

## *Novaplatirostrum*, late Famennian rhynchonellid brachiopod genus from Sauerland and Thuringia (Germany)

by Paul SARTENAER

### Abstract

A new genus, *Novaplatirostrum*, with type species *N. sauerlandense* n. sp., is described from the late Famennian of northern Sauerland and southeastern Thuringia. From the latter region, lack of material precludes a description of the species, but serial transverse sections made from two specimens confirm the generic placement. Both species are rare and occur with goniatites in a deep water facies.

**Key-words:** *Novaplatirostrum* - rhynchonellid - brachiopod - late Famennian - Sauerland - Thuringia

### Résumé

L'auteur fonde un nouveau genre, *Novaplatirostrum*, avec *N. sauerlandense* n. sp. du Famennien supérieur du Sauerland septentrional comme espèce-type. Le manque de matériel à la disposition de l'auteur interdit la description d'une autre espèce de la Thuringe sud-orientale, mais des sections sérieuses transverses ont été effectuées dans deux spécimens de cette espèce pour en confirmer l'appartenance générique. Les deux espèces sont rares et associées à des goniatites dans un faciès d'eau profonde.

**Mots-clefs:** *Novaplatirostrum* - Rhynchonellide - Brachiopode - Famennien supérieur - Sauerland - Thuringe

### Introduction

Although rare in Devonian deep water facies, brachiopods usually occur together with goniatites as a minor element of the fauna. This is the case in northern Sauerland where a rhynchonellid brachiopod, here designated as the type species of a new genus, is found at many horizons within the Wocklum Limestone. The rarity makes a study worth while, but not necessarily feasible, for a collection of acceptable size must be available. Such a collection has been assembled through the patient endeavour of various palaeontologists over the last 150 years.

SARTENAER (1986, pp. 145-150) recognized four stages in the evolution of the study of rhynchonellids. The fourth stage - increased breaking up - is the current phase. It runs alongside the continuation of the third stage - notable increase in the number of genera -, with the combination of both stages leading inevitably to a greater chronological accuracy. *Novaplatirostrum* n. gen. is an example that

perfectly illustrates this approach. It results from a restriction of the meaning of the genus *Planovatiostrum* SARTENAER, 1970, which has become too encompassing due either to species erroneously assigned to it or to forms mistaken as a valid species of the genus. On the base of the literature SARTENAER (1982, p. 132, table 2) reported the following stratigraphical range for the genus in terms of the ammonoid succession: do (III)-IV,V,VI. SARTENAER & XU (1989, p. 44) wrote that the do III age remained uncertain, and even doubtful, and that the do VI occurrence needed confirmation and corroboration. With the introduction of the new genus, the latest Famennian (do VI) age will now have to be ruled out, and do IV-V, as stated by SARTENAER & XU (1989, p. 44), remains "the most reliable age for the genus *Planovatiostrum*". Thus *Novaplatirostrum* n. gen. succeeds *Planovatiostrum* in time.

When citing the species included in the genus *Planovatiostrum*, SARTENAER & XU (1989, pp. 38-39) discussed briefly the way in which views evolved on *Terebratula subcurvata* von MÜNSTER, 1840 and *T. Richteri* OPPENHEIMER, 1916. The problems raised by forms assigned to both these species are here investigated further in order to answer questions related to their identity, geographical distribution, generic assignment, and age. Four regions are concerned: Upper Franconia, southeastern Thuringia, northern Sauerland (all three in Germany), and Moravia (Czech Republic). The intricate way in which views regarding these species evolved in course of time are elucidated and summarized in Table 1.

The first indication of the presence of the new genus here proposed possibly goes back to von MÜNSTER (1840, p. 78, pl. XIV, fig. 15), who identified a species found at Schübelhammer in Upper Franconia as *Terebratula rotunda* (MURCHISON, 1839). Caution must be observed however, because the species is described as "sehr gewölbt", and figure 15 is the dorsal view of a narrow specimen that unfortunately could not be located. Representatives of the species belonging to the new genus are never strongly convex, and narrow specimens are of exceptional occurrence. In any case this form has nothing in common with the Wenlock Shale species *Atrypa rotunda* described by MURCHISON (1839, p. 629, pl. 13,

Table 1 — Various generic and specific assignments since 1848 of the species discussed in the present paper.

		SE THURINGIA	MORAVIA	N SAUERLAND
1848	RICHTER	<i>Terebratula</i> , p. 40, pl. V, figs. 153-155, 158, 159		
1856	RICHTER in RICHTER & UNGER	<i>Terebratula subcurvata</i> var. v. Münster, p. 29, pl. I, figs. 37-39		
1916	OPPENHEIMER	<i>e.p. Terebratula Richteri</i> n.n., pp. 35-36	<i>Terebratula Richteri</i> n.sp., p. 6 <i>e.p. Terebratula Richteri</i> n.n., pp. 35-36, pl. I, figs. 13a,b	
1924	SCHMIDT	<i>Liorhynchus subcurvata</i> RICHT. (non MSTR.), p. 145, p.p., p. 162 p.p.		<i>Liorhynchus subcurvata</i> RICHT. (non MSTR.), p. 145p.p., p. 161, p. 162 p.p., non synonymia.
1928	GALLWITZ	<i>e.p. Liorhynchus subcurvata</i> RICHT., p. 525		<i>Liorhynchus subcurvata</i> RICHT., p. 496, p. 519, p. 525 p.p.
1954	PFEIFFER	<i>Liorhynchus subcurvata</i> (REINH. RICHTER), p. 69, pl. IX (=p. 104), fig. 7		
1972	WEYER	<i>e.p. "Liorhynchus subcurvatus</i> (RH. RICHTER, 1856, non MÜNSTER, 1840)", p. 84		<i>e.p. "Liorhynchus" subcurvatus</i> (RH. RICHTER, 1856, non MÜNSTER, 1840)", p. 84
1979	WEYER	<i>Planovatiostrum cf. planoovale</i> (Nalivkin, 1937), p.99, p. 103, pl. 4, fig. 13		
1979	HAVLÍČEK		<i>Planovatiostrum richteri</i> (Oppenheimer, 1916), pp. 96-97, pl. II, figs. 1-5 (=pl. I, figs. 13a,b in OPPENHEIMER, 1966), fig. 6 in textu p. 96	
1980	BARTZSCH & WEYER	<i>Planovatiostrum</i> , p.39		
1981	WEYER	<i>Planovatiostrum cf. richteri</i> (OPPENHEIMER, 1916), p. 5,		
1986	WEYER in BARTZSCH & WEYER	<i>Planovatiostrum richteri</i> (OPPENHEIMER, 1916), pl. I, right column, fig. 4		
1988	BECKER	<i>e.p. Planovatiostrum richteri</i> (OPPENHEIMER), p. 194	<i>e.p. Planovatiostrum richteri</i> (OPPENHEIMER), p. 194	<i>Planovatiostrum richteri</i> (OPPENHEIMER), p. 194 p.p., fig. 2, p. 195, p. 196, p. 198, pl. 2 (= p. 213), figs 17-19
1990	WEYER	<i>Planovatiostrum richteri</i> , fig. 3/18 (= p. 29), fig. 13 (=pl. 4, fig. 13 in WEYER, 1979 as <i>P.</i> <i>cf. planoovale</i> )		
1993	WEYER in BARTZSCH , BLUMENSTENGEL & WEYER	<i>Planovatiostrum richteri</i> , fig. 13, p.35 (= pl. 4, fig. 13 in WEYER, 1979 as <i>P. cf.</i> <i>planoovale</i> )		
1993	BECKER in KÜRSCHER, et al.			<i>Planovatiostrum richteri</i> , p. 603
1993	BECKER in BECKER et al.			<i>Planovatiostrum richteri</i> , fig.17, p. 25, fig. 18, p. 26
1995	SEIDEL	<i>Planovatiostrum cf. richteri</i> , pl. 4.3.4-I (=p.141 ), fig. 13 (= pl. 4, fig. 13 in WEYER, 1979 as <i>P. cf. planoovale</i> )		
1996	BECKER			<i>Planovatiostrum richteri</i> (Oppenheimer) auct., fig.1, p. 21, p.23

*e.p.* (= *ex parte*) and *p.p.* (= *pro parte*) mean that more than one region is concerned



fig. 7) to which von MÜNSTER refers. Thus, the first reliable mention of material belonging to the new genus is that of RICHTER (1848, p. 40, pl. V, figs. 153-155, 158, 159; not figs. 156, 157, 160, 161), who identified it as *Terebratula* at Bohlen and Pfaffenberg near Saalfeld, in southeastern Thuringia. Later, the same author (1856, p. 29) accepted at Bohlen the name *T. subcurvata* var. for one (figs. 6a,b) of the three varieties ("Spielarten" or "Varietäten") of *T. subcurvata* introduced by von MÜNSTER (1840, p. 76, figs. 4a,b, 5a,b, 6a,b). He figured (pl. I, figs. 37-39) a small to middle-sized specimen with four costae on the fold and three in the sulcus, which has nothing in common with any of the varieties described and figured by von MÜNSTER. *T. subcurvata* itself is a species from the late Silurian Orthoceratidenkalk of Elbersreuth in Upper Franconia that is not discussed here, because it has nothing to do with any of the fossils mentioned in this paper to which its name has been given at either specific or generic level; it is probably not even a rhynchonellid. It is precisely on account of this absence of relationship ("keine Verwandtschaft") between *T. subcurvata* and a Moravian species "hauptsächlich im thüringischen Oberdevon verbreitet" that OPPENHEIMER (1916, p. 6, pp. 35-36) put RICHTER's (1856, pl. I, figs. 37-39) *T. subcurvata* into synonymy with a new Moravian species (figs. 13a,b), *T. Richteri* OPPENHEIMER, 1916. This species, collected near Brno in the "Ostracodenkalk" at the top of the "Mittleres Oberdevon", is rare (according to HAVLÍČEK, 1979, p. 96). The Thuringian and Moravian forms are thus considered conspecific.

SCHMIDT (1924, p. 145, p. 161, p. 162, p. 163), who was not aware of OPPENHEIMER's (1916) publication, thought he could recognize the forms called *T. subcurvata* var. by RICHTER (1856, p. 29, pl. I, figs. 37-39) from southeastern Thuringia in the "Dasbergsschichten" (to V $\alpha$ , V $\beta$ , VI) of the northwestern part (Gerlingsen and Hasselbachtal) of Sauerland as well as in its northeastern part (Belecke and Eulenspiegel), and in the Kellerwald (Wildungen). He called them *Liorhynchus subcurvata* RICHT. (non MSTR.). In turn GALLWITZ (1928, p. 496, p. 519, p. 525) described *L. subcurvata* RICHT. from "die Seiler bei Iserlohn" in the northwestern part of Sauerland, from beds considered as equivalent to the "Dasberg-Schichten  $\beta$ ". The Thuringian and the Sauerlandian forms are thus considered to be conspecific.

Following the taxonomic position taken by SCHMIDT (1924) and GALLWITZ (1928), PFEIFFER [1954, p. 69, pl. IX (= p. 104), fig. 7] gave the name *L. subcurvata* (REINH. RICHTER) to the Thuringian form from Bohlen and declared it restricted to "Stufe VI". WEYER (1972, p. 84) correctly expressed that he was unsatisfied with such a specific and generic assignment. Accordingly, in 1979 (p. 99, p. 103, pl. 4, fig. 13) he used the name *Planovatiostrum* cf. *planoovale* (NALIVKIN, 1937) for the form from Bohlen, immediately south of Saalfeld, which was found in the Wocklumian between 0.4 and 0.6 m under the "Upper Quartzite horizon" (= Upper *Bispathodus costatus* Zone in terms of the old conodont succession) as well as for the figured specimen collected at the

Mauxion railway station in the Bohlen section in the "middle part of the upper clymenioid limestones and shales, level with *Kalloclymenia subarmata*" (= Middle *Bispathodus costatus* Zone in terms of the old conodont succession). BARTZSCH & WEYER (1980, p. 39) mentioned also *Planovatiostrum* in the "Begleitfauna" of the beds with *Wocklumeria sphaeroides* at Fischersdorf-Ost near Saalfeld. HAVLÍČEK (1979, pp. 96-97, pl. II, figs. 1-5, fig. 6 in textu p. 96) identified as *Planovatiostrum richteri* (OPPENHEIMER, 1916) a Moravian species that had fallen into oblivion. It had been collected near Brno on Hády Hill in the Hády Limestone (Famennian V or VI), and at Ostrov in beds of Famennian V age. WEYER (1981, p. 5) adopted this name in Thuringia, using *P. cf. richteri* for a specimen collected in the *Wocklumeria*-Stufe in the Geipel quarry in Schleiz. WEYER (in BARTZSCH & WEYER, 1986, pl. I, right column, fig. 4) also identified and figured as *Planovatiostrum richteri* a specimen from the lower part of the *Wocklumeria*-Stufe at Gositz-Felsen-Süd near Fischersdorf south of Saalfeld.

To conclude, one and the same species of the genus *Planovatiostrum*, *P. richteri*, is supposed to characterize beds of latest Famennian age in southeastern Thuringia, Moravia, and northern Sauerland. This is recalled by BECKER (1988, p. 194), who collected [fig. 2, p. 195, p. 196, p. 198, pl. 2 (= p. 213), figs. 17-19] fifteen specimens of the species from the Wocklum Limestone in the section of the southern slope of the Hasselbachtal, northwestern Sauerland. Twelve specimens were also collected by BECKER (1996, fig. 1, p. 21, p. 23) in various beds of the same section.

SARTENAER & XU (1989, p. 38) have already expressed their disagreement with the amalgamation of the Moravian and Thuringian forms into one and the same species.

### Novaplatirostrum n. gen.

#### DERIVATIO NOMINIS

The name is formed by rearrangement of the first seven letters of *Planovatiostrum*, to which the new genus bears great resemblance. It is more than a coincidence that *nova* and *plati* are parts of the name. "*Nova*" (*novus*, *a*, *um* = Latin adjective meaning new) indicates that new light is shed indirectly on the genus *Planovatiostrum*, and "*plati*" ( $\pi\lambda\alpha\tau\acute{\upsilon}\nu$ ,  $\epsilon\acute{\iota}\alpha$ ,  $\upsilon$  = Greek adjective meaning flat) is meant to stress one of the characteristic external features of the new genus, its flatness.

#### TYPE SPECIES

*Novaplatirostrum sauerlandense* n. gen., n. sp.

#### DIAGNOSTIC FEATURES

Small- to medium-sized; flatly biconvex valves; outline variable, commonly distorted; sharp commissure; very shallow sulcus; very low fold; sulcus and tongue wide; top of tongue always located lower, often considerably lower, than top of shell; few, low, well marked, simple and wide median costae, restricted to anterior third of



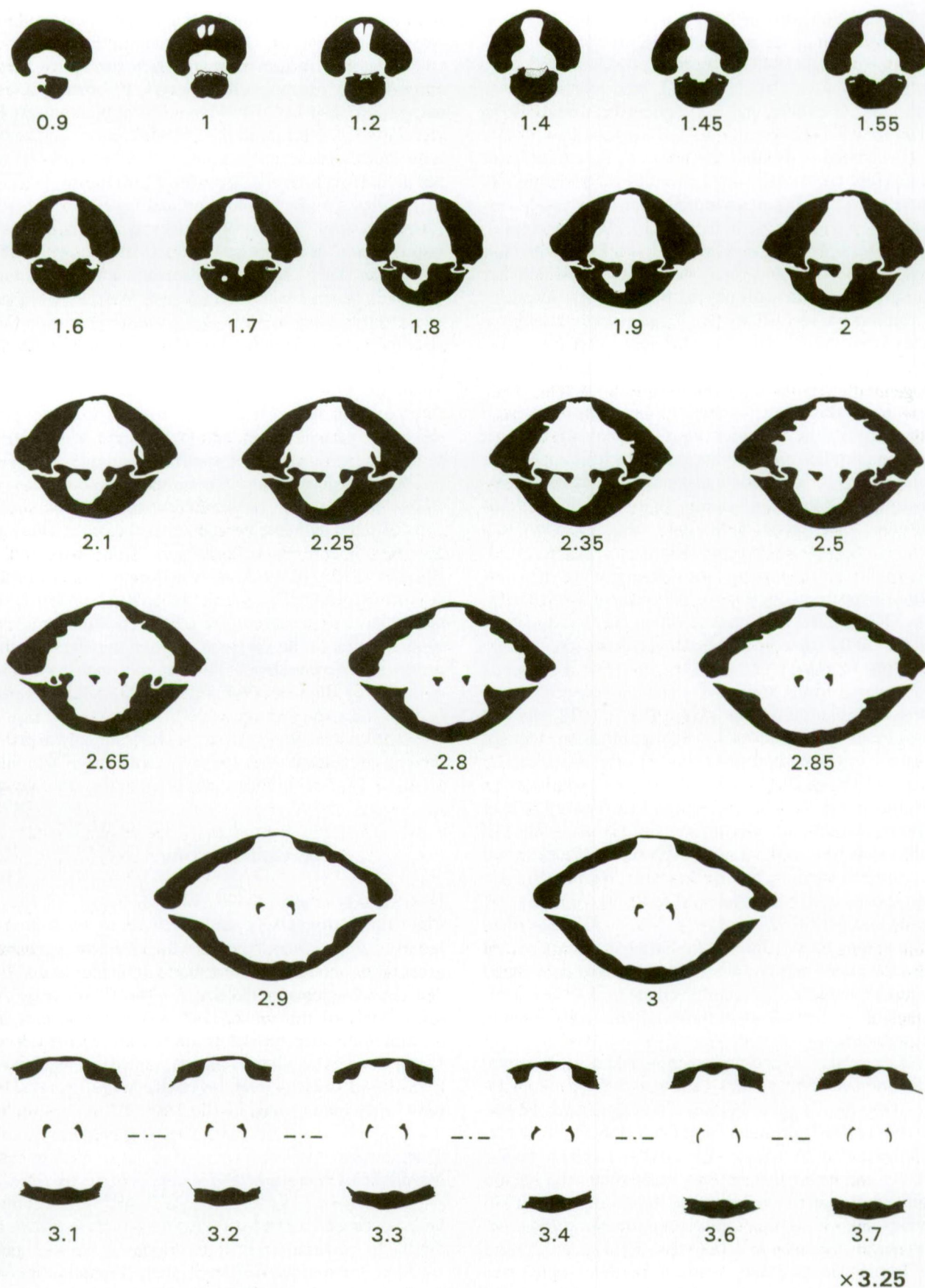


Fig. 1 — *Novaplatisrostrum sauerlandense* n. gen., n. sp. Camera lucida drawings of serial transverse sections; figures are distances in mm forward of the ventral umbo. Paratype J, SMF65008. Measurements: length = 23.2 mm; width = 27.3 mm; thickness = 10 mm.



shell; few lateral costae if any, and, when present, often reduced to undulations of commissure; costellae present; wide apical angle; thick shell; no dental plates; short crura.

#### SPECIES ATTRIBUTED TO THE GENUS

Besides the type species, one other species from southeastern Thuringia is assigned to the genus. Various generic and specific names have erroneously been given to the latter species in the course of time (see Table 1). On account of insufficient material this species is left in open nomenclature. Nevertheless serial transverse sections have been made in two specimens (MB.-B.1037, 1038), and those of the former are figured (Text-Fig. 2).

#### DESCRIPTION

Size generally small to medium, rarely large. Flat. Uniplicate to slightly parasulcate. Valves flatly biconvex. Outline variable, commonly subrounded (Pl. 1, Figs. 16-20) to transversely subelliptical (Pl. 1, Figs. 1-5), rarely subpentagonal (Pl. 1, Figs. 36-40), very rarely subrectangular, and exceptionally subquadratic. On account of asymmetry, outline is slightly distorted in about fifty per cent of specimens. Transverse profile shallowly biconvex. Commissure sharp, projecting, clearly indented by median costae, and lateral costae when present. External median costae on fold rarely slightly higher than middle ones, when frontal commissure has slight median depression. Postero-lateral margins concave near commissure.

Flanks of shallow pedicle valve flat to slightly convex, sloping gently from umbonal region, which has slight relief. Very shallow sulcus becoming well marked and clearly separated from flanks in anterior third or less of valve. Bottom of sulcus slightly convex or flat. Sulcus starts wide, becoming very wide at front. Tongue wide, very shallow, trapezoidal, well defined; its top is always lower, often considerably lower, than top of shell. Beak small, flat, erect to slightly incurved, overhanging cardinal line, often almost in contact with dorsal umbonal region. Interarea shallow, wide, clearly separated from flanks. Neither foramen nor deltidial plates have been observed.

Brachial valve shallow, slightly and uniformly convex. Although very low, fold is nevertheless well marked and clearly separated from flanks in anterior third or less of valve; it develops late, and is wide at front. Median part of fold rarely depressed anteriorly; this depression affects whole part of fold between external costae.

Costae few, clearly marked, relatively regular, simple, wide, angular with rounded top, low or of reduced height. Median costae develop late; they begin sometimes somewhat anterior to, sometimes somewhat posterior to, and sometimes on a level with the beginning of sulcus and fold. Lateral costae when present are short, and often mere undulations of the commissure. No parietal costae. Costellae present.

Maximum depth of pedicle valve located posteriorly. Top of brachial valve is never at frontal commissure, but

at variable point located either posteriorly or around mid-length; from this point valve slopes rapidly towards frontal commissure. Width always greatest dimension. Maximum width of shell occurs between half and two thirds of shell-length anterior to ventral beak. Both valves are low and have subequal thicknesses. Wide apical angle and angle of commissure.

Shell thick. Neither dental plates nor umbonal cavities nor septum. Teeth small, wide and strong. Hinge plate composed of two strong, flat to slightly concave parts. A distinct layer of secondary shell, resting on the hinge plate, is clearly observable in serial transverse sections. Inner socket ridges of dental sockets moderately high and extending ventro-laterally. Stout crural bases. Crura short, in serial transverse sections triangular proximally and hooked distally.

#### COMPARISONS

*Novaplatirostrum* n. gen. and *Planovatiostrum* have the following features in common: flat appearance with gently biconvex profile; sharp commissure protruding, and clearly indented by the median costae; flat to slightly convex ventral flanks; very shallow sulcus and very low fold, both well marked, beginning at some distance from the beaks and wide at front; wide tongue, very shallow, trapezoidal with sharp borders, standing out clearly; top of tongue always lower than top of shell; small, erect to slightly incurved beak, overhanging the cardinal line, often almost in contact with the dorsal umbonal region; long ventral interarea; few well marked and wide costae, angular with rounded top; wide apical angle and angle of the commissure; small, wide and strong teeth; a distinct layer of secondary shell resting on the hinge plate; inner socket ridges of dental sockets moderately high and stretched ventro-laterally.

Many characters make *Novaplatirostrum* n. gen. distinct from *Planovatiostrum*: size usually smaller, i.e. it does not reach a size commonly acquired by species of *Planovatiostrum*; variable outline (always suboval in *Planovatiostrum*), and then commonly (in around 50 per cent of specimens), slightly distorted on account of asymmetry; median part of fold rarely marked by a slight depression; sulcus and fold starting in the anterior third (often less) of the valve, wider where they start, and widening slowly; top of tongue often located lower; costae lower and shorter, always simple; median costae beginning a great distance from the beaks; lateral costae more often absent, commonly reduced to mere undulations of the commissure; shift, within the limits of similar general costal formulae, of the number of median costae towards higher values, the reverse being true for the number of lateral costae; costellae present; greatest thickness of shell commonly located more posteriorly, and brachial valve sloping more rapidly from this point; different ratios of dimensions:  $l/w$  (0.72 to 0.88 for *Novaplatirostrum*; 0.70 to 0.79 for *Planovatiostrum*);  $t/w$  (0.35 to 0.47 for *Novaplatirostrum*; 0.31 to 0.34 for *Planovatiostrum*);  $t/l$  (0.41 to 0.54 for *Novaplatirostrum*; 0.41 to 0.47 for *Planovatiostrum*); thicker shell; absence



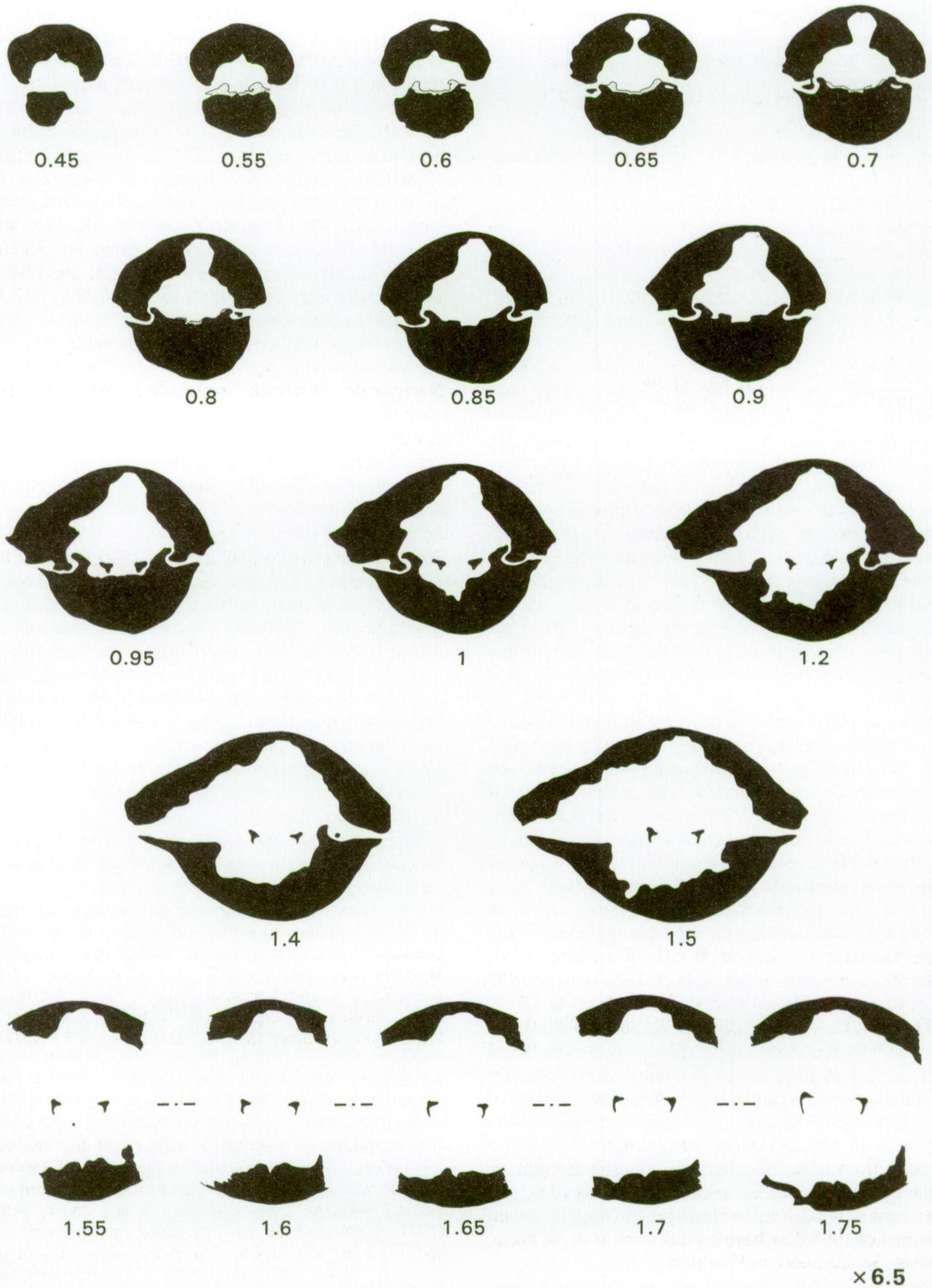


Fig. 2 — *Novaplatirostrum* sp. Specimen collected by D. Weyer, in 1969 at Bornleite near Obernik (Saalfeld), southeastern Thuringia, in the middle “*Wocklumeria*-Stufe”. Camera lucida drawings of serial transverse sections; figures are distances in mm forward of the ventral umbo. MB.-B.1037. Measurements: length = 15.2 mm; width = 18.6 mm; thickness = 6.8 mm.



of dental plates, umbonal cavities and crural plates; shorter crura.

*Novaplatirostrum sauerlandense* n. gen., n. sp.

Plate 1, Figures 1-40, Text-figure 1

SYNONYMY

- 1924 *Liorhynchus subcurvata* RICHT. (non MSTR.) - SCHMIDT, p. 145 *pro parte*, p. 161, p. 162 *pro parte*, non synonymia;
- 1928 *Liorhynchus subcurvata* RICHT. - GALLWITZ, p. 496, p. 519, p. 525 *pro parte*;
- e.p. 1972 "*Liorhynchus subcurvatus* (RH. RICHTER, 1856, non MÜNSTER, 1840)" - WEYER, p. 84;
- 1988 *Planovatiostrum richteri* (OPPENHEIMER) - BECKER, p. 194 *pro parte*, fig. 2, p. 195, p. 196, p. 198, pl. 2 (= p. 213), figs. 17-19;
- 1993 *Planovatiostrum richteri* - BECKER in KÜRSCHNER *et al.*, p. 603;
- 1993 *Planovatiostrum richteri* - BECKER in BECKER *et al.*, fig. 17, p. 25 (= fig. 2, p. 195 in BECKER, 1988, slightly updated), fig. 18, p. 26;
- 1996 *Planovatiostrum richteri* (Oppenheimer) auct. - BECKER, fig. 1, p. 21, p. 23.

DERIVATIO NOMINIS

From Sauerland in west-central Germany.

TYPES

Holotype, SMF50004 [Pl. 1, Figs. 16-20 = pl. 2 (= p. 213), figs. 17-19 in BECKER, 1988 as *Planovatiostrum richteri*], Paratype I, SMF50002. Respectively bed 23 and bed 18 (fig. 2, p. 195, p. 196 in BECKER, 1988 as *P. richteri*) in the lower half of the Wocklum Limestone in the Hasselbachtal S-Section, northwestern Sauerland = lower half of the *Kamptoclymenia endogona* Subzone (lower *Parawocklumeria paradoxa* Zone), do VIß. This age has been slightly modified (personal communication by Becker, R.T.) and is now: *Kosmoclymenia* (*Muessenbiaergia*) *bisulcata* Zone (see BECKER, 1996) = lower part of the Upper *Kalloclymenia subarmata* Zone *sensu* KORN (e.g. 1986), do Vα. Collector: Becker, R.T., 1986, 1987. Paratypes A, SMF65002 (Pl. 1, Figs. 1-5), B, SMF65003 (Pl. 1, Figs. 6-10), C, SMF65004 (Pl. 1, Figs. 11-15), E, SMF65005 (Pl. 1, Figs. 26-30), F, SMF65006 (Pl. 1, Figs. 31-35), G, SMF65007 (Pl. 1, Figs. 36-40), J, SMF65008 (Text-Fig. 1). Hasselbachtal, northwestern Sauerland. "Wocklumer-Kalk VI". Collector: Brakensiek, H., between 1912 and 1928. These paratypes, identified as *Leiorhynchus subcurvata* RICHTER were part of the collections of the Städtisches Museum in Menden, northern Sauerland, under the catalogue number 88/3613; on account of the definitive closing down of this museum at the end of 1995 they have been deposited in the Natur-Museum Senckenberg in Frankfurt.

Paratype D, SMF65000 (Pl. 1, figs. 21-25). Riemke, northwestern Sauerland. "Wocklumer-Kalk VI". Collector: Brakensiek, H., between 1912 and 1928. Identified as *Leiorhynchus subcurvata* RICHTER. Previous Städtisches Museum's catalogue number: 88/3618a.

Paratype H, MB.-B.1031. Henkhausen, Hasselbachtal, northwestern Sauerland. "Dasberg Schichten (to4)". Collector: Torley, K., before 1924. This paratype, identified as *Liorhynchus subcurvata* RICHT. (non MSTR.), has been mentioned by SCHMIDT (1924, p. 145).

Other paratypes have the following catalogue numbers: SMF50000/1-5, 50001/1,2, 50003, 50005/1-3, 50006, 50007 (see BECKER, 1988, fig. 2, p. 195, p. 196, p. 198), 65001 (previous Städtisches Museum Menden's catalogue number 88/3618b), 65008-65014 (previous Städtisches Museum Menden's catalogue number 88/3613), MB.-B.1008-1012, 1013.1,2, 1014, 1015, 1016.1-3 (see BECKER, 1996, fig. 1, p. 21, p. 23), 1017-1030, 1032-1036 (see under Material).

SMF = Natur-Museum Senckenberg, Frankfurt.

MB.-B. = Paläontologisches Museum des Museums für Naturkunde, Humboldt Universität zu Berlin (HUB).

LOCUS TYPICUS

South slope of the Hasselbachtal section, northwestern Sauerland, west-central Germany.

STRATUM TYPICUM

Bed 23 in the lower half of the Wocklum Limestone in the Hasselbachtal S-Section = lower half of the *Kamptoclymenia endogona* Subzone (lower *Parawocklumeria paradoxa* Zone), do VIß (see BECKER, 1988, fig. 2, p. 194, p. 196). This age has been slightly modified (personal communication by Becker, R.T.) and is now: *Kosmoclymenia* (*Muessenbiaergia*) *bisulcata* Zone (see BECKER, 1996, fig. 1, p. 21, table 1, p. 26, table 2, p. 28) = lower part of the Upper *Kalloclymenia subarmata* Zone *sensu* KORN (e.g. 1986), do VIα.

MATERIAL

The material consists of seventy-three specimens deposited in four German scientific institutions; only sixty-three specimens were examined by the author.

Eight specimens from the following localities were examined in the Paläontologisches Museum des Museums für Naturkunde, Humboldt Universität zu Berlin: Eulenspiegel near Warstein [two specimens (MB.-B.1035,1036), one of them collected by A. Denckmann & H. Lotz, 1901; "Gonioclymenien-Schichten (Dasberg Stufe to V)"]; road trench near Gerlingsen [one specimen (MB.-B.1029) collected by A. Denckmann & H. Lotz, 1900 in the "Wocklumer Kalk (tow)"]; Henkhausen [four specimens (MB.-B.1031-1034) in the K. Torley collection; "Dasberg-Schichten = to4"]; Bemberg above Henkhausen, Hasselbachtal [one specimen (MB.-B.1030) collected by A. Denckmann, 1904 in the "Wocklumeria Kalk"; "Dasberg-Schichten = to4"]. These specimens, with the exception of one from Eulenspiegel, have been identified as *Liorhynchus subcurvata* RICHT. (non MSTR.) by SCHMIDT (1924, p. 98, p. 145), who examined them as well as six specimens [Belecke (one specimen), Hasselbachtal (one specimen), Wildungen (four specimens)], which the writer did not manage to locate in the collection.

Two specimens from Eulenspiegel near Warstein are deposited in the collection of the Geologisch-Paläontologisches Institut und Museum der Georg-August-Universität in Göttingen. They have also been examined and identified as *Liorhynchus*.



*chus subcurvata* RICHT. (non MSTR.) by SCHMIDT (1924, p. 145). The writer could not have access to these two specimens.

Fifteen specimens from the Hasselbachtal section (thirteen specimens, 88/3613) and from Riemke (two specimens, 88/3618a,b) were located in the collections of the Städtisches Museum in Menden (northern Sauerland). They were collected by Brakensiek, H., high school teacher, in the "Wocklumer-Kalk VI" and are identified as *Leiorhynchus subcurvata* RICHTER. 88/3613 and 3618a,b are catalogue numbers given by MAY, who brought the museum collections up-to-date in 1988, and published (1991) on some Givetian brachiopods and corals from northwestern Sauerland contained in them. They have received the following SMF numbers: 65000-65001 for 88/3618a,b, and 65002-650014 for 88/3613.

Thirty-three specimens from the southern slope section (= Hasselbachtal S-Section) of the Hasselbachtal are part of the collections of the Natur-Museum Senckenberg in Frankfurt/Main (SMF) and of the Paläontologisches Museum des Museums für Naturkunde, Humboldt Universität zu Berlin (HUB)(MB.-B.). Sixteen specimens were identified as *Planovatirostrum richteri* (OPPENHEIMER) by BECKER (1988, fig. 2, p. 195, p. 196, p. 198), who illustrated one of them [pl. 2 (= p. 213), figs. 17-19]; fifteen have the following catalogue numbers: SMF 50000/1-5, 50001/1,2, 50002, 50003, 50004 (photographed), 50005/1-3, 50006, 50007; a fragment of a brachial valve of a loose specimen did not receive a number. Thirteen specimens have been identified as *P. richteri* auct. by BECKER (1996, fig. 1, p. 21, p. 23), who gave Ob numbers to twelve of them; they are catalogued under the following numbers: MB.-B.1008 (= Ob47), 1009 (= Ob71), 1010 (= Ob72), 1011 (= Ob73), 1012 (= Ob74), 1013.1 (= Ob83/1), 1013.2 (= Ob83/2), 1014 (= Ob56), 1015 (= Ob48), 1016.1 (= Ob70/1), 1016.2 (= Ob70/2), 1016.3 (= Ob70/3), 1017. Two specimens (MB.-B.1025,1026) have been collected in 1995 by Weyer, D. Two further specimens have been given up for studies on strontium isotope stratigraphy (see KÜRSCHNER *et al.*, 1993, p. 603) and did not receive catalogue numbers.

Nine specimens from the northern slope of the Hasselbachtal (= Hasselbachtal N-Section), collected in 1993 and 1994 by D. Weyer were also deposited in the collection of the Paläontologisches Museum des Museums für Naturkunde, Humboldt Universität zu Berlin (HUB) under the catalogue numbers: MB.-B.1018-1024, 1027, 1028.

Thirty-five of the sixty-five specimens examined are in good state of preservation, sixteen satisfactory, and one poor; thirteen specimens are fragmental.

DESCRIPTION  
This refers only to specific characters in need of further detail.

Contour slightly distorted in 54 per cent of specimens. In six specimens the external median costae on the fold are slightly higher than the middle ones.

Sulcus beginning at 66 to 81 per cent of the shell-length, most of the values varying from 69 to 76 per cent, or 57 to 80 per cent of the unrolled length of the valve, most of the values varying from 63 to 76 per cent. The sulcus starts with a width of 56 to 81 per cent of its width at the front, and reaches its greatest width (60 to 69 per cent of the shell-width, most of the values varying from 63 to 66 per cent) at the junction of the frontal and lateral commissures. Top of tongue 32 to 48 per cent lower than point of maximum shell-thickness. Length of ventral interarea varying from 43 to 74 per cent of shell-width. Median depression on the fold in six specimens.

The general costal formula, which is a grouping of at least 75 per cent of the specimens in median, parietal, and

lateral categories, is  $\frac{4-5}{3-4}$ ; 0;  $\frac{0-2}{0-3}$ . The ratios of median

and lateral costae (in specimens in which such observations were possible) are given in Table 2. Median costae begin at a distance of the beak varying from 65 to 85 per cent of shell-length, most of the values varying from 71 to 82 per cent. Width of costae at front generally varies from 2 to 3.5 mm, but the external median costa on both sides may reach a width as high as 5 mm. Lateral costae absent in 33.5 per cent of specimens. Costellae (5 per mm at front) have been observed in two specimens.

Measurements of ten specimens, of which eight have been photographed, are given on Table 3. Columns 2 to 8 refer to adult specimens, column 1 to the largest specimen at hand, column 9 to an ephebic, and column 10 to a juvenile.

Top of pedicle valve located posteriorly at a variable point between 22 and 41 per cent of the shell-length, and top of brachial valve at a point varying between 28 and 53 per cent of the shell-length anterior to the ventral beak. Maximum width occurs at a point between 49 and 65 per

Table 2 — Number of median and lateral costae.

Median costae			Lateral costae		
Number of costae	Number of specimens	%	Number of costae	Number of specimens	%
3/2	2	4.5	0	16	39
4/3	20	43.5	1/2	13	32
5/4	18	39	2/3	9	22
6/5	6	13	3/4	3	7
	46	100		41	100



Table 3 — Measurements (in mm) based on 10 specimens; figures in parentheses are reasonable estimates on damaged specimens. Abbreviations used: l = length; w = width; t = thickness; pv = pedicle valve; bv = brachial valve.

in mm	Paratype H	Paratype A	Paratype B	Paratype C	Holotype	Paratype D	Paratype E	Paratype F	Paratype G	Paratype I
l	(23.4)	22.5	22.3	22.2	21.3	20.3	20.2	19.6	18.4	16.4
w	(32.3)	26.8	28.1	27.8	24.8	23.2	24.7	24.8	21	19.5
lpv unrolled	(28.5)	27	26.5	25.5	24.5	24.5	24	24	21	18
t	11.4	(10.8)	10.9	9.9	10.6	10.9	10.3	10.3	7.6	5.8
tpv	?	4.7	4.8	4.1	4.8	4.6	4.8	4.1	3.9	3.6
tbv	?	(6.1)	6.1	5.8	5.8	6.3	5.5	6.2	3.7	2.2
l/w	(0.72)	0.84	0.79	0.8	0.86	0.88	0.82	0.79	0.88	0.84
t/w	(0.35)	(0.40)	0.39	0.36	0.43	0.47	0.42	0.42	0.36	0.3
t/l	(0.49)	(0.48)	0.49	0.45	0.5	0.54	0.51	0.53	0.41	0.35
apical angle	(146°)	140°	141°	139°	135°	?	141°	144°	(134°)	(130°)
angle of the commissure	?	143°	145°	(142°)	138°	?	144°	?	?	?

l = length; t = thickness; w = width; bv = brachial valve; pv = pedicle valve. Measurements shown in parentheses indicate a reasonable estimate on a damaged specimen.

cent of the shell-length anterior to the ventral beak. Apical angle varying from 134° to 146° (most values are between 139° and 144°). Angle of the cardinal commissure varying from 138° to 145°.

Serial transverse sections of one specimen (paratype J, SMF 65008) are shown in Text-figure 1.

#### DISCUSSION OF SYNONYMY

The synonymy given by SCHMIDT (1924) is here rejected entirely, because only the figures by RICHTER (1848, figs. 153-155, 158, 159) of two Thuringian specimens (mentioned above) relate to the new genus, and the author considers the species from Sauerland to be different from the species from Thuringia.

*e.p.* and *pro parte* mean that the quotations apply also to other regions than northern Sauerland.

#### COMPARISONS

The species from Sauerland, here described as *Novaplatirostrum sauerlandense* n. gen., n. sp., and the species from Thuringia, here named *N. sp.*, have been considered conspecific with the Moravian species *Terebratula Richteri*, assigned by HAVLÍČEK (1979, pp. 96-97) to the genus *Planovatiostrum*.

The author's knowledge of *Novaplatirostrum* sp. from the Wocklumeria-Stufe = do VI of southeastern Thuringia rests on the figures of six specimens (see Table 1) and on three specimens (MB.-B.1037-1039) received from Weyer in 1973. Serial transverse sections made from

two (MB.-B.1037, 1038) of these three specimens leave no doubt about the assignment to *Novaplatirostrum* n. gen., but the author considers that it is not advisable to give it a formal specific name based on such a restricted number of specimens. However in the Thuringian species, which is generally smaller, the contour is usually suboval and more commonly asymmetrical, the costae are generally weaker, and the lateral costae more seldom present. The Thuringian species will be described in a joint paper with Weyer, D., who, in the course of time and by dint of hard work, succeeded in collecting some two hundred specimens of the species.

*Terebratula Richteri* is a rare species of small size described in the Proceedings of the Naturalists' Society of Brno (Naturforschender Verein in Brünn) in Moravia. On account of the limited distribution of this local Proceedings, the species had sunk into complete oblivion until HAVLÍČEK (1979) gave it a new life after sixty-three years, and named it *Planovatiostrum richteri*. Nevertheless, the species remains very poorly known. According to HAVLÍČEK (1979, p. 96) it is represented by "4 shells and several incomplete valves". When the author visited the National Museum in Prague (Národní Muzeum v Praze) in April 1980, and then, in October 1993, the Rokycany Museum near Prague, where the collection had been transferred, Havlíček could only show him an almost complete specimen, and an incomplete specimen (the almost complete brachial valve + the cardinal part of the pedicle valve). However, the almost



complete specimen should have been called a lectotype, because OPPENHEIMER did not designate an holotype, and the last paragraph of his description of the species implied that he had more than one specimen at his disposal. In the subrounded brachial valve of this incomplete specimen the median costae originate before mid-length while two well marked, although short, lateral costae are visible on one flank (the border of the other flank is broken); on account of these characters the author does not believe that this specimen belongs to the species. The critical specimen of which three serial transverse sections had been published by HAVLÍČEK (1979, text-fig. 6, p. 96) was declared lost. The scarcity of the material accounts also for the shortcomings of the description of the species by OPPENHEIMER (1916, pp. 35-36) and by HAVLÍČEK (1979, pp. 96-97), who both only figured one and the same specimen, the only one of which they gave measurements and the number of median costae. The precise locality and age of the species have also still to be documented; the author, although accompanied by regional geologists, could not locate any of the two outcrops mentioned in HAVLÍČEK's publication. As a matter of fact, in the box of the figured specimen the original label by OPPENHEIMER indicates "Ostracodenkalk, Prolobitesstufe, Oberdevon III, Hádý", while the label by HAVLÍČEK reads "Hádý Limestone, Upper Famennian (V-VI), Hádý near Brno". The only other specimen examined by the author, and which does not seem to belong to the species (see above), is accompanied by a label on which one can read "Křtiny Limestone, Upper Famennian (probably V), Moravian karst, Ostrov". As far as the sectioned specimen of *Terebratula Richteri* is concerned, it does not belong to the genus *Planovatiostrum*, because it shows neither dental plates (HAVLÍČEK writes "dental plates not observed (due to preservation?)" nor crural plates. If three sketchy serial transverse sections are not enough to allow a good understanding of the internal structure, nevertheless they show two characters (absence of dental plates, and strong hinge plate) also to be found in *Novaplatirostrum* n. gen. To conclude, the knowledge of *Terebratula Richteri* rests on shaky ground, and in the absence of a well located collection of acceptable size, it is wiser to wait before giving it a generic assignment; this is the reason why the author has consistently used the original name of the Moravian species in the present paper. Consequently, the following comparison of this species with *Novaplatirostrum sauerlandense* n. gen., n. sp. and *N. sp.* is based on the single figured specimen.

*Novaplatirostrum sauerlandense* n. gen., n. sp. is easily separated from *Terebratula Richteri* by a larger size, a common asymmetrical outline, a wider sulcus, different l/w ratios (72 to 88 per cent for *Novaplatirostrum sauerlandense* n. gen., n. sp., about 71 per cent for the figured specimen of *Terebratula Richteri*), and stronger costae.

OPPENHEIMER (1916, p. 16) already considered *T. Richteri* from Moravia as "hauptsächlich im thüringischen Oberdevon verbreitet". The identity of the Moravian and Thuringian species is nowadays also accepted by the

Thuringian geologists, but SARTENAER & XU (1989, p. 38) stated that they did not agree with the assignment of the Thuringian specimens to the Moravian species. In fact, *Novaplatirostrum* sp. from southeastern Thuringia has: a suboval and asymmetrical outline (the figured specimen of *Terebratula Richteri* has a subrectangular and symmetrical outline), a different l/w ratio (73 to 94 per cent for *Novaplatirostrum* sp., about 71 per cent for the figured specimen of *Terebratula Richteri*), and narrower costae.

#### GEOGRAPHICAL LOCATION AND STRATIGRAPHICAL POSITION

According to BECKER (1988, p. 194, fig. 2, p. 195, p. 196, p. 198; 1996, fig. 1, p. 21, p. 23) and to stratigraphical information accompanying two specimens (MB.-B.1025,1026) collected by D. Weyer in 1995, the species, identified as *Planovatiostrum richteri*, is found throughout the c. 2.71 m thick lower part of the Wocklum Limestone on the southern slope of the Hasselbachtal section (= Hasselbachtal S-Section). The upper part of the Wocklum Limestone was exposed for a short time in 1988 and was sampled by KORN (see LUPPOLD *et al.*, 1994, fig. 3, p. 17). In terms of the ammonoid succession (revised by BECKER, 1996), *Novaplatirostrum sauerlandense* n. gen., n. sp. is found in the *Sphenoclymenia brevispina* Zone (= Lower *Kalloclymenia subarmata* Zone *sensu* KORN, e.g.1986), with the exception of its lowermost part (seven specimens); the *Kosmoclymenia (Muessenbiaergia) bisulcata* Zone (= lower part of Upper *Kalloclymenia subarmata* Zone *sensu* KORN, e.g.1986) (seventeen specimens); the *Balvia (Mayneoceras) lens* Zone (= upper part of Upper *Kalloclymenia subarmata* Zone *sensu* KORN, e.g.1986) (four specimens); and in the Lower *Parawocklumeria paradoxa* Zone *sensu* KORN, e.g.1986 (one specimen).

Seven juvenile specimens (MB.-B.1018-1024) have been collected by D. Weyer, in 1994, in the *Wocklumeria sphaeroides* Zone (= lower part of the Upper *Parawocklumeria paradoxa* Zone *sensu* KORN, e.g.1986) of the upper part of the Wocklum Limestone on the northern slope of the Hasselbachtal (= Hasselbachtal N-Section). The entire Menden collection derives from the "Wocklumer-Kalk (VI)", and is identified as *Leiorhynchus subcurvata* RICHTER.

All specimens seen by the author in 1973 in the Berlin collection are either unidentified or were named *Liorhynchus subcurvata* RICHT. (non MSTR.) by SCHMIDT (1924, p. 145, p. 161). Their assigned age is either "Dasberg-Schichten (to4)" or "Gonioclymenien-Schichten (Dasberg Stufe toV)" or "Wocklumer Kalk (tow)" according to the locality. As recalled by SARTENAER & XU (1989, p. 39), SCHMIDT (1924, pp. 160-163), who examined the material, accepted a toV, toV, toVI age for the "Dasberg-Schichten" (= "Gonioclymenienstufe") [as defined by him (pp. 98-99)] in which the species was found. It must be borne in mind that this Berlin collection goes back to the beginning of this century, and the part of the "Dasberg-Schichten" containing *Novaplatirostrum sauerlandense* n. gen., n. sp. is now included in the Wocklum-



Stufe. Anyhow, there is no trace of a Dasberg fauna in the Hasselbachtal.

In short, the range of *N. sauerlandense* n. gen., n. sp. is: Wocklum Limestone, with the exception of its lowermost part = *Sphenoclymenia brevispina* (with the exception of its lowermost part) to *Wocklumeria sphaeroides* Zones or *Linguaclymenia* (VI-A) (with the exception of its lowermost part), *Balvia* (VI-B), *Parawocklumeria* (VI-C), and *Wocklumeria* (VI-D) Genozones of the Wocklumian (= VI-A to VI-F).

The species is not only restricted stratigraphically; it is also restricted geographically. A few outcrops stretch on a distance of 50 km on the northern flanks of the Remscheid-Altena anticlinorium and Warstein anticline in northern Sauerland. They are from W to E: Henkhausen, Hasselbachtal, Gerlingsen, Riemke, Beleck, and Eulenspiegel bei Warstein.

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### Explanation of Plate 1

*Novaplatiostrostrum sauerlandense* n. gen., n. sp.

- Fig. 1-5 — Paratype A, SMF65002. Ventral, dorsal, frontal, apical, and lateral views. Costal formula:  $\frac{4}{5}$ ; 0;  $\frac{2}{3}$ .
- Figs. 6-10 — Paratype B, SMF65003. Ventral, dorsal, frontal, apical, and lateral views. Costal formula:  $\frac{6}{5}$ ; 0; 0.
- Figs. 11-15 — Paratype C, SMF65004. Ventral, dorsal, frontal, apical, and lateral views. Costal formula:  $\frac{5}{4}$ ; 0; 0.
- Figs. 16-20 — Holotype, SMF50004. Ventral, dorsal, frontal, apical, and lateral views. Costal formula:  $\frac{5}{4}$ ; 0; 0.
- Figs. 21-25 — Paratype D, SMF65000. Ventral, dorsal, frontal, apical, and lateral views. Costal formula:  $\frac{4}{3}$ ; 0; 0.
- Figs. 26-30 — Paratype E, SMF65005. Ventral, dorsal, frontal, apical, and lateral views. Costal formula:  $\frac{4}{3}$ ; 0;  $\frac{2}{3}$  and  $\frac{3}{4}$ .
- Figs. 31-35 — Paratype F, SMF65006. Ventral, dorsal, frontal, apical, and lateral views. Costal formula:  $\frac{3}{2}$ ; 0;  $\frac{1}{2}$  and  $\frac{2}{3}$ .
- Figs. 36-40 — Paratype G, SMF65007. Ventral, dorsal, frontal, apical, and lateral views. Costal formula:  $\frac{4}{3}$ ; 0; 0?



Plate 1

