

New Middle Olenekian (Early Triassic) Ammonoids of South Primorye

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Abstract—Nine new ammonoid species (*Inyoceras singularis*, *Yvesgalleticeras proximus*, *Tirolites opiparus*, *Koninckitoides solus*, *Bajarunia magna*, *Albanites vulgaris*, *Nordophiceratoides praecox*, *Palaeophyllites admirandus*, *Kamenushkaites acutus*) and one new genus of the family Palaeophyllitidae (*Kamenushkaites*) are described based on material from the mid-Olenekian of the Kamenushka River basin, South Primorye.

Keywords: ammonoids, middle Olenekian, Kamenushka River basin (South Primorye)

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INTRODUCTION

Middle Olenekian deposits are widespread on continents, but ammonoids of this stratigraphic level in the Lower Triassic are insufficiently studied, especially outside the Alps and Karatau (Mangyshlak). Until recently the middle Olenekian ammonoids in South Primorye were recognized mainly from the shallow-water Schmidt Formation (Buriy and Zharnikova, 1981; Zakharov and Rybalka, 1987; Zakharov et al., 2004), cropping out in the southern regions of South Primorye (Russky Island).

Recently, large-scale building work in the region exposed some new Triassic sections, including sections of the Lower Triassic Kamenushka Formation in the northern region of South Primorye (Zakharov et al., 2014), possibly associated with deep-shelf depositional settings.

The best studied Kamenushka-2 section is located south-south-east of the village of Kondratenovka (43°36'11.8" N, 132°10'16.8" E), stretching along a gas pipeline. Another studied section (Kamenushka-1), representing a rock cliff along a new highway is only 100–140 m east of the Kamenushka-2 section.

The purpose of this paper is a description of new ammonoid taxa on the basis of the material from the Olenekian Kamenushka Formation in the Kamenushka River basin. The data on the shell interior morphology of some of the species described here and the data on their biostratigraphy and paleobiogeography derived from the new occurrences will be discussed in other papers. The material studied is housed in the museum of the Far East Geological Institute of the Far East Branch of the Russian Academy of Sciences (DVGI) (collection no. 852).

SYSTEMATIC PALEONTOLOGY

Family Xenoceltitidae Spath, 1930

Genus *Inyoceras* Tozer, 1994

Inyoceras singularis Zakharov et Smyshlyaeva, sp. nov.

Plate 3, fig. 1

E t y m o l o g y. From the Latin *singularis* (singular).

H o l o t y p e. DVGI, no. 20/852, phragmocone with the surviving body chamber; South Primorye, Kamenushka-2 Section; *Neocolumbites insignis* Zone, upper part of the Kamenushka Formation (Sample 960–22 from Member 18).

S h e l l s h a p e. The shell is discoidal, evolute, with a narrowly rounded venter in the young whorls and slightly flattened on the outer whorl. The ventral shoulder is rounded, the flanks are flattened. The umbilicus is wide, with a sloping wall and rounded edge.

O r n a m e n t a t i o n. The flanks are covered by radial ribs and folds, and a few constrictions, which are more prominent in the young whorls. The ribs near the ventral shoulder are bent towards the aperture to form arches curved orad on the venter.

S u t u r e (Fig. 1a). The suture is ceratitic, with a wide and deep ventral lobe (V), subdivided by a high median saddle into two narrow branches with serrated bases. The narrow lateral lobe (L), serrated at the base, longer than the ventral lobe; the umbilical lobe U¹, also serrated at the base, narrower and shorter. The umbilical wall possesses small auxiliary elements of the suture. The inner lateral lobe (I) narrow, with two denticles at the base. The dorsal lobe (D) is deep, with two denticles at the base. The first lateral saddle is lower and wider than the second.

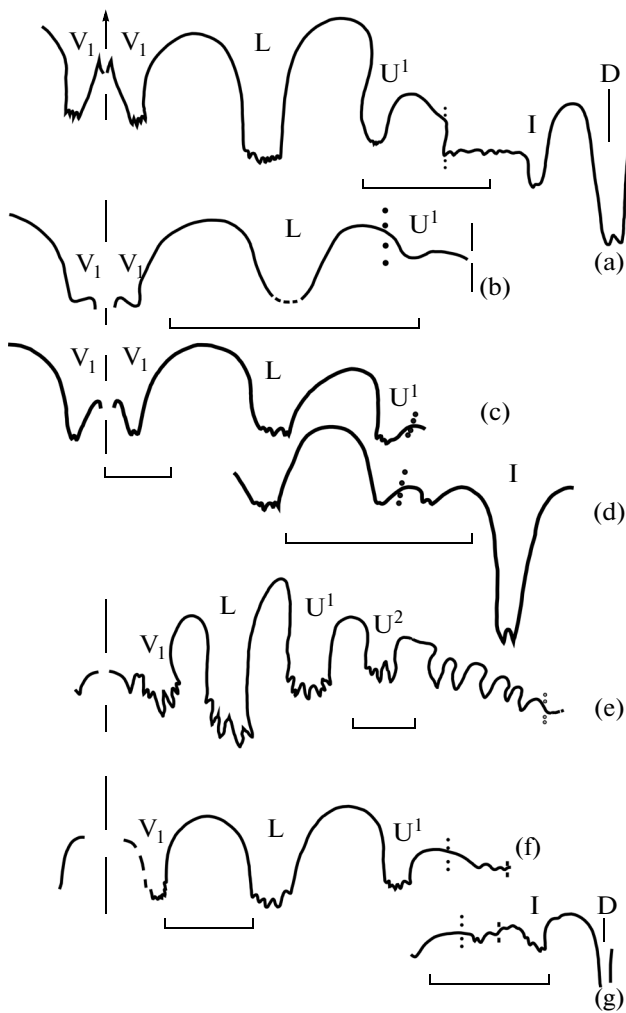


Fig. 1. Sutures: (a) *Inyoceras singularis* sp. nov., holotype DVGI, no. 20/852 at H = 11.5 mm; (b) *Yesgalleticeras proximus* sp. nov., holotype DVGI, no. 40/852 at H = 4.9 mm; (c, d) *Tirolites opiparus* sp. nov., holotype DVGI, no. 1/852: (c) at H = 14.5 mm, (d) at H = 9.0 mm; (e) *Koninckitoides solus* sp. nov., holotype DVGI, no. 70/853 at H = 31.0 mm; (f, g) *Bajarunia magna* sp. nov., holotype DVGI, no. 13/852: (f) at H = 18.9 mm, (g) at H = 17.0 mm. Scale bar 5 mm.

Dimensions in mm and ratios:

Specimen no.	D	H	W	U	H/D	W/D	U/D
32/852	120.5	46.7	16.2?	42.0	0.39	0.13?	0.35
Holotype 20/852	50.0	16.1	11.9	22.1	0.32	0.24	0.44
21/852	41.1	13.2	9.9	19.5	0.32	0.24	0.47

Comparison. This species is distinguished from *I. bitneri* (Hyatt et Smith) from the *Neopopano-ceras haugi* Zone of California (Hyatt and Smith, 1905, p. 123, pl. 20, figs. 5–15; Guex et al., 2010, p. 69, pl. 57, figs. 4–6, pl. 60, fig. 5, which is most

similar in shell morphology and ornamentation, by the weaker constrictions on the external whorl of the shell and more complex auxiliary series of the suture.

Material. Forty-seven specimens from the type locality (upper part of the Kamenushka Formation), represented by the closely located sections of Kamenushka-1 (Samples 955–1, 2, 3, 4, 7, 7a, 7c, 7(2), 8 specimens from Member 24) and Kamenushka-2 (Sample 960–8, 14, 20; 960–21, 22, 23, 27; 961–10, 11 specimens from Members 17–21).

Family Tirolitidae Mojsisovics, 1882

Genus *Tirolites* Mojsisovics, 1879

Tirolites opiparus Zakharov et Smyshlyaeva, sp. nov.

Plate 3, fig. 3

E t y m o l o g y. From the Latin *opiparus* (splendid).

H o l o t y p e. DVGI, no. /852, phragmocone with a body chamber; South Primorye, Kamenushka-2 Section; *Neocolumbites insignis* Zone, upper part of the Kamenushka Formation (Sample 955–1 from Member 24).

S h e l l s h a p e. The shell is thickly discoidal, evolute, with a broadly rounded venter, narrowly rounded ventral shoulder and flattened flanks. The umbilicus is wide, with a rounded edge and the vertical umbilical wall.

O r n a m e n t a t i o n. The surface of the flanks is covered by numerous radial folds and ribs possessing ventrolateral nodes, more prominent in the young whorls.

S u t u r e. The suture is ceratitic (Figs. 1c, 1d). The ventral lobe is wide and deep (V) is subdivided by a median saddle into two branches with two digits at the base. The lateral lobe (L), serrated at the base, is shorter than the ventral lobe; the umbilical lobe U¹, also serrated at the base, is narrower and slightly shorter than the L lobe. The inner lateral lobe (I) is small, with two denticles at the base. The dorsal lobe (D) is deep and narrow, with two digits at the base.

Dimensions in mm and ratios:

Sample no.	D	H	W	U	H/D	W/D	U/D
Holotype 1/852	68.2	24.1	22.6	28.0	0.35	0.33	0.41
6/852	27.0	10.5	9.0	10.0	0.39	0.33	0.37

Comparison. The new species differs from *T. subcassianus* Zakharov, 1987 from the Beds with *Tirolites ussuriensis* on Russky Island in South Primorye (Buriy and Zharnikova, 1981, p. 64, pl. 7, fig. 2; Zakharov and Rybalka, 1987, p. 41, pl. 4, figs. 2, 3) by the considerably wider and slightly less evolute shell. It differs from *T. smithi* Kummel from the *Columbites parisianus* Zone in Idaho (Kummel, 1969, p. 501, pl. 54, figs. 1–5) in the more strongly evolute shell and in the presence of the more promi-

ment nodes on the ventral shoulder of the young whorls.

Material. Fifteen specimens from the type locality: 4 specimens from the middle part of the Kamenushka Formation in the Kamenushka-2 Section (Sample 960–17 from Member 17); 11 specimens from the upper part of the Kamenushka Formation of the Kamenushka-1 (Sample 955–1, 1a, 7b from Member 24) and Kamenushka-2 (Sample 956–1, 961–1 from Members 21 and 24).

Family Proptychitidae Waagen, 1895

Genus *Koninckitoides* Dagys et Ermakova, 1988

Koninckitoides solus Zakharov et Smyshlyayeva, sp. nov.

Plate 3, fig. 5

Etymology. From the Latin *solus* (solitary).

Holotype. DVGI, no. 70/852, phragmocone with a small portion of the body chamber; South Primorye, Kamenushka-2 Section; *Tirolites-Amphistephanites* Zone, middle part of the Kamenushka Formation (Sample 960–5 from Member 12).

Shell shape. The shell is discoidal, evolute; the venter is rounded, with indistinct ventral shoulders, more or less prominent only on the outer whorl. The lateral walls are convex. The umbilicus is very narrow, with an angular shoulder, the umbilical wall is vertical and high.

Ornamentation. The surface of the flanks is covered by radial folds, bent aperturad near the ventral shoulders and forming arches on the venter. The arches are bent towards the aperture.

Suture (Fig. 1e). The suture is ceratitic, with large digits at the base of the lobes and saddles almost phylloid in shape. The wide and deep ventral lobe (V) is subdivided by a low median saddle, complicated by adventive lobes weakly developed into two branches. The lateral lobe (L) is deep and narrow. The umbilical lobe U¹ resembles in shape the lobe L, but is somewhat shorter. The U² lobe is narrower and considerably shorter than the U¹ lobe. The auxiliary series is long and complex (with several saddles and lobe of various sizes).

Dimensions in mm and ratios:

Sample no.	D	H	W	U	H/D	W/D	U/D
Holotype 70/852	98.8	55.6	22.6	7.9	0.56	0.28	0.08

Comparison. The new species differs from the morphologically similar species *K. popovi* (Kummel) from the *Columbites parisianus* Zone of the Idaho (Kummel, 1969, p. 384, text-figs. 10a–10c) and the Kamenushka Formation of South Primorye in the longer and more complex auxiliary series. It is distinguished from *K. posterius* (Popow) from Arctic Siberia (Popow, 1961, p. 51, pl. 4, fig. 2; Dagys and Ermak-

ova, 1988, p. 9, pl. 6, figs. 1–3, pl. 7, fig. 1) by the more strongly involute shell.

Material. Holotype.

Family Meekoceratidae Waagen, 1895

Genus *Bajarunia* Dagys, 1983

Bajarunia magna Zakharov et Smyshlyayeva, sp. nov.

Plate 3, fig. 4

Etymology. From the Latin *magnus* (large).

Holotype. DVGI, no. 13/852, phragmocone with a body chamber; South Primorye, Kamenushka-2 Section; middle part the Kamenushka Formation (Sample 960–3a from Member 12).

Shell shape. The shell is discoidal, evolute, with a rounded venter and flattened flanks. The umbilicus is wide, with a rounded edge and relatively high, more or less vertical umbilical wall.

Ornamentation. The shell surface is covered by low sinusoidal fold and growth lines.

Suture (Figs. 1f, 1g). The suture is ceratitic. The wide and deep ventral lobe (V) is subdivided by a median saddle into two branches with small serrations at the base. The lateral lobe (L), serrated at the base, longer ventral lobe; umbilical lobe U¹, serrated at the base, shallower than the lobe L. The auxiliary series, entirely lying on the umbilical wall, is short. The inner lateral lobe (I) is shallow, serrated at the base. The dorsal lobe (D) is narrow and deep.

Dimensions in mm and ratios:

Specimens no.	D	H	W	U	H/D	W/D	U/D
Holotype 13/852	91.0	30.0	20.0	41.0	0.33	0.22	0.45
18/852	60.0	21.0	—	24.0	0.35	—	0.40

Comparison. This species is very similar in its shell shape to *B.* sp. from the *Bajarunia euomphala* Zone from the lower reaches of the Lena River (Dagys and Ermakova, 1988, p. 27, pl. 4, figs. 1, 2). An adequate comparison is difficult because of the absence of complete information on its suture. This species differs from the type species *B. euomphala* (Keyserling) from Arctic Siberia (Keyserling, 1845, p. 172, pl. 3, figs. 7–10; Mojsisovics, 1886, p. 76, pl. 11, fig. 7; Kummel, 1969, p. 465, pl. 47, figs. 6–8; Dagys and Ermakova, 1988, p. 23, pl. 3, figs. 3–5) by the more strongly evolute, higher umbilical wall and less complexly dissected umbilical portion of the suture. The new species is distinguished from *B. confusionensis* Guex et al. from *Bajarunia* Beds in Utah (Guex et al., 2005, p. 5, pl. 4, fig. 1; 2010, p. 72, pl. 39, figs. 5–7, pl. 58, fig. 2) by the more strongly evolute shell and the more strongly rounded venter.

Remarks. Guex et al. (2010, p. 71, pl. 38, figs. 1–6, pl. 58, fig. 1) assigned *Meekoceras pilatum* Hyatt et Smith from the lower part of the *Columbites parisianus* Zone of Idaho to the genus *Bajarunia*.



However, we think that this taxon is more similar to the species of the genus *Subolenekites*, widespread in the upper part of the Olenekian of Arctic Siberia (Dagys and Ermakova, 1988).

Material. Seven specimens from the type locality (Kamenushka-2 Section): 6 specimens from the middle part of the Kamenushka Formation (Sample 960–1, 2, 3a from Member 12); 1 specimen from an isolated block (Sample 960–8), found near the transitional beds between the middle and the upper parts of the Kamenushka Formation.

Family Prionitidae Hyatt, 1900

Genus *Albanites* Arthaber, 1909

Albanites vulgaris Zakharov et Smyshlyaeva, sp. nov.

Plate 4, fig. 2

Etymology. From the Latin (*vulgaris*) common.

Holotype. DVGI, no. 71/852, phragmocone with body chamber; South Primorye, Kamenushka-2 Section; *Neocolumbites insignis* Zone, upper part of the Kamenushka Formation (Sample 960–9 from Member 17).

Shell shape. The shell discoidal, moderately evolute; the venter is narrow, flattened, with rounded ventral shoulders. The lateral wall flattened; the maximum shell width is in the region near the ventral shoulders.

Ornamentation. The ornamentation is represented by radial folds and thin ribs bent toward the aperture near the ventral shoulder and forming arches on the venter. The convexities of the arches are oriented toward the aperture. Some arches possess small nodes on the ventral shoulders. The radial ribs are more prominent in the young whorls, accompanied by widely spaced weak constrictions.

Suture (Fig. 2g). The suture is ceratitic. The shape of the two largest lateral saddles is similar to phylloid. The bases of lobes are strongly serrated. The wide and deep ventral lobe (V) is subdivided by a high median saddle into two narrow branches. The lateral lobe (L) is almost twice as long as the venter. The umbilical lobe U¹ is shorter than the L lobe. The auxiliary series is very short. The first lateral saddle is narrower and lower than the saddle.

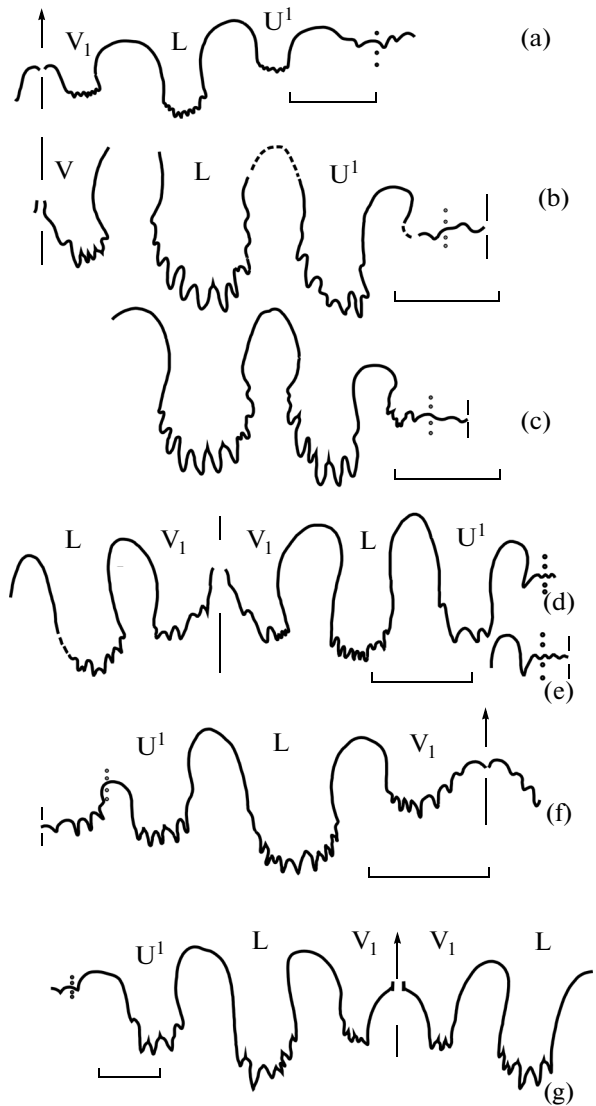


Fig. 2. Sutures: (a) *Nordophiceratoides praecox* sp. nov., holotype DVGI, no. 76/852 at H = 13.0 mm; (b–e) *Kamenushkaites acutus* gen. et sp. nov.: (b) holotype DVGI, no. 91/852 at H = 17.0 mm, (c) at H = 16.9 mm; (d, e) specimens DVGI, no. 24/852: (d) at H = 15.5 mm, (e) at H = 13.9 mm; (f) *Palaeophyllites admirandus* sp. nov., holotype DVGI, no. 89/852 at H = 15.0 mm; (g) *Albanites vulgaris* sp. nov., holotype DVGI, no. 71/852 at H = 25.5 mm. Scale bar 5 mm.

Explanation of Plate 3

Fig. 1. *Inyoceras singularis* sp. nov., holotype DVGI, no. 20/852: (1a) lateral view, (1b) apertural view; Kamenushka-2 Section, upper part of the Kamenushka Formation.

Fig. 2. *Yvesgalleticeras proximus* sp. nov., holotype DVGI, no. 40/852: (2a) lateral view, (2b) apertural view; Kamenushka-1 section, upper part of the Kamenushka Formation.

Fig. 3. *Tirolites opiparus* sp. nov., holotype DVGI, no. 1/852: (3a) lateral view, (3b) ventral view; Kamenushka-1 section, upper part of the Kamenushka Formation.

Fig. 4. *Bajarunia magna* sp. nov., holotype DVGI, no. 13/852: (4a) lateral view, (4b) ventral view; Kamenushka-2 Section, middle part of the Kamenushka Formation.

Fig. 5. *Koninckitoides solus* sp. nov., holotype DVGI, no. 70/852: (5a) lateral view, (5b) ventral view; Kamenushka-2 Section, middle part of the Kamenushka Formation.

All sizes are natural.

Dimensions in mm and ratios:

Specimens no.	D	H	W	U	H/D	W/D	U/D
Holotype 71/852	80.1	28.9	18.1	29.6	0.36	0.23	0.37
73/852	64.9	26.3	14.0?	19.9	0.41	0.22?	0.29

C o m p a r i s o n. This species is very similar in the shell shape to *A. sheldoni* (Kummel) from the Thaynes formation of Idaho (Kummel, 1969, p. 453, pl. 43, fig. 1), differing in the somewhat more evolute shell, presence of nodes on the ventral shoulders, and in the shorter auxiliary series of the suture. It is distinguished from *A. gracilis* (Kiparisova) from the *Kiparisovites carinatus* – *Tirolites* – *cassianus* Zone of Mangyshlak (Voinova et al., 1947, p. 164, pl. 39, figs. 3, 4) by the narrower venter.

M a t e r i a l. Six specimens from the type locality (Kamenushka-2 Section): 3 specimens from the middle part of the Kamenushka Formation (Sample 960–2, 4, 12 from Members 12 and 16); 3 specimens from the upper part of this formation (Sample 960–25, 962–2 from Members 19 and 24).

Family Olenikitidae Tozer, 1971

Genus *Nordopiceratoides* Guex et al., 2005

Nordopiceratoides praecox Zakharov et Smyshlyaeva, sp. nov.

Plate 4, fig. 1

E t y m o l o g y. From the Latin *praecox* (very early).

H o l o t y p e. DVGI, no. 76/852, phragmocone with a body chamber; South Primorye, Kamenushka-2 Section; *Neocolumbites insignis* Zone, upper part of the Kamenushka Formation (Sample 960–9 from Member 17).

S h e l l s h a p e. The shell is discoidal, moderately evolute, with a narrowly rounded venter. The ventral shoulders are not developed. The lateral wall is weakly convex. The umbilicus is relatively wide, with an angular edge. The umbilical wall is vertical.

O r n a m e n t a t i o n. The flanks are covered by sinusoidal ribs, continuing on the venter by weakly developed arches, convexities of which are facing the aperture. The ribs are most prominent on the umbilical shoulders.

S u t u r e (Fig. 2a). The suture is ceratitic, with serrated bases of the lobes and wide lateral saddles. The wide and shallow ventral lobe (V) is subdivided by a low median saddle into two wide branches. The narrow lateral lobe (L) is twice as long as the ventral lobe; the umbilical lobe U¹ is shorter than the L lobe. The auxiliary series is short.

Dimensions in mm and ratio:

Specimens no.	D	H	W	U	H/D	W/D	U/D
81/852	66.9	31.9	14.0	19.3	0.48	0.21	0.29
Holotype 76/852	44.1	17.4	10.0	14.6	0.39	0.23	0.33

C o m p a r i s o n. In the shell shape, the new species is the most similar to the type species *N. catherinae* Guex et al. from the *Columbites parisianus* Zone of Idaho (Guex et al., 2005, p. 12, pl. 2, fig. 2, pl. 6, fig. 7; 2010, p. 67, pl. 35, figs. 2–5, pl. 57, fig. 5), differing in the narrower venter, narrower lateral lobe and wider lateral saddles. It is distinguished from *N. gracilis* Guex et al. from same zone in Idaho (Guex et al., 2010, p. 68, pl. 37, figs. 4, 5) by the more strongly evolute shell and more prominent radial ribbing. It differs from *N. bartolinae* Guex et al. from the same zone of Idaho (Guex et al., 2010, p. 69, pl. 36, figs. 1, 2, pl. 52, fig. 1) in the more strongly evolute shell and narrower venter. It is distinct from *N. adriani* Guex et al., 2010 from the *Columbites parisianus* Zone in Idaho (Guex et al., 2010, p. 68, pl. 36, figs. 3, 4, pl. 37, figs. 1–3, pl. 57, fig. 6) in the more strongly evolute shell, narrower venter, the shallower ventral lobe and in the wide lateral saddles.

M a t e r i a l. Twenty-four specimens from the type locality: 14 specimens from the middle part of the Kamenushka Formation in the Kamenushka-2 Section (Sample 959–17a; 960–1, 2, 13 from Member 12); 10 specimens from the upper part of this formation in the Kamenushka-1 (Sample 955–2, 7 from Member 24) and Kamenushka-2 sections (Sample 956–1b; 960–21, 26; 961–3, 7, 14; 963–1 from Members 18, 19, 21, and 24).

Explanation of Plate 4

Fig. 1. *Nordopiceratoides praecox* sp. nov., holotype DVGI, no. 76/852: (1a) lateral view, (1b) ventral view; Kamenushka-2 Section, upper part of the Kamenushka Formation.

Fig. 2. *Albanites vulgaris* sp. nov., holotype DVGI, no. 71/852: (2a) lateral view, (2b) apertural view, (2c) lateral view; Kamenushka-2 Section, upper part of the Kamenushka Formation.

Fig. 3. *Palaeophyllites admirandus* sp. nov., holotype DVGI, no. 89/852: (3a) lateral view, (3b) ventral view; Kamenushka-2 Section, upper part of the Kamenushka Formation.

Figs. 4 and 5. *Kamenushkaites acutus* gen. et sp. nov.: (4) specimen no. DVGI, no. 94/852: (4a) ventral view, (4b) lateral view; Kamenushka-2 Section, upper part of the Kamenushka Formation; (5) holotype DVGI, no. 91/852: (5a) lateral view, (5b) apertural view, (5c) ventral view, the arrow shows the keel on the external whorl; Kamenushka-1 section, upper part of the Kamenushka Formation.

All sizes are natural.

Plate 4



Family Sibiritidae Mojsisovics, 1886

Genus *Yvesgalleticeras* Guex et al., 2005*Yvesgalleticeras proximus* Zakharov et Smyshlyaeva, sp. nov.

Plate 3, fig. 2

E t y m o l o g y. From the Latin *proximus* (assumed).

H o l o t y p e. DVGI, no. 40/852, phragmocone with body chamber; South Primorye, Kamenushka-1; *Neocolumbites insignis* Zone, upper part of the Kamenushka Formation (Sample 960–22 from Member 18).

S h e l l s h a p e. The shell is discoidal, strongly evolute, with a rounded venter and indistinct ventral shoulders. The flanks are flattened. The umbilicus is very wide, shallow, with a rounded edge.

O r n a m e n t a t i o n. The ornamentation is represented by numerous radial, weakly bent ribs and folds, possessing nodes on the ventral shoulders (oriented toward the aperture and most noticeable in the young whorls). The ribs are accompanied by widely spaced, weak constrictions. The ornamentation is weaker on the venter.

S u t u r e (Fig. 1b). The wide and deep ventral lobe (V) is subdivided by a very low median saddle into two small wedge-like branches. The wide lateral lobe (L) is also deep, possibly with no serrations at the base. The umbilical lobe U¹ is very shallow, clearly with no serrations at the base. The lateral saddles are low and wide.

Dimensions in mm and ratios:

Specimens no.	D	H	W	U	H/D	W/D	U/D
42/852	25.0	6.4	6.0	14.1	0.26	0.24	0.56
Holotype 40/852	21.2	5.9	6.0	12.8	0.25	0.26	0.55

C o m p a r i s o n. The new species is apparently very similar to the type species *Y. montpelierensis* (Kummel) from the *Columbites parisianus* Zone of Idaho (Kummel, 1969, p. 382, pl. 43, fig. 2, 3, pl. 44, figs. 11–13; Guex et al., 2010, p. 35, pl. 12, figs. 3–7, pl. 54, fig. 2), differing mainly in the more strongly evolute shell and a very low median saddle of the ventral lobe.

R e m a r k s. Guex et al. (2005), who established the new genus *Yvesgalleticeras*, included it within the family Columbitidae, but this was not supported by the data on the shell interior (data on *Y. proximus* will be a subject of a different paper).

Representatives of the family Columbitidae have a dorsal siphuncle in the first whorl (Zakharov, 1978; Zakharov et al., 2009), whereas in *Y. proximus* sp. nov. it is close to the ventral.

M a t e r i a l. Twenty-one specimens from the type locality (upper part of the Kamenushka Formation of

the Kamenushka-1 section (Samples 955–3, 4, 7, 7a, 7c, 8, 9a, 12a from Member 24).

Family Palaeophyllitidae Popov, 1958

Genus *Palaeophyllites* Welter, 1922*Palaeophyllites admirandus* Zakharov et Smyshlyaeva, sp. nov.

Plate 4, fig. 3

E t y m o l o g y. From the Latin *admirandus* (remarkable).

H o l o t y p e. DVGI, no. 89/852, phragmocone a partly distorted body chamber; South Primorye, Kamenushka-2 Section; *Neocolumbites insignis* Zone, upper part of the Kamenushka Formation (Sample 955–1 from Member 24).

S h e l l s h a p e. The shell is thinly discoidal, evolute, with a rounded venter. The ventral shoulders are not developed. The flanks are flattened and subparallel. The umbilicus is wide, with a rounded edge and a low, sloping umbilical wall.

O r n a m e n t a t i o n. The flanks possess radial folds, bent near the venter toward the aperture and accompanied by weak constrictions.

S u t u r e (Fig. 2f). The suture is ceratitic, with phylloid saddles. The wide and shallow ventral lobe (V) is subdivided by a low median saddle into two wide branches, serrated at the base. The wide lateral lobe (L), serrated at the base, is twice as long the ventral lobe; the umbilical lobe U¹, is also serrated at the base, narrower and shorter than the L lobe. The auxiliary series is short. The first lateral saddle is lower than the second, and the third lateral saddle is small.

Dimensions in mm and ratios:

Specimens no.	D	H	W	U	H/D	W/D	U/D
Holotype 89/852	59.6	18.7	–	25.8	0.31	–	0.43
	51.2	17.2	7.6	21.8	0.34	0.15	0.43

C o m p a r i s o n. In shell shape, the new species resembles the type species *P. steimanni* Welter from the beds with *Prohungarites* of Timor (Welter, 1922, p. 119, pl. 162, figs. 5–7, pl. 163, figs. 3–6), differing in the narrower whorls, weaker radial ornamentation, and the wider and shallower ventral lobe.

M a t e r i a l. Holotype.

Genus *Kamenushkaites* Zakharov et Smyshlyaeva, gen. nov.

E t y m o l o g y. After the Kamenushka River in South Primorye.

T y p e s p e c i e s. *K. acutus* sp. nov.

D i a g n o s i s. A palaeophyllitid species with a carinate venter.

S p e c i e s c o m p o s i t i o n. Type species.

Comparison. The new genus is distinguished from the all known genera of the family Palaeophyllitidae by the carinate venter.

Kamenushkaites acutus Zakharov et Smyshlyeva, sp. nov.

Plate 4, figs. 4 and 5

Etymology. From the Latin *acutus* (acute).

Holotype. DVGI, no. 91/852, phragmocone with a partly preserved body chamber; South Primorye, Kamenushka-1 section; *Neocolumbites insignis* Zone, upper part of the Kamenushka Formation (Sample 955–3 from Member 24).

Shell shape. The shell is thinly discoidal, semiinvolute, with an acute, carinate venter in the outer whorl and rounded to acute in the young whorls. The flanks are slightly convex; the maximum whorl width is in the mid-flank. The umbilicus is wide, with a rounded edge and a low vertical wall.

Ornamentation. The ornamentation is represented by radial folds on the body chamber and numerous radial ribs in the young whorls. The radial folds are bent toward the ventral keel. The venter of the young whorls possesses virtually no ribs.

Suture (Figs. 2b–2e). The suture is ceratitic, with phylloid saddles. The ventral lobe (V) is subdivided by a high median saddle into two narrow branches, serrated at the base. The wide lateral lobe (L), is essentially serrated at the base, is longer than the V lobe. The umbilical lobe U¹ is also deep and is serrated at the base, and is narrower than the L lobe. The auxiliary series is short. The second lateral saddle is narrower than the first. The third lateral saddle is small.

Dimensions in mm and ratios:

Specimens no.	D	H	W	U	H/D	W/D	U/D
Holotype 91/852	98?	38.1	–	43?	0.39?	–	0.44?
	41.0?	12.9	8.2	15.5?	0.46?	0.19?	0.38?
94/852	39.9	16.0	8.1	14.2	0.40	0.20	0.36

Material. Two specimens from the type locality [upper part of the Kamenushka Formation of the Kamenushka-1 section (Sample 955–3 from Member 24) and Kamenushka-2 (Sample 960–22 from Member 18)].

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