

A REVISION OF THE NEOCOMIAN AMMONITES OF THE CRIMEA: THE GENERA *Neohoplloceras* Spath AND *Luppovella* Nikolov

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Abstract: The genera *Neohoplloceras* and *Luppovella* (family Neocomitidae), found for the first time in the Crimea, are revised. The genus *Luppovella* is divided into two subgenera: *Luppovella* s. str. and *Planibulliceras* subgen. nov. New species *L. (P.) kachensis* and *L. (P.) lambertiformis* are described. Two new species were assigned to the genus *Neohoplloceras* — *N. recticostatum* and *N. imlayi*. Analysis of the assemblage permits a redating of the lowermost part of the Cretaceous section in the vicinity of Verkhorech'ye settlement and the assignment of the terrigenous sequence, traditionally considered Hauterivian, to the Valanginian stage.

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The current ideas on the biostratigraphy of the lower part of the Cretaceous system in the southwestern Crimea are based on many years' work by the Lower Cretaceous branch of the Paleontology Department in the School of Geology of Moscow University. The first results of these researches were published by Drushchits in 1956 [5] and then in more complete form in the *Atlas of Lower Cretaceous Fauna of the Northern Caucasus and Crimea* [1]. This, and subsequent publications, show that in the Bakhchisaray area the Tavricheskaya group is overlain, with an erosional gap and a sharp unconformity, by a Hauterivian terrigenous sequence up to 80 m thick. These ideas were not disputed in the past and have become traditional [2, 6, 8, 12].

The best section through the Lower Cretaceous deposits in the southwestern Crimea, on the right bank of the Kacha River near Verkhorech'ye, has been studied and restudied many times. Beginning with Karakasch [7], Valanginian ammonites have been mentioned repeatedly at the base of the stage, but their occurrence has been attributed to the redeposition from Hauterivian time. During the past six years (1988-1993), Baraboshkin, with his students in the geology department of Moscow University, collected ammonites from the lowermost part of the "Hauterivian" part of the section in the area of Verkhorech'ye and Prokhladnoye. Identification of these ammonites, as well as reidentification of the old collections by the Group of Crimean 00000

Translated from: K revizii neokomskikh ammonitov Kryma: rody *Neohoplloceras* Spath i *Luppovella* Nikolov. Paleont. zhur., No. 3, pp. 41-54, 1994.

Research, showed that a large part of these fossils characterizes the Valanginian stage. This confirms Karakasch's view [7] that the Valanginian is present within the second ridge of the Crimean Mountains. Most representatives of the families Neocomitidae, Olcostephanidae, Ancyloceratidae, etc., known from the Neocomian of the Crimea, require substantial revision. This need has become especially clear in view of the most recent studies made by European stratigraphers [17, 19, 21, 24, 35]. The identifications of the ammonites given below may, therefore, be corrected in the future.

The ammonites considered here were collected from the watershed of the Kacha and Bodrak rivers. Most of the specimens come from the condensation horizon (fig. 1), which is 4.25-4.50 m above the top of the Tavrisheskaya group in the Mt. Rezanaya section (on the northern outskirts of Verkhorech'ye). Here were found *Neohoploceras submartini* (Mallada), *N. recticostatum* sp. nov., and *Luppovella (Planibulliceras) kachensis* sp. nov. together with numerous representatives of *Karakaschiceras* s. l. and also *Busnardoites campylotoxus* (Uhlig), *Distoloceras* sp., *Paquiericeras (Paquiericeras)* cf. *paradoxum* Sayn, etc. This assemblage indicates that the condensation took place at the boundary between the Lower and the Upper Valanginian (the *campylotoxus*—*verrucosum* zones).

The subgenus *L. (Planibulliceras)* was also found on the Patil' plateau, at the base of a member of cross-bedded sandy dolomites where *Karakaschiceras* s.l., *Distoloceras* sp., *Thurmanniceras gueymardi* (Sayn), *T. otopeta* (Thieuloy), *T. salentinum* (Sayn), and *Busnardoites* ex gr. *campylotoxus* (Uhlig), corresponding to the Lower Valanginian, have also been found.

Thus, representatives of two Valanginian genera, *Neohoploceras* and *Luppovella*, have been found for the first time in the Crimea. Below are descriptions of three species of the former genus and three of the latter. Four species and one subgenus are erected by the authors.

SUPERFAMILY PERISPHINCTACEAE STEINMANN, 1890

FAMILY NEOCOMITIDAE SALFELD, 1921

SUBFAMILY NEOCOMITINAE SALFELD, 1921

Genus *Neohoploceras* Spath, 1939

Arnoldia: Stolley, 1937, p. 453; *Neohoploceras*: Spath, 1939, p. 105; Arkell et al., 1957, p. L361; *Fundamentals of Paleontology*, 1958, p. 100; Kemper et al., 1981, p. 286; Company, 1987, p. 152.

Type species. *Ammonites submartini* Mallada, 1887; Lower Cretaceous; Spain.

Diagnosis. Medium-sized shell, semievolute. Transverse section through whorls varying from rounded-hexagonal to oval-rectangular. Umbilicus moderately wide and fairly shallow. Umbilical wall vertical and fairly low. Sculpture represented by costae, tubercles and constrictions. Straight or slightly curved costae not cutting across ventral side, but terminating in its middle. Costae with diameter less than 60 mm grouped into clusters, and clusters in turn grouped into cycles separated by deep, fairly narrow constrictions (fig. 2). Clusters having various structures, but double and often also triple branching of costae always traceable. Cycle beginning with solitary costa, followed by one or two clusters; each cluster having 6 to 7 branches. Three

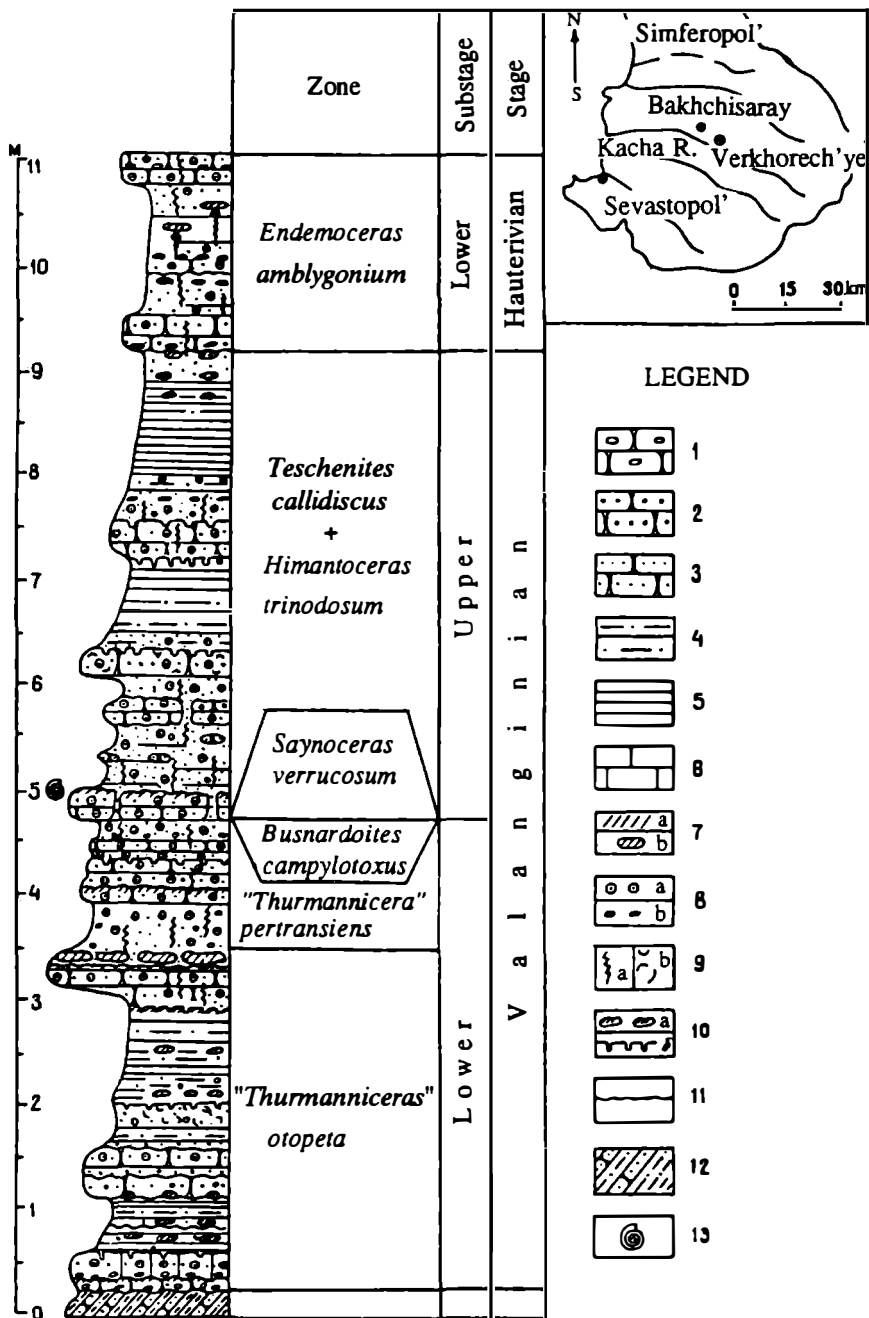


Fig. 1. Section through Valanginian deposits at Verkhorech'ye. 1 - conglomerates; 2 - gravelites; 3 - sandstones; 4 - siltstones; 5 - clays; 6 - limestones; 7 - iron-rich deposits (a), limonite and marcasite concretions (b); 8 - limonite oolites (a), phosphorite concretions (b); 9 - bioturbations (a), shell detritus (b); 10 - "hardground": mature stage (a), initial stage (b); 11 - erosional boundaries; 12 - deposits of Tavricheskaya group; 13 - localities of ammonites described.

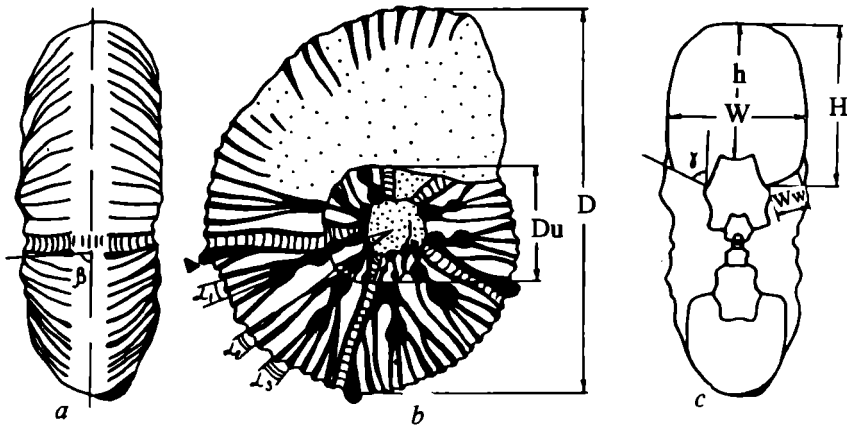


Fig. 2. Sculpture of genus *Neohoploceras* and main characteristics of shell on example of *N. submartini* (Mallada) (Spec. MGU No. 1/93): *a* - ventral side, *b* - lateral side, *c* - aperture. Designations: D - shell diameter, H - shell height, h - inner height of whorl, W - width of whorl, Du - diameter of umbilicus, Ww - width of umbilical wall, α_1 - angle between radius of shell and direction of main costae, α_2 - angle between radius of shell and direction of subsidiary costae, α_3 - angle between additional costae, β - angle between plane of symmetry of shell and plane of costae or their ventral terminations (tubercles), γ - angle of inclination of umbilical wall to plane of symmetry.

rows of tubercles, located on turn of umbilicus, in middle of lateral side where costae diverge and on turn of ventral side. Suture line, judging by illustrations in some publications [19, 27, 32], having large somewhat asymmetrical umbilical lobe, considerably deeper than ventral and first umbilical lobes. Outer saddle indistinctly bipartite. Periumbilical part of suture line sagging.

Specific composition. Seven species: *N. ambikyense* Collignon, 1962; *N. imlayi* sp. nov.; *N. recticostatum* sp. nov; *N. sayni* Collignon, 1962; *N. schardti* (Baumberger, 1906); *N. solignaci* Memmi, 1973; *N. submartini* (Mallada, 1887); and *N. syncostatum* (Baumberger, 1906) from Upper Valanginian of Madagascar, Tunisia, Spain, France, Germany, England, Bulgaria, Crimea, Pakistan, South Africa and Mexico (fig. 3). *Neohoploceras* sp. from Upper Valanginian of Mangyshlak region of Russia may also belong to this genus [3].

Comparison. Differs from *Kilianella* in complex costae with two or three levels of branching and in presence of large ventral tubercles, and from some *Karakaschiceras* in more complex structure of costal clusters and in differentiation of ventral tubercles into large and small.

Remarks. Wiedman [36], in his study of the suture line, lowered the taxonomic rank of *Neohoploceras* to the level of a subgenus of *Kilianella* (*Neohoploceras*), but his view was not generally accepted. It was at first shared by Kemper [23], who subsequently concluded that this genus is a fully independent one [24].

Certain species that should be excluded from the composition of *Neohoploceras* were pre-

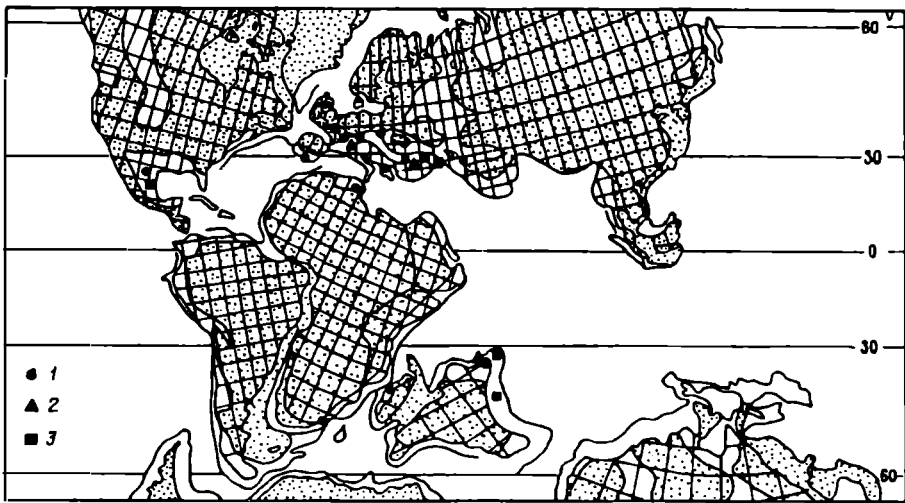


Fig. 3. Distribution of *Neohoploceras* - 1, *Luppovella* (*Luppovella*) - 2 and *Luppovella* (*Planibulliceras*) - 3.

viously assigned to it because of the inadequate clarity of its original diagnosis [32, p. 105], as well as the morphological similarity of all the neocomitids to this genus. The species *N. jacobi* (Besairie, 1936), *N. besairiei* (Collignon, 1962), *N. collignoni* (Fatmi, 1977) and *N. baumbergeri* (Spath, 1939) must be transferred to other genera, since their typical features do not correspond to the diagnosis of the genus under consideration. *Ammonites arnoldi* Pictet et Campiche, previously belonging to *Neohoploceras*, is not considered within its composition, since type species of *A. arnoldi* [29, pl. 35, fig. 1] has no constrictions and large ventral tubercles, and its costae cut across its entire ventral side. Thieuloy et al. are of the same opinion [35]. Certain specimens assigned by Pictet and Campiche [29, pl. 35, figs. 2, 3, 5] to *A. arnoldi* actually belong to *Neohoploceras*.

Finally, *Hoplites dubisiensis* Baumberger [14, p. 71, pl. 12, fig. 1], which some authors assign to *Neocomites* and others to *Neohoploceras*, have the features characteristic of *Neohoploceras* and, therefore, cannot belong to it. *Ammonites subanceps* Tate, which Kennedy and Klinger [25] and also Cooper [20] assigned to *Neohoploceras*, was included by Spath [31] in the genus *Solgeria* as long ago as 1930.

Neohoploceras submartini (Mallada, 1887)

Pl. III, fig. 1

Ammonites sub-Martini: Mallada, 1887, p. 17, pl. 10, figs. 7-9; pl. 11, figs. 12-14.

Leopoldia (*Hoplitides*) *submartini*: Sayn, 1907, p. 57, pl. 4, figs. 13, 17.

Neohoploceras submartini: Spath, 1939, p. 105, pl. 16, fig. 1; Collignon, 1962, p. 46, pl. 192, fig. 872; Kemper et al., 1981, p. 155, pl. 41, figs. 4, 6.

Kilianella (Neohoploceras) submartini: Wiedmann, 1966, p. 69, pl. 2, fig. 4.

Neohoploceras arnoldi: Dimitrova, 1967, p. 122, pl. 51, fig. 8.

Neotype. Institute of Geology and Paleontology, Tübingen, Germany (GPIT) No. 1310/9, chosen by Wiedmann [36]; Spain; Upper Valanginian.

Form. Medium-sized shell is semievolute. Transverse section changes from rounded-hexagonal in early whorls to rounded-trapezoidal in later whorls. Umbilicus is moderately wide and fairly shallow; umbilical wall steep to vertical and narrow.

Dimensions in mm and angles in degrees:

Spec. No.	D	H	W	Du	Ww	α_1	α_2	α_3	β	γ
1/93	64.3	23.5	26.7	21.9	5.2	0	0-5	5	0-5	85

Sculpture. Consists of simple and branching costae, occasionally intercalated, plus tubercles and constrictions. Cyclical character of sculpture is maintained up to $D = 60$ mm: single solitary costa, followed by posterior cluster, then anterior cluster. Cycle is bordered by narrow and moderately deep constrictions. Initial element of cycle is solitary costa situated after constriction and beginning from umbilical seam. Small swellings form at this point. Costae then form S-curve on lateral side and end in small elevations on turn to ventral side. Second and third elements of cycle are represented by two costal clusters of similar structure. Number of costae varies from 6 to 9 within each cluster. Cluster begins to form from turn of umbilicus, where 2 or 3 branches diverge from prominent, slightly pointed tubercle. Posterior simple or bipartite branch usually is intercalated, and branches in middle of lateral side. Somewhat thicker central (main) branch in middle of lateral side (or somewhat below it) divides into 2 to 4 subsidiary branches, accompanied by formation of high, pointed tubercle. Anterior branch (closer to aperture) divides for first time in lower quarter of lateral side, and for second time in its middle, without forming tubercle. All costae after branching are radial, and do not cut across ventral side but end on turn of ventral side in small inflations perpendicular to plane of symmetry of shell. Exception is first branch, which in cluster following next after solitary costa thickens slightly and forms high, blunt ventral tubercle. Thus, cycle begins with solitary costa and ends with anterior branch of second cluster, with strongly elevated pointed ventral tubercle. In all, whorl has 12 clusters containing 12 main and 72 subsidiary costae, as well as 6 solitary costae and 6 constrictions.

On late whorls, at diameters > 60 mm, sculpture changes: constrictions disappear, tubercles tend to level out, and costae do not form clusters.

Suture. Not observed.

Comparison. Differs from similar species *N. sayni* in finer sculpture, in having two instead of one cluster in each cycle, and in higher transverse section.

Remarks. The species *N. submartini* probably also includes *Eleniceras nikolovi*, described with illustrations by Breskovski [15, p. 51, pl. 6, fig. 1]. It has costal clusters of neohoploceratid type, grouped into cycles, as in *N. submartini*, but complete identification is impossible because of the poor preservation of the specimen.

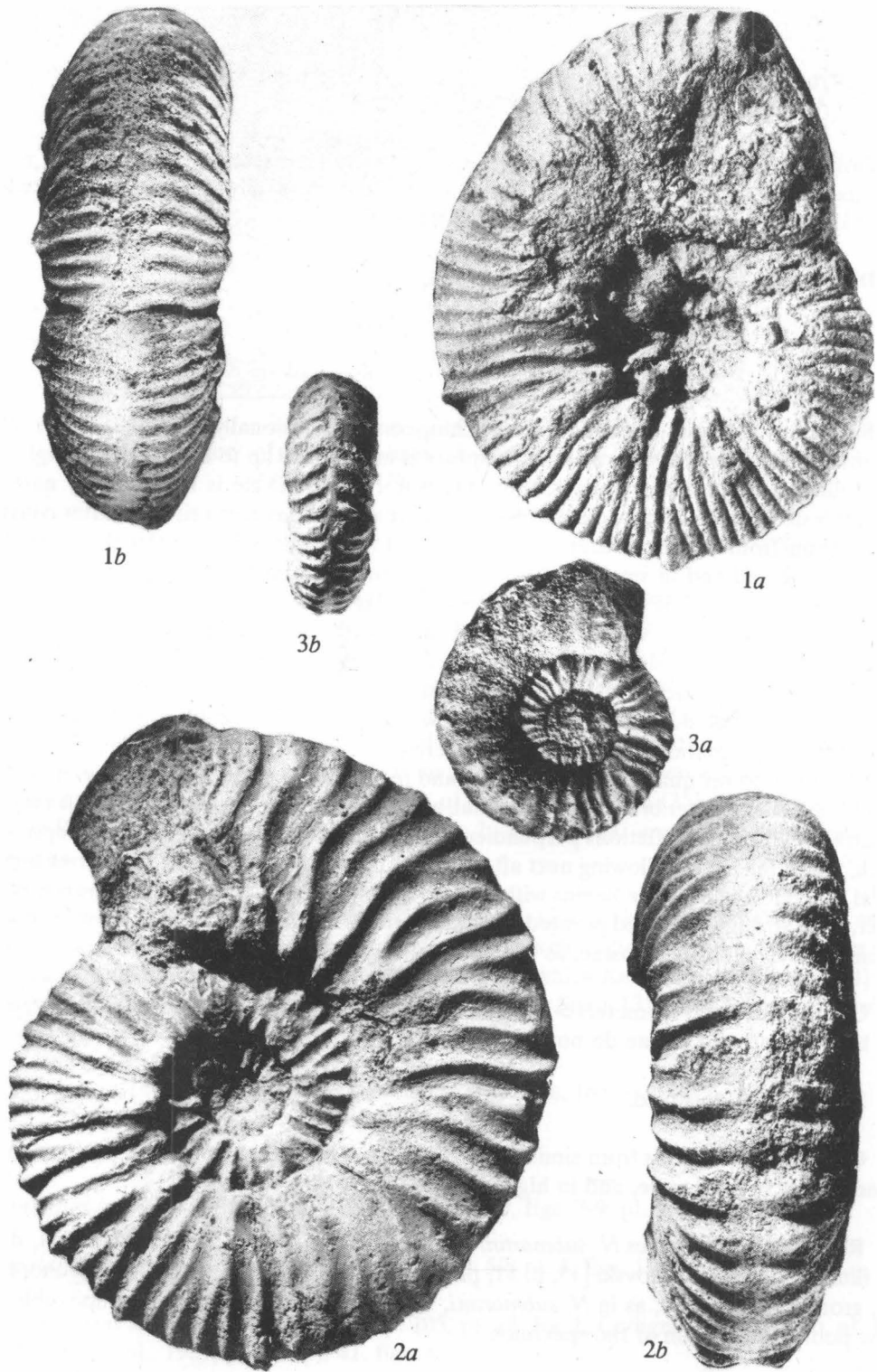


PLATE III

Distribution. Upper Valanginian of Crimea, Spain, France, Bulgaria, Madagascar, and Pakistan.

Material. One well-preserved specimen, from right bank of Kacha River at Verkhorech'ye (collected by V. V. Drushchits).

Neohoploceras recticostatum Baraboshkin et I. Mikhailova, sp. nov.

Pl. III, fig. 2

Specific name. Latin *rectus* (straight) and Latin *costatus* (ribbed).

Holotype. Museum of Earth Sciences, Moscow State University (MGU) No. 2/93; Crimea, right bank of Kacha River, near Verkhorech'ye; talus, probably Upper Valanginian.

Form. Shell is medium-sized, semievolute. Transverse section changes from hexagonal in early whorls to trapezoidal and rounded-rectangular in latter ones. Umbilicus is moderately wide and fairly shallow. Umbilical wall is steep to vertical and narrow.

Dimensions in mm and angles in degrees:

Spec. No.	D	H	W	Du	Ww	α_1	α_2	α_3	β	γ
Holotype	67.2	24.8	27.5	24	3	0	0-10	7	-	85
2/93	86.5	30.9	30	31.3	4	5	-35 ¹	30	0-10	90

Sculpture. Consists of costae, tubercles, and constrictions. Costae are solitary and branching, forming clusters. Between each two adjacent constrictions, in cyclical order, are from

¹Minus sign means that costa deviates backward, away from aperture.

KEY TO PLATE III

All illustrations natural size.

Fig. 1. *Neohoploceras submartini* (Mallada, 1887): Spec. No. MGU 1/93, 1a - lateral side, 1b - ventral side; Crimea, right bank of Kacha River, near Verkhorech'ye; Upper Valanginian.

Fig. 2. *Neohoploceras recticostatum* sp. nov., Holotype MGU No. 2/93: 2a - lateral side, 2b - ventral side; Crimea, right bank of Kacha River near Verkhorech'ye; Upper Valanginian.

Fig. 3. *Luppovella (Planibulliceras) lambertiformis* sp. nov., Holotype MGU No. 6/93: 3a - lateral side, 3b - ventral side; Crimea, Patil' plateau, Prokhladnoye; Lower Valanginian.

three costal clusters on early to one or two on middle whorls. Cycle begins with solitary, almost radial costa located just past constriction, which can be traced from umbilical suture. Branching costae also begin from umbilical suture and divide into two or three branches on turn of umbilicus, where a pointed tubercle shows best on middle whorls ($D = 30-50$ mm). Repeated branching occurs somewhat below middle of sides, flattish tubercle being formed on only one of branches (on main costa); remaining costae thicken slightly at point of branching. Subsidiary costae show intercalation. On turn of ventral side, costae thicken slightly and end, without crossing ventral side. Anterior costae of cluster, immediately in front of constriction, are markedly thicker when going to ventral side and terminate in high, flat tubercle. Similar but lower tubercles are also irregularly present on solitary costae. One whorl bears 12 clusters, which include 12 main and 52 subsidiary costae, as well as 8 solitary costae and constrictions.

Later, at $D > 70$ mm, costation levels out somewhat and costae begin to become S-shaped. Branching costae twice give way to fairly flat biramose costae with thin branch at point of bending of cluster. Costae now tend to run across ventral side. Overall style of costation on latest whorls resembles that in genus *Busnardoites*.

Suture. Not observed.

Comparison. *N. recticostatum* sp. nov. is closest to *N. schardti*, from which it differs in sculpture of middle and later whorls: rare bi- and triramose costae, which are curved as in *Busnardoites* of *campylotoxus* group, and also in lower and wider transverse section.

Remarks. The holotype of the new species shows marks at the beginning of the living chamber of injury during the animal's life. However, the costae become simpler (which is characteristic of this species alone) and bend somewhat earlier, so that the damage is not an obstacle to the establishment of a new species. It is possible, however, that the simplification of the costae is due to the damage, which, in turn, may testify to the genetic similarity of *Neohoploceras* to the older genus *Busnardoites*.

Distribution. Upper Valanginian of Crimea.

Material. Holotype (collected by V. V. Drushchits).

Neohoploceras imlayi Baraboshkin et I. Mikhailova, sp. nov.

Acanthodiscus bernii: Imlay, 1938, p. 575, pl. 4, figs. 7, 9.

Specific name. In honor of Ralph W. Imlay.

Holotype. Paleontological Museum, Univ. of Michigan No. 19023; Mexico; Upper Valanginian, Taraises Formation.

Description. Medium-sized semievolute shell has hexagonal transverse section. Umbilicus is moderately narrow and fairly shallow. Umbilical wall is steep. Sculpture consists of simple costae, asymmetrical bidichotomous clusters bearing tubercles, and constrictions. "Neohoplocerate" cycle is formed by simple costa and single bidichotomous costa of which 4 or 5 branches can be seen on ventral side. Lateral tubercles in cluster are fairly flat but slightly pointed.

Comparison. Differs from other species of genus in fewer costae (4-5) in cluster and presence of single bidichotomous costa in cycle.

Distribution. Upper Valanginian of Mexico.

Genus *Luppovella* Nikolov, 1966

Luppovella: Nikolov, 1966, p. 642.

Diagnosis. Shell is medium-sized and semievolute. Transverse section through whorls hexagonal and changing from high to low. Cluster moderately wide and fairly shallow. Umbilical wall steep to vertical.

Sculpture. Consists of costae, tubercles, and variously manifested constrictions. Costae are slightly curved and branching: dichotomous and bidichotomous, not cutting across ventral side and approaching it at right angles. On later whorls, bi- and triramose costae replace bidichotomous; they are sometimes present also on early whorls. Cyclicity in manifested in disposition of costae: constriction is followed by two simple costae (more rarely one costa), and then by asymmetrically dichotomous or bidichotomous costa. Tubercles are in three rows. Their characteristic feature is flatness, and are both large and small.

Composition. Two subgenera: *Luppovella* Nikolov, 1966 and *Planibulliceras* subgen. nov. from Valanginian of France, Spain?, Bulgaria, Northern Caucasus, Mexico, Pakistan, and Himalayas (see fig. 3).

Subgenus *Luppovella* Nikolov, 1966

Type species. *Thurmannia (Kilianella) superba* Sayn, 1907; Valanginian; southern France.

Diagnosis. Shell is medium-sized and semievolute. Transverse section through whorls from trapezoidal to hexagonal. Umbilicus moderately wide and fairly narrow. Umbilical wall steep and fairly narrow. Sculpture consisting of frequent simple, bi- and triramose and bidichotomous costae, tubercles, and also constrictions, sometimes present on early whorls. Tubercles of upper row in branching forms fairly flat, but pointed in nonbranching forms. Suture line with very deep umbilical lobe. Ventral lobe fairly shallow, with almost parallel sides. Outer saddle bipartite and strongly dissected.

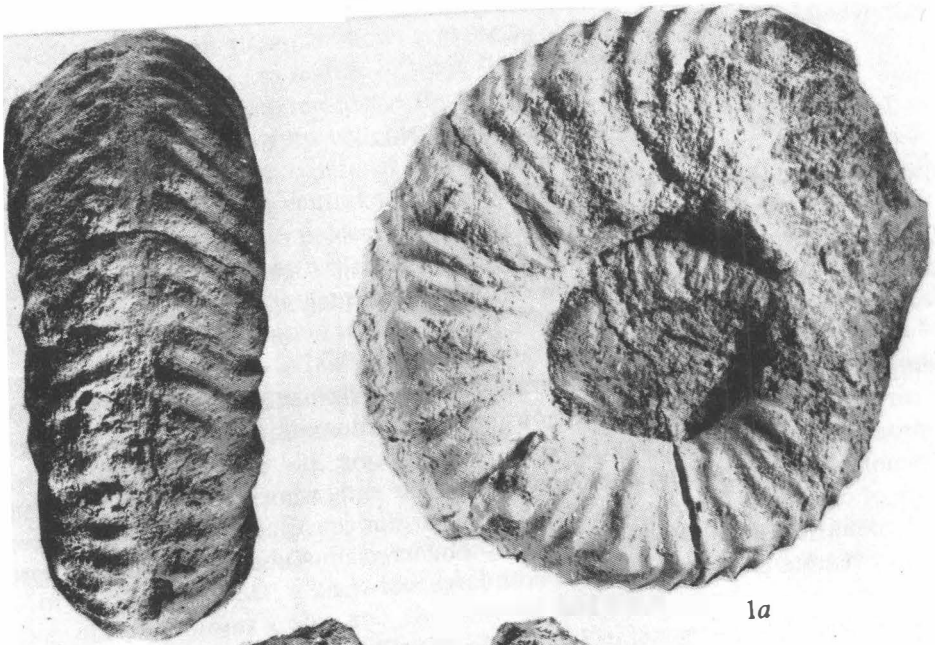
Specific composition. Two species: *L. (L.) superba* (Sayn, 1907) and *L. (L.) baumbergi* (Spath, 1939) from Valanginian of France, Bulgaria, Crimea, and Pakistan.

Luppovella (Luppovella) baumbergi (Spath, 1939)

Pl. IV, fig. 1

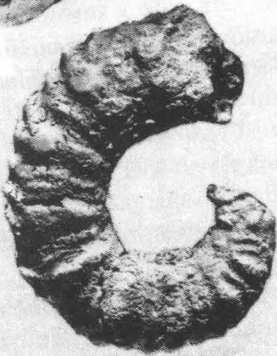
Neohoploceras baumbergi: Spath, 1939, p. 106, pl. 22, fig. 3; Fatmi, 1977, p. 290, pl. 12, fig. 3.

Neohoploceras arnoldi: Mandov, 1976, p. 80, pl. 19, fig. 5.



1b

1a



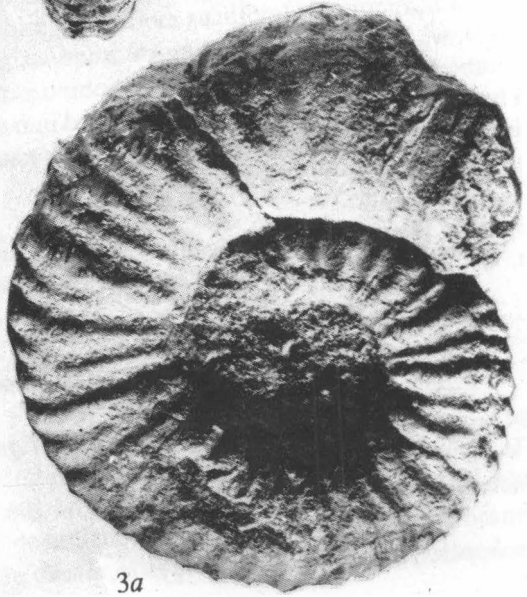
2a



2b



3b



3a

PLATE IV

Holotype. Museum of Geological Service of India No. 16615; Pakistan, Valanginian.

Form. Shell is medium-sized and semievolute. Transverse section is from hexagonal to low ellipsoidal in later whorls. Umbilicus is moderately wide and fairly shallow. Umbilical wall is narrow and steep.

Dimensions in mm and angles in degrees:²

Spec. No.	D	H	W	Du	Ww	α_1	α_2	α_3	β	γ
3/93	81	28.5	32.4	33	6	0.5	50	40-45	75	83

Sculpture. Consists of frequent thin costae. Between bidichotomous (on early whorls) and bi- and triramose (on later whorls) costae, as a rule, are two solitary costae; the one (aboral) in upper third of whorl sometimes bears indistinct tubercle. Constrictions are almost not manifested. Ventral ends of costae are fairly flat and lie at almost right angles to plane of symmetry of shell. Flattest of them (but of same height as others) are on continuations of main costae. One whorl has 30 main (including 18 solitary) and 24 subsidiary costae. On later whorls, tubercles of main costae almost merge into one thick costa.

Suture line. Not fully observed (fig. 4). Its striking feature is very deep umbilical lobe, which, while being clearly tripartite, also has somewhat asymmetrical central denticle. Ventral lobe is fairly shallow, with almost parallel sides. Outer saddle is bipartite and deeply dissected.

Comparison. Differs from *L. (L.) superba* in having two solitary costae between bi- and tripartite costae and also in lower and wider section through whorls.

Distribution. Lower? Valanginian of Crimea, Valanginian of Pakistan and Bulgaria.

²Dimensions D and Du are only approximate because of poor preservation of specimen.

KEY TO PLATE IV
All illustrations natural size.

Fig. 1. *Luppovella (Luppovella) baumbergeri* (Spath, 1939); Spec. No. 3/93: 1a - lateral side, 1b - ventral side; Crimea, right bank of Kacha River near Verkhorech'ye; Lower Valanginian.

Figs. 2, 3. *Luppovella (Planibulliceras) kachensis* sp. nov.; 2 - Spec. No. 5/93: 2a - lateral side, 2b - ventral side; Crimea, right bank of Bodrak River, above Trudolyubovka settlement; Lower? Valanginian; 3 - Holotype MGU No. 4/93: 3a - lateral side, 3b - ventral side; Crimea, right bank of Kacha River around Verkhorech'ye; Lower? Valanginian.

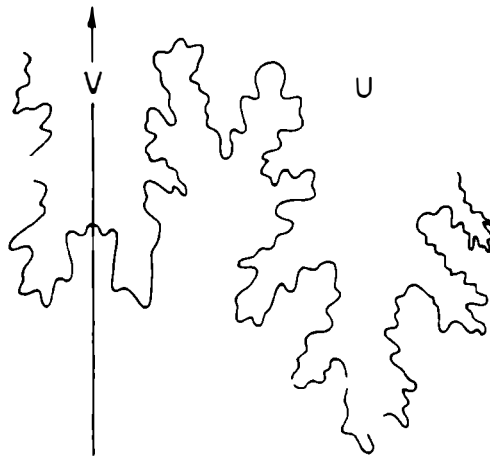


Fig. 4. Suture line of *Luppovella (Luppovella) baumbergeri* (Spath, 1939); Spec. No. 3/93 at H = 23 mm ($\times 3$); right bank of Kacha River near Verkhorech'ye; Lower Valanginian.

Material. One deformed specimen with incompletely preserved inner whorls, from right bank of Kacha River, near Verkhorech'ye (collected by V. V. Drushchits).

Subgenus *Planibulliceras* Baraboshkin et I. Mikhailova, subgen. nov.

Subgeneric name. Latin *planus* (flat), Latin *bulla* (tubercle) and Greek *keras* (horn).

Type species. *L. (P.) kachensis* sp. nov.; Valanginian; Crimea.

Diagnosis. Shell is medium-sized and semievolute. Transverse section through whorls hexagonal or rounded-hexagonal. Ventral side slightly convex. Umbilicus wide and moderately deep. Umbilical wall from steep to inclined and merging smoothly into lateral sides.

Sculpture. Consists of thick, relatively rare simple, bi- and triramose and bidichotomous costae with three rows of fairly flat tubercles, as well as constrictions, which are always present on early whorls.

Suture line. Has very deep umbilical lobe. Ventral lobe has high, tripartite secondary saddle and deeply dissected lateral sides. Umbilical lobe is tripartite, and from symmetrical to slightly asymmetrical. Saddle is bipartite, sometimes deeply dissected.

Specific composition. Six species: *L. (P.) bernii* (Imlay, 1938), *L. (P.) collignoni* (Fatmi, 1937), *L. (P.) kachensis* sp. nov., *L. (P.) lamberti* (Sayn, 1907), *L. (P.) lambertiformis* sp. nov. and ?*L. (P.) hookeri* (Blanford, 1863-1866) from Valanginian of Mexico, southeastern France, Crimea, northern Caucasus, Pakistan, and Himalayas.

Comparison. Differs from subgenus *Luppovella* in having very distinct constrictions,

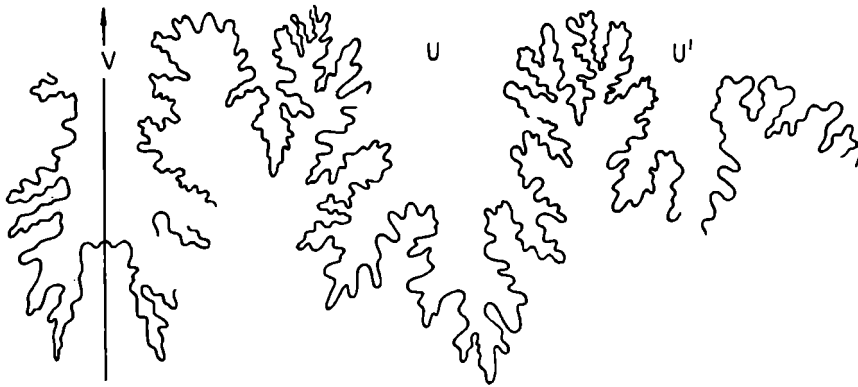


Fig. 5. Suture line of *Luppovella (Planibulliceras) lambertiformis* sp. nov.; Spec. No. 5/93 at H = 16 mm ($\times 4$); right bank of Bodrak River, above Trudolyubovka; Lower? Valanginian.

presence of only one simple costa between adjacent bidichotomous or bi- and triramose costae, and also relatively rare costae on middle and late whorls.

Luppovella (Planibulliceras) kachensis Baraboshkin et I. Mikhailova, sp. nov.

Pl. IV, figs. 2, 3

Specific name. From Kacha River.

Holotype. Museum of Earth Sciences, Moscow State University, No. 4/93; Crimea, right bank of Kacha River, near Verkhorech'ye; Valanginian, talus.

Form. Shell is medium-sized and semievolute. Transverse section changes from hexagonal in middle to rounded-hexagonal in later whorls. Umbilicus is wide and moderately deep. Umbilical wall is from steep to inclined, and grades smoothly into lateral sides.

Dimensions in mm and angles in degrees:

Spec. No.	D	H	h	W	Du	Ww	α_1	α_2	α_2	β	γ
Holotype 4/93	71.2	23.6	-	24.2	29.5	7	0	25	25	70	70
5/93	44.2	16.8	16	17	16	6	0-18	45	27	60	50

Sculpture. Consists of simple, bi- and triramose and bidichotomous costae and constrictions. Solitary costae are slightly S-curved, and number one or two between adjacent branching costae. Indistinct tubercle sometimes present in upper third of lateral side. On turn of ventral side costae thicken slightly and terminate, not crossing ventral side. Bidichotomous as well as simple costae begin from umbilical suture and on turn of umbilicus branch into two or

rarely three branches, with formation of elongated flat tubercle. Intercalation is sometimes observable. Anterior (adoral) costa is usually main one, and divided into two or three branches for second time in upper third of lateral side, with formation of slightly elongated flat tubercle. Sometimes costae do not branch, but then tubercle is present. Secondary costae incline toward aperture and terminate on ventral turn in thick, flattish tubercles. Posterior tubercle usually is somewhat larger than anterior. Constrictions are very indistinct and shallow. One whorl bears 28 main (including 12 solitary) and 40 subsidiary costae, and also 6 constrictions.

Suture line (fig. 5). Ventral lobe has almost parallel, deeply dissected lateral sides. Umbilical lobe is slightly deeper, tripartite, and somewhat asymmetrical. Saddles are bipartite and deeply dissected.

Comparison. Differs from *L. (P.) lamberti* in less distinct constrictions, thicker costae, presence of one simple costa between adjacent bipartite costae in early whorls, and less flat ventral tubercles.

Remarks. New species approaches *Lyticoceras* cf. *claveli* Busnardo et Thieuloy [34] from Valanginian of France in character of costation, but poor preservation of inner whorl of French specimen prevents reliable identification.

Distribution. Lower? Valanginian of Crimea.

Material. Two well-preserved casts from right bank of Kacha River near Verkhorech'ye (collected by students of Moscow State Univ.), and from right bank of Bodrak River above Trudolyubovka (collected by V. V. Drushchits in 1950).

Luppovella (Planibulliceras) lambertiformis Baraboshkin et
I. Mikhailova, sp. nov.

Pl. III, fig. 3

Kilianella? ("*Acanthodiscus*") sp. nov. cf. *lamberti*: Spath, 1939, p. 98, pl. 16, fig. 3.

Specific name. From *L. (P.) lamberti* and *formis* (Latin - like, similar).

Holotype. Museum of Earth Sciences, Moscow State Univ., No. 6/93; Crimea, Patil' plateau near Prokhladnoye; Lower? Valanginian.

Form. Shell is semievolute and small. Transverse section through whorls is hexagonal to rounded-hexagonal. Umbilicus is wide and fairly shallow. Umbilical wall is steep and narrow.

Dimensions in mm and angles in degrees:

Spec. No.	D	H	W	Du	Ww	α_1	α_2	α_3	β	γ
Holotype 6/93	35	11.5	12.2	15	4.7	25	50	25	60	65

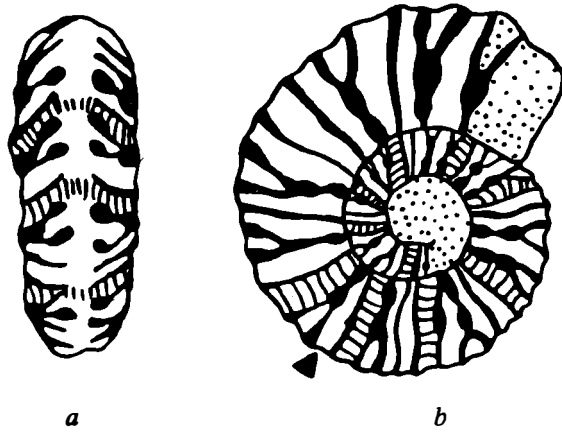


Fig. 6. Sculpture of *Luppovella (Planibulliceras) lambertiformis* sp. nov.; Holotype MGU No. 6/93: *a* - ventral side, *b* - lateral side; Patil' plateau near Prokhladnoye; Lower Valanginian.

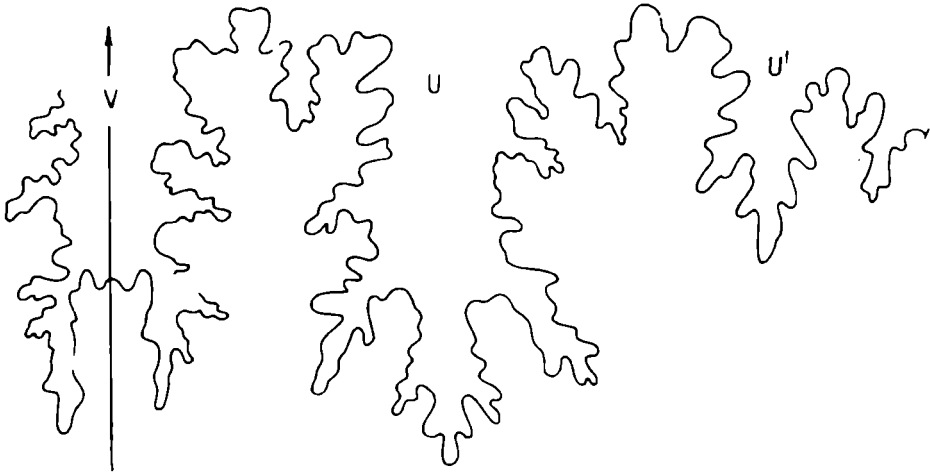


Fig. 7. Suture line of *Luppovella (Planibulliceras) lambertiformis* sp. nov., Holotype MGU No. 6/93 at H = 9.5 mm ($\times 7$); Patil' plateau near Prokhladnoye; Lower Valanginian.

Sculpture. Consists of solitary, biramose and bidichotomous costae and also of constrictions (fig. 6). Simple costae are slightly S-curved, disposed in pairs (at $D < 30$ mm) or singly ($D > 30$ mm) between adjacent branching costae. Bidichotomous costae are present at $D < 30$ mm. They begin at umbilical suture and on turn of umbilicus divide into two branches with formation of elongated flat tubercle. Secondary branching is in upper third of lateral side; flat round tubercle is present at point of this branching. Branches thus formed incline strongly forward and end on ventral turn. Posterior branch, which is a continuation of main costa, terminates in flat and round tubercle. Bifurcate costae on later whorls are replaced by bidichotomous costae

similar to them in configuration. Constrictions are quite distinct, narrow, and curved like costae. One whorl bears 32 main (including 18 solitary and 28 subsidiary) costae and 10 constrictions.

Suture line (fig. 7). Ventral lobe has large lateral denticles. Umbilical lobe is symmetrical and somewhat deeper than ventral. Saddles are bipartite, with branches of unequal size.

Comparison. This new species is closest to *L. (P.) lamberti*, from which it differs in pronounced bending of costae, distinct constrictions, and predominance of bipartite over solitary simple costae. Differs from *L. (P.) hookeri* in presence of two simple costae between adjacent bipartite costae.

Distribution. Lower? Valanginian of Crimea; Valanginian of Pakistan.

Material. Holotype (collected by F. Karpenko in 1984).

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