperture width is fairly stable ranging between 0.3–0.4 mm, the latter being a more common value. The apertural margin (Pl. 3: 8–9) is rimmed by a roll-like thickenning involving the apertural process and merging with the virgella. Apertural process is normally 0. 2 mm wide, but rarely attains 0.3 or 0.4 mm. The process is very prominent, resembling a broad shovel in shape ("wing-like" in URBANEK's terms) (Pl. 3: 7, 9). Virgella attains 0. 6–0.7 mm. One or two metasicular rings can be seen.

Thecae. — Biform. In mature colonies, the first 12 to 17, but more often, 15 proximal thecae possess elaborated paired lateral lobes. The lobes of the first 3–4 thecae are strongly convex and curved downwards

producing, in flattened specimens, a beak-like appearance. However, etched specimens or those preserved in full relief show that the lobes are separated by a fairly conspicuously deep ventral notch. (Pl. 3: 2, 6) In some specimens the lateral lobes of th₁ are slightly curved inwards in their terminal portion and even overlap (Pl. 3: 7, 9). Younger thecae feature only the separating notch. With further growth of the colony, beginning from th₁₂-th₁₄, lateral lobes gradually disappear, the aperture being modified into a straight tube as is characteristic of the *dubius* type. Such straight thecae constitute the distal part of the rhabdosome, emphasizing its biformism.

The first theca buds at a distance of 0.2-0.3 mm from the sicular aperture, the successive ones overlapping, at first insignificantly and later, in the course of astogeny, more and more strongly, becoming especially conspicuous in the distal part of the rhabdosome. Here, thecae are 1.5 to 1.7 mm long, 0.4 to 0.5 mm wide, with the free ventral wall being 0.6-0.8 mm. A perpendicular cut across the distal part of the rhabdosome will generally reveal two interthecal septa (three in very mature forms).

Remarks. — A 52-meter thick claystone graptolitiferous series from the Chełm IG-1 section (depth 1530.5–1582.5 m) was described by TELLER (1964). Among the rich graptolite fauna of the interval, two species, *Pristiograptus aduncus* TELLER and *P. bugensius* TELLER, were identified.

These identifications were questioned, without sufficiently convincing arguments, by JAEGER (1977: p. 338) who assigned the above forms to *Monograptus ultimus*, an opinion he confirmed in 1986 (KRIŽ *et al.* 1986: p. 321).

The present revision reveals that the specimens earlier recognized as *P. bugensius* and *P. aduncus*, studied in both flattened and etched form, represent *Neocolonograptus lochkovensis*, a taxon not previously known in Poland.

The present description is based chiefly on the material embedded in matrix and, as such, differs in some details from that offered by URBANEK (see this volume, p. 169) who studied isolated material from the Mielnik IG-1 boring.

N. lochkovensis was described for the first time by PŘIBYL (PŘIBYL 1940) from the then recognized Přidoli beds of the Prague Basin. PŘIBYL assigned it the rank of an index species for the eponymous zone. For many years, however, *N. lochkovensis* had not been recognized in other parts of the world, until Spasov (1960) reported it from Bulgaria, although his identification seems doubtful.

JAEGER (1977: pp. 337 and 340) was next to mention N. lochkovensis. Two forms from the Lochkov section illustrated by him very well display the diagnostic characters of the species.

KOREN' (1986: pp. 99–101) provides the first description of it from Kazakhstan, although details of the proximal and medial thecal morphology are lacking, and some characteristic features and measurements obviously differ from those of the holotype. Furthermore, some of the drawings and photographs illustrated in that paper may also raise doubts. All this leads the present author to approach these forms with caution. They might rather be representatives of the *transgrediens* group, or it is quite possible that only some of them belong to *lochkovensis* (KOREN' 1986: fig. 17z, pl. 21: 4).

The first fairly comprehensive description accompanied by good photographs of the forms collected in the Prague Basin does not appear until several years later (JAEGER in KRIŽ *et al.* 1986: pp. 324–325). On the basis of their vertical distribution in that basin, JAEGER recognizes an upper and lower *lochkovensis* Subzones separated by the *pridoliensis* Subzone. This view seems to be rather controversial and difficult to corroborate outside the Prague Basin.

In the same paper, JAEGER (in KRIŽ et al. 1986: pp. 325–326) describes a new form, Monograptus branikensis JAEGER, which he believes to be "morphologically and temporally intermediate between M. ultimus and M. lochkovensis but morphologically much closer to M. lochkovensis". It is very difficult, however, to distinguish this new species from N. lochkovensis, a fact emphasized by JAEGER himself as he points to "one character only, namely the lack of overlap of the interthecal septa also in the distal part" (JAEGER in KRIŽ et al. 1986: p. 326). He adds that "it is easy to distinguish the large adult or half grown rhabdosomes of M. lochkovensis from the small M. branikensis, but it may be impossible to separate the juveniles of the two species". The doubts raised by JAEGER are sufficient to weaken the diagnostic force of the new species. It seems therefore more reasonable to regard the morphological differences, if any, in M. branikensis as intraspecific variation and not as a basis for distinguishing a new species (see also the opinion of URBANEK, this volume, p. 169).

KOREN' and SUYARKOVA (personal information) have distinguished a new species, *Monograptus tu*multuosus in the Tien Shan sections (Central Asia). According to the authors, this form occurs above *M.* branikensis and below *M.* bouceki, that is in the same stratigraphic position as does *N.* lochkovensis in many sections world over. Following my study of the type material in Sankt Petersburg (February 1994), I conclude that the overall shape of the rhabdosome and the structure of individual thecae in these forms are almost identical with those seen in the *lochkovensis* morphotype, the differences being so insignificant as to be considered intraspecific variation. Thus it seems justified to assign these forms to *lochkovensis*. In my opinion, qualifying them as a separate species is insufficiently substantiated. Among the huge population of the species *N. lochkovensis* from the Chełm IG-1 boring, forms can be encountered, both juvenile and adult, which show some slight deviations from the *lochkovensis* morphotype; e.g. the variable number of thecae with lateral lobes, their disappearance, the degree of elaboration, and also thecal overlapping in the distal part of the rhabdosome. I am convinced that such insignificant deviations within a population do not provide a sufficient ground for distinguishing new taxa.

Geographic distribution. — A cosmopolitan species recognized in many Early Přidoli sections throughout the world. Populations abundant.

Assemblage. — The form occurs monospecifically. *Linograptus posthumus posthumus* (Reinhard RICHTER) is the only co-occurring species.

Acknowledgements. — Thanks are due to Tatjana N. KOREN' (Sankt Petersburg), Adam URBANEK (Warsaw), Petr ŠTORCH (Praha) and Piotr TSEGELNJUK (Kiev) for valuable opinions and suggestions. I express my gratitude to Mrs Irina BAGAJEWA-URBANEK for translating the Polish manuscript into English. Thanks are also due to Professor A.C. LENZ (London, Ontario, Canada), the referee, for his helpful suggestions, corrections and improvements.

REFERENCES

- JACKSON, D.E., LENZ, A.C., and PEDDER, A.E.1978. Late Silurian and Early Devonian graptolite, brachiopod and coral faunas from north-western and Arctic Canada. *Geological Association of Canada Special Paper* 17, 1–159.
- JAEGER, H. 1977. Graptolites. The Silurian-Devonian Boundary IUGS Series A 5, 337-345.
- KOREN', T.N. 1986. Graptolites [in Russian]. In: I.F. Nikitin and S.M. Bandaletov (eds), The Tokrau horizon of the Upper Silurian Series: Balkhash segment, 86-138. Nauka Kazakhskoi SSR, Alma Ata.
- KOREN^{*}, T.N. 1992. New late Wenlock monograptids from the Alai Range [in Russian]. Paleontologicheskii zhurnal 2, 21–23.
- KOREN', T.N. and LYTOCHKIN, V.N. 1992. A graptolite-based biozonal scheme of the Upper Silurian in the Turkistan-Alai Range [in Russian]. Sovetskaya geologiya 11, 37–44.
- KOREN', T.N. and URBANEK, A. 1994. Adaptive radiation of monograptids after the late Wenlock crisis. Acta Palaeontologica Polonica 39, 137–167.
- KRIŽ, J., JAEGER, H., PARIS, F., and SCHÖNLAUB, H.P. 1986. Přidoli the Fourth Subdivision of the Silurian. Jahrbuch Geologischer Bundesanstalt 129, 291–360.
- MÜNCH, A. 1952. Die Graptolithen aus dem anstehenden Gotlandium Deutschlands und der Tschechoslowakei. *Geologica* 7, 1–157.
- PERNER, J. 1899. Études sur les Graptolites de Bohème. Palaeontographica Bohemiae 1-3b.
- PŘIBYL, A. 1940. Die Graptolithenfauna des mittleren Ludlows von Böhmen (Oberes eß). Věstnik geologičeskeho ústavu 16, 63–74.
- PŘIBYL, A. 1943. Revise zastupcu rodu Pristiograptus ze skupiny P. dubius a P. vulgaris z českeho a ciziho siluru. Rozpravy II Třídy Česke Akad. 4, 1–49.
- PŘIBYL, A. 1983. Graptolite biozones of the Kopanina and Přidoli Formations in the Upper Silurian of Central Bohemia. Časopis pro mineralogii a geologii 28, 149–167.
- SPASSOV, CH. 1960. Neue Fauna des Bulgarischen Obersilurs (Ober Ludlow). Traveaux sur la Géologie de Bulgarie série Paléontologie 2, 17–24.
- TELLER, L. 1964. Graptolite Fauna and Stratigraphy of the Ludlovian deposits of the Chełm borehole Eastern Poland. *Studia Geologica Polonica* 13, 1–88.
- TSEGELNJUK, P.D. 1976. The stratigraphy of the Silurian and Lower Devonian deposits of the Polesye Massif and Brest Depression [in Russian]. In: P.L. Shulga (ed.), Palaeontology and stratigraphy of the Upper Precambrian and Lower Paleozoic of the SW part of the East European Platform, 77–90. Naukova Dumka, Kiev.
- TOMCZYK, H. and TELLER, L. 1956. The Ludlow deposits in Eastern Poland. Biulletin de l'Académie Polonaise des Sciences Cl. III 4, Série des Sciences Biologiques, 549-553.
- URBANEK, A. 1997. Late Ludfordian and Early Přidoli monograptids from the Polish Lowland. Palaeontologia Polonica 56, 87–231.
- WATERLOT, G. 1945. Graptolites du Maroc. Notes et Mémoires du Service Géologic du Maroc 62, 1-111.

LECH TELLER

REVISION OF CERTAIN PŘIDOLI MONOGRAPTIDS FROM THE CHEŁM KEYSECTION (EEP)

PLATE 1

1. Flattened rhabdosome. The first theca provided with two lateral lapets. Successive thecae straight, of dubius type, depth $1610.5-1611.1 \text{ m}; \times 5.5$

Neocolonograptus ultimus (PERNER)

2-5. Flattened rhabdosomes with well-developed first theca and notches on the successive ones, depth 2, 4, 5 – 1601.5-1601.6 m, 3 - 1606.2-1606.4 m; 2×9.5 ; 3×3.5 ; $4-5 \times 4.5$.

- 6. Flattened and broken fragment of rhabdosome. Two proximal thecae provided with lateral paired lapets, depth $1461.3-1461.5 \text{ m}; \times 4.5$.
- 7. Flattened complete rhabdosome. Two proximal thecae provided with paired lateral lapets, depth 1462.0-1462.1 m; × 4.5.

8-9. Flattened complete rhabdosomes. Three first thecae provided with paired lateral lapets, depth 8 — 1463.9-1464.8 m, depth 9 - 1514. 1 m; 8 × 4.5; 9 × 5.6.

All samples from the Chełm IG-1 borehole.



LECH TELLER

REVISION OF CERTAIN PŘIDOLI MONOGRAPTIDS FROM THE CHEŁM KEYSECTION (EEP)

PLATE 2

- 1. Flattened complete rhabdosome, depth 1364.85-1365.1 m; × 5.3.
- 2. Medium size flattened rhabdosome. Five proximal thecae with well developed paired lateral lapets, depth $1383.5-1383.7 \text{ m}; \times 6$.
- 3. Juvenile proximal part in half relief. Four thecae with developed paired lateral lapets, depth 1383.55–1383.7 m; \times 6.
- 4. Juvenile broken proximal part. Five first of ten thecae with well-developed paired lateral lapets, depth 1383.9–1384.1 m; \times 6.
- 5. Isolated first two thecae with well-developed lateral lapets and a notch, depth 1379.4–1379.5 m; \times 43.
- 6. Isolated three distal thecae with a roll-like thickening surrounding the apertural margin, depth 1373.4–1375.8 m; \times 30.
- 7. Isolated five proximal thecae and sicula. The thecae with well-developed lateral lapets and notches. Sicula simple with a slight wing-like process, depth 1382.5-1382.6 m; $\times 25$.
- 8. Isolated broken proximal part with three thecae provided with well developed lateral lapets and notches. Sicula normal with a light dorsal process, depth 1379.7–1379.8 m; × 35.
- 9. Isolated sicula with a wide aperturae surrounded by a roll-like thickening. The first theca possesses a pair of well-developed lateral lapets, depth 1379.4-1379.5 m; × 40.
- 10. Isolated sicula with a big concave wing-like dorsal process and a thick roll like margin with a virgella, depth $1382.5-1382.6 \text{ m}; \times 70.$
- 11. Isolated sicula with a wide, almost straight, aperture and a slightly widened dorsal process. First theca provided with two lateral lapets, depth 1383.0–1383.2 m; × 53.

All samples from the Chełm IG-1 borehole.



LECH TELLER

REVISION OF CERTAIN PŘIDOLI MONOGRAPTIDS FROM THE CHEŁM KEYSECTION (EEP)

PLATE 3

Neocolonograptus lochkovensis (PŘIBYL) 77

- 1. Flattened juvenile rhabdosome. Thecae provided with very distinct paired lateral lapets, depth 1547.6-1547.7 m; \times 6.5.
- 2. Flattened juvenile rhabdosome. 8th thecae provided with distinct paired lateral lapets, depth 1542.5–1542.6 m; \times 6.0.
- 3. Flattened two first thecae provided with paired lateral lapets, depth $1572.9-1573.1 \text{ m}; \times 8.0$.
- 4. Adult flattened rhabdosome, 15 thecae provided with paired lateral lapets, depth 1547.6–1547.7 m; \times 6.5.
- 5. Adult flattened rhabdosome, 25 thecae provided with paired lateral lapets, depth 1544.1 m; \times 6.6.
- 6. Isolated broken fragment of rhabdosome with four thecae and a distinct sicula, depth 1514.5-1514.7 m; \times 50.
- 7. Isolated sicula and first theca possessing two distinct lateral lapets. The dorsal process of the sicula wing-like and the apertural margin thickened, depth 1542.5-1542.6; $\times 46$.
- 8. Isolated proximal thecae provided with two lateral lapets. The apertural margin of the sicula thickened, depth 1565.3-1565.5; \times 50.
- 9. Isolated first theca with two lateral lapets. The sicula with a dorsal process and a thickening surrunding the aperturae, depth 1560.0 m; × 50.

All samples from the Chełm IG-1 borehole.

