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Nerinella? varioplicata sp. n., a new gastropod species from the Upper Jurassic of Sulejów, Central Poland

ABSTRACT: A new gastropod species from chalky limestones of the Upper Jurassic of Sulejów is described. Its internal structure has been studied on the basis of axial sections. Its ontogeny and taxonomic position is discussed.

INTRODUCTION

In the present paper description is given of a species from a collection of more than 2,000 specimens of gastropods collected by the author in the Upper Jurassic deposits near Sulejów on the Pilica river. The specimens described were found in chalky limestones, assigned by Barczyk (1961) to the Astartian and by Kutek (1968) to the Lower Kimmeridgian.

Specimens of *Nerinella? varioplicata* sp. n. constitute an important component of a rich gastropod assemblage, represented in these deposits by several scores of species of the following families: Pseudonerineidae Pchelintsev, 1965; Nerineidae Zittel, 1873 emend. Pchelintsev, 1965; Ptygmatisidae Pchelintsev, 1965; Cryptoplocusidae Pchelintsev, 1965; Nerinellidae Pchelintsev, 1965; Elatoriellidae Pchelintsev, 1965; Auroraellidae Pchelintsev, 1965; Phaneroptyxisidae Pchelintsev, 1965 and Acteonidae Pchelintsev, 1959.

These gastropods have already been elaborated preliminarily by the author (Wieczorek 1971), who intends, after further studies, to devote them an extensive monograph.

STATE OF PRESERVATION

Most of 140 specimens of the species described are rather poorly preserved. All shells are incomplete, devoid of apical and, in some cases also of distal parts (*cf.* Pls 1—2) and their ornamentation is mostly partly

or completely obliterated. Some of them are sheathed in oncolitic envelopes and some others are, in addition, cut by burrowing pelecypods.

Axial sections of most specimens enabled the studies of a generally well-preserved internal plication. Only in a dozen or so specimens, due to a strong recrystallization, usually including the early whorls, the internal plication was rather poorly visible.

DESCRIPTION

Family **Nerinellidae** Pchelintsev, 1965
Genus *NERINELLA* Sharpe, 1849
Nerinella? varioplicata sp. n.
(Pl. 1, Figs. 1—6, Pl. 2, Figs. 1—6)

Holotype: Pl. 1, Fig. 1, specimen *S-9*, housed in the Geological Museum PAN Cracow, Senacka 3.

Type horizon: Lower Kimmeridgian.

Type locality: Sulejów on the Pilica, western margin of the Holy Cross Mts, Central Poland.

Derivation of the name: Lat. *vario* = to change; Lat. *plico* = to fold; after the number and structure of inner spiral folds varying in the development process of the shell.

Diagnosis. — Shell slender, turret-like, with high whorls, covered with spiral ribs. Aperture rhomboid, terminating in a fairly long siphonal canal. Two folds occur on the columellar lip. Internal plication varying in the development process of shell. Number of folds up to six.

Material. — 140 specimens.

Dimensions (all specimens incomplete):

Description. — Shell medium-sized, slender, turret-like. Whorls numerous, high, slightly concave. The largest concavity in early whorls occurs in their middle part and in later ones whorls — in their lower part. Suture situated on a fairly high spiral ridge, formed by two adjoinning whorls contacting each other. In early whorls, the ridge is symmetrical and sharp, in later ones whorls — slightly asymmetrical and rounded (Pl. 1, Figs. 1, 5 and Pl. 2).

Number of specimen	Number of whorl	Height of shell in mm	Height to width ratio of whorls	Pleural angle	Sutural angle
S-9	9	48.0	0.95-0.90	7	68-66
S-10	8	55.2	0.95-0.85	8	69-65
S-12	12	50.0	0.95-0.80	7	71-68
S-27	9	53.4	0.95-0.90	7	70-68

Aperture narrow, rhomboid, terminating in a fairly long siphonal canal slightly deflected posteriorly. Two folds, the lower one larger, rounded and the upper one small, narrow, pointed are visible on the inner columellar lip. Outer lip damaged in all specimens.

Shell base slightly concave, smooth, covered only with growth lines and separated by a distinct keel from the lateral surface of the last whorl. Umbilicus lacking.

The surface of whorls covered with six, tuberculate spiral ribs, four of them markedly thicker. One of the remaining two, thinner ribs, is situated in the

middle part of whorl and the other in the upper. On the last whorl, the lowermost rib disappears, while the other are considerably more distinct and more tuberculate.

Closely-spaced growth lines run obliquely at an angle of about 20° to shell axis, in the upper part of whorl strongly deflected posteriorly and approaching but not contacting the suture. Such a trace of growth lines is indicative of a presence of a narrow, poorly visible selenizone formed as the result of a gradual fusing of the anal slit situated in the upper part of aperture.

Inner folds (Fig. 1, Pl. 1, 2) are visible in axial sections of particular whorls.

The cavity of the earliest whorl preserved is partly occupied by a palatal fold (L_2) only, which occurs in the form of a wide, mild swelling of the inner wall of whorl. In further whorls of the initial part of shell, the inner plication is more

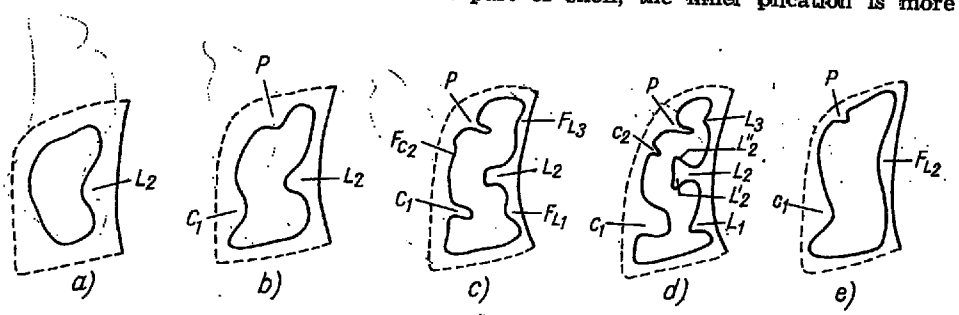

Fig. 1

Nerinella? varioplicata sp. n. — axial sections of whorl

a the earliest whorl preserved, × 17; *b* a whorl of the early part of shell, × 10; *c* a whorl of the middle part of shell, × 4; *d* a whorl with the most complex internal plication, terminal part of shell, × 2,5; *e* the last whorl, × 2. The remaining explanations in text

complex. In addition to fold L_2, which is considerably narrower, there also occurs a parietal fold (P), which is short and fairly wide and a columellar fold (C_1), very wide and situated in the lower part of the inner wall of whorl. In addition, three flexures, F_{L_1}, F_{L_3}, F_{C_2}, which in the later whorls develop to form folds L_1, L_3 and C_2, appear in the middle part of shell. With the strongest complexity of internal plication, the arrangement and structure of folds are as follows: (Fig. 1d, Pl. 1,2):

The lower palatal fold (L_1), wide at the base, gradually contracting and turned towards the lower columellar fold (C_1); the midde palatal fold (L_2), very large, wide at the base, narrow in the central and extending once again in the terminal part, divided into two secondary folds, that is, lower (L'_2) and upper (L''_2): the upper palatal fold (L_3), short, pointed, shaped like a wide cone facing the axis of shell; the lower columellar fold (C_1), large, wide, rounded in terminal part; the upper columellar fold (C_2), small, narrow, slightly deflected in a hooklike manner; the parietal fold (P), long, narrow, turned towards the outer wall of whorl. Two folds, very large and wide fold C_1 and short, conical fold P, occur in the aperturaI part of the last whorl. On the other hand, flexure F_{L_2} is situated on the outer wall.

Development. — A decrease in the whorl height to width ratio h/d from 1.0 in early whorl to 0.80—0.85 in later whorls takes place in the process of shell development. This results from a more rapid increase in the width of consecutive whorls than in their height. The shell is, therefore, marked by a positive allometry of width.

At the same time, a slight decrease is also recorded in the value of sutural angle from 0.70—0.72 in early to 0.65 in later whorls. On the other hand, the value of the spiral angle increases from 5—6 (apical angle) to 7—8 (pleural angle).

Considerable changes are also observed in the internal plication of shell (Fig. 2, Pl. 1, Figs. 1—4, Pl. 2).

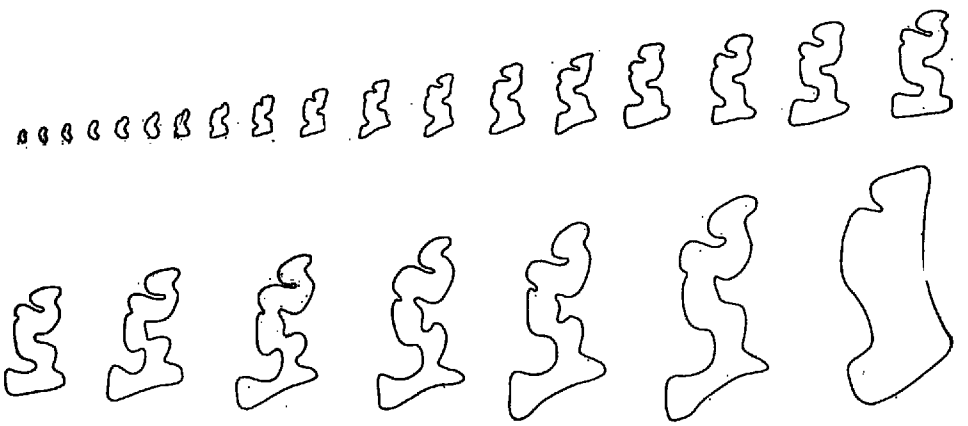

Fig. 2

Nerinella? varioplicata sp. n. — variability in internal plication. Cavities of consecutive whorls. ×2

A contraction and a more and more distinct separation of fold L_2 takes place in early whorls. Gradually, there appear flexures, which rapidly transform into folds P and C_1. Then, all folds (L_2, P_1, C_1) elongate and contract, which results in an increase in the area of walls of whorl devoid of folds. In later whorls, flexures, F_{L_1}, F_{L_3} and F_{C_2}, appear gradually and develop to form distinctly separated folds. Considerable changes are also observed at the same time in folds P, C_1 and L_2. Fold P strongly elongates and slightly deflects; fold C_1 becomes rounded and increases its size; fold L_2 extends in the terminal part and then bifurcates forming two secondary folds.

Such a strong complexity of the internal plication persists for two to three whorls and then, the degree of folding walls gradually decreases in the terminal part of shell (the last and the last but one whorls). This process is particularly rapid in the terminal part of the last whorl (Fig. 3).

Folds L_1, L_3 and C_2 turn into the flexures and then disappear. There also occurs a change in the structure of fold L_2, at first only in the terminal part in which the lower branch of L_2' disappears. Then, this fold takes the form of a small, gradually disappearing cone. In the apertural part of the last whorl, an only very slight thickening of the wall replaces fold L_2. Fold P becomes subject to strong shortening and the upper part of fold C_1 more and more gently contacts the wall of whorl.

Thus, a constant and consistent increase in the degree of complexity of internal plication and subsequently, after a brief period of stabilization in morphological changes, its rapid simplification, are characteristic features of the ontogenetic development of the species *Nerinella? varioplicata* sp. n.

The simplification of the internal plication in the last whorl is also observed in juvenile individuals, in which the folding of walls in the preseding whorl does not yet reach a maximum of complexity (Fig. 4, Pl. 2, Figs. 4—5). and, therefore, this is not a geromtic but developmental simplification.

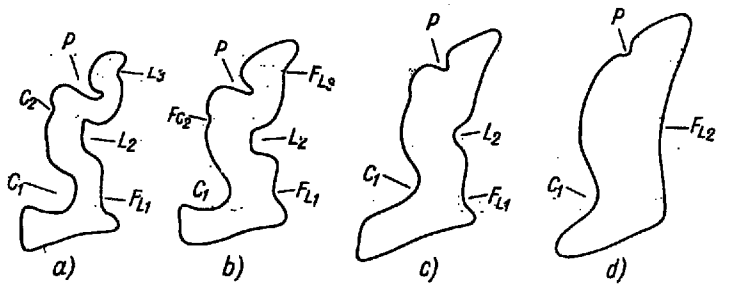

Fig. 3

Nerinella? varioplicata sp. n. — simplification of internal plication; a sector of the terminal part of the last whorl

Cavities: *a* at three-quarters of the length of whorl from aperture; *b* halfway the length of whorl from aperture; *c* at a quarter of the length of whorl from aperture; *d* in the apertural part of whorl. × 2,5

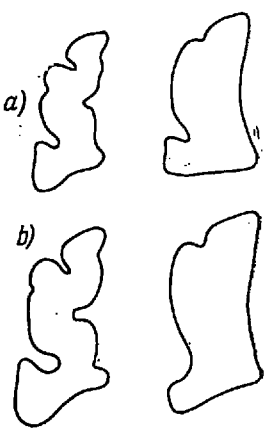

Fig. 4

Nerinella? varioplicata sp. n. — whorl cavities in the terminal part of shell in juvenile individuals, × 3

Variability. — The intraspecific variability of *Nerinella? varioplicata* sp. n. is expressed mostly in small differences in structure and size of folds, which are most distinct in later whorls (Fig. 5). Minor differences are also observed in various individuals in h/d ratio, angular values and distinctness of ornamentation.

Remarks. — The taxonomic position of the new forms is debatable. The external features of the species *varioplicata* are typical of the genus *Nerinella* Sharpe, 1849, while the high degree of complexity of internal plication (the presence of six folds) is rather characteristic of the genus *Bactroptyxis* Cossmann, 1896.

According to many authors (*cf.* Dietrich 1925; Pchelintsev 1931, 1965; Karczewski 1960), the character of the inner spiral folding is one of the most important generic features. However, in addition to three-fold forms, also those having a single fold (e.g. *Nerinella uniplicata* Pchel., 1965), two folds (e.g. *Nerinella dupi-*

niana d'Orb. 1842) and even three-fold ones also having flexures, such as, e.g. *Nerinella jollyana* d'Orb., 1850, are assigned to the genus *Nerinella* Sharpe. Despite considerable difference in internal plication, the species mentioned above display external features typical of the genus *Nerinella* Sharpe.

In the light of the considerations presented above, the assignment of the species *varioplicata* to the genus *Nerinella* Sharpe and not *Bactroptyxis* Cossmann, although debatable, nevertheless seems to be more justified, especially if we take into consideration considerable differences in external characters occurring between these taxons.

Of species of the genus *Nerinella* Sharpe, a considerable similarity to the form described is displayed by *Nerinella jollyana* d'Orb., 1850 (*cf.* descriptions and illustrations in d'Orbigny, 1850—1852; Cossmann, 1896; Levasseur, 1931; Karczewski, 1960). This species has, however, a considerably simpler internal plication which changes to a smaller extent during the ontogenetic development and its palatal fold is more strongly developed in the apertural part of shell.

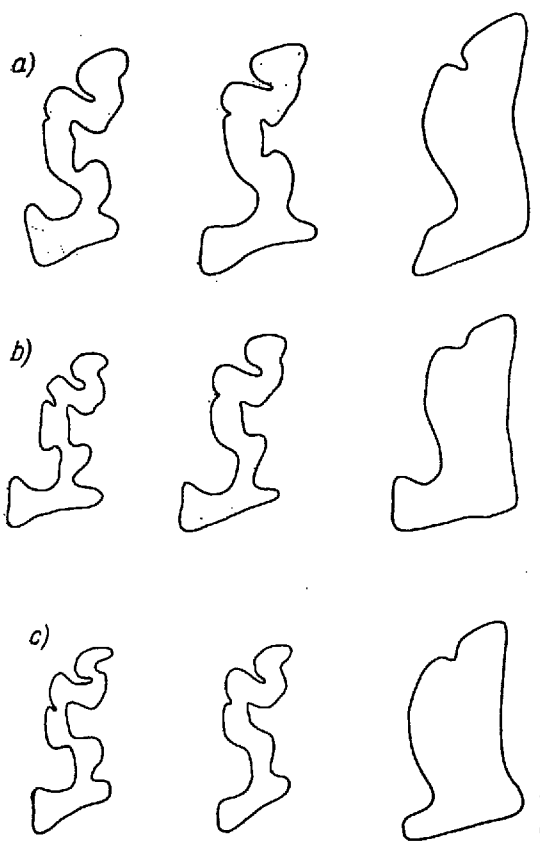

Fig. 5

Nerinella? varioplicata sp. n. — whorl cavities in the terminal part of shell in various individuals, × 2,5

It is worth mentioning that out of the nerineids species known so far, strong changes in internal plication occurring in consecutive whorls (*cf.* Delpey 1939) have hitherto been found only in *Polyptyxis schiosensis* (Pirona 1869). The process of ontogeny in the last-named species, the same as in the newly described one, contradicts Pchelintsev's (1931) view that the pattern of the folding of inner walls

of whorls has never been subject to major changes during the development of shell.

The simplification of internal plication in the last whorl characteristic of *Nerinella? varioplicata* sp. n., even including its juvenile forms, is not an exception among the nerineids. A similar process was observed by the author in the species *Ptygmatis bruntrutana* (Thurmann, 1832).

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NERINELLA? VARIOPLICATA sp. n. — NOWY GATUNEK ŚLIMAKA Z GÓRNEJ JURY SULEJOWA NAD PILICĄ

(Streszczenie)

W pracy opisano nowy gatunek ślimaka *Nerinella? varioplicata*, z wapieni kredowatych górnej jury Sulejowa nad Pilicą. Na podstawie przekrojów osiowych zbadano budowę wewnętrzną muszli oraz prześledzono rozwój ontogenetyczny (*por.* fig. 1—5 oraz pl. I—2); omówiono także pozycję taksonomiczną nowego gatunku.

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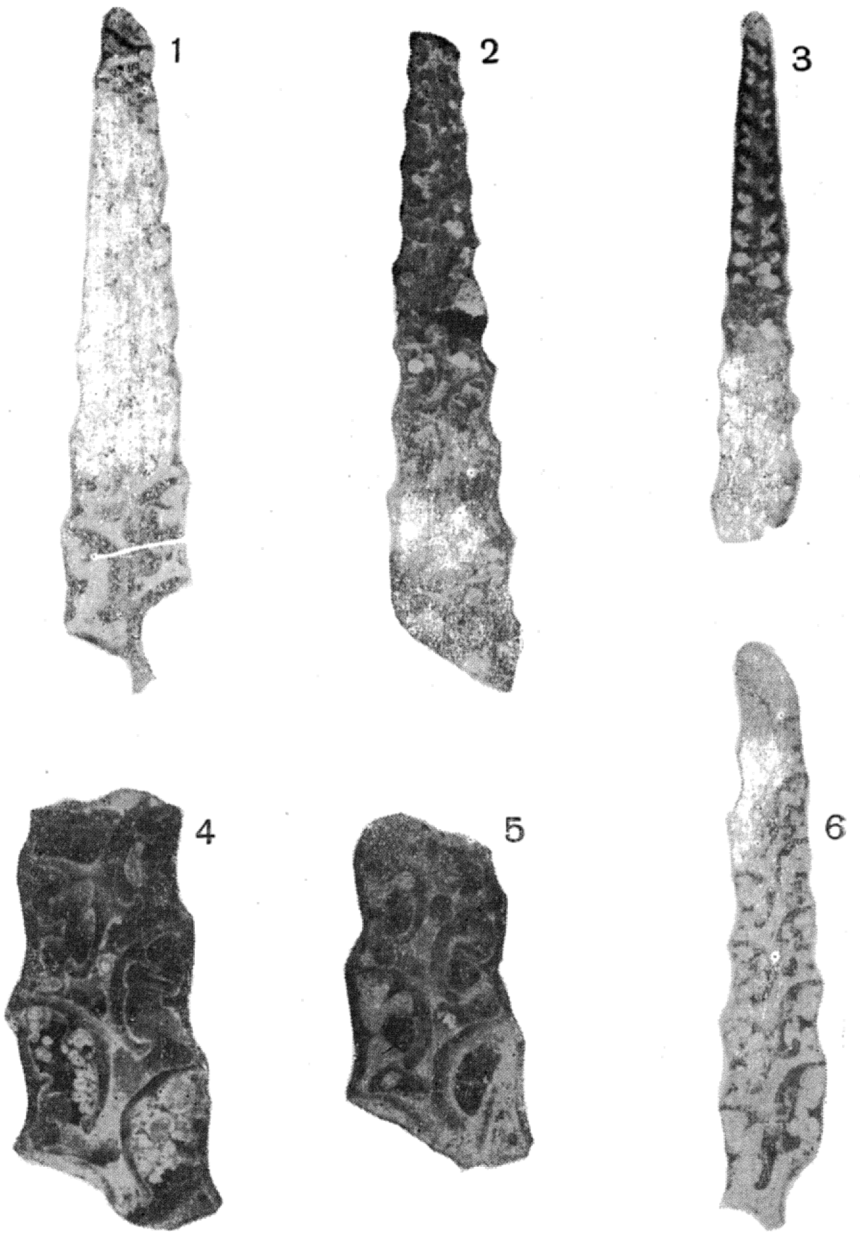
Nerinella? varioplicata sp. n.

1, 2, 4 — axial sections of shells (a holotype specimen with a calcite vein is shown in Fig. 1), × 1.5; 3 — axial section, × 2; 5 — outer view, × 1.5; 6 — apertural view, × 2



Nerinella? varioplicata sp. n.

1, 6 — adult specimens, × 1.5; 2, 3 — early parts of shells of incomplete specimens, × 1.5; 4, 5 — juvenile specimens, last whorls, × 4. All figures show axial sections