TREASURE OF RUSSIAN SHELLS

Vol. 9

VITRINIDAE

ROMAN EGOROV

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INTRODUCTION

The name vitrinids (glass snails) is due to the glassy translucent and fragile shell of those small snails (their body size is less than 20 mm).

Vitrinids are distributed mainly in Holarctic, only a few endemic genera present in Arabian peninsula and islands of East Atlantic and in North Africa. Several native vitrinid species mostly live on the ground in sufficiently humid and cool places, below decaying leaves and moss, near springs and at the side of creeks, in the mountains also in high altitudes. Vitrinids only appear above ground when the weather becomes colder and wet during autumn. They remain active during the winter and even can be found below thawing snow. Because glass snails are so indifferent to coldness, their area of distribution reaches quite far North: it extends beyond the Arctic Circle. In the mountains there are species living in altitudes above 3000 m above sea level. Many glass snail species also take profit from their resistance against coldness in feeding on other snails during their hibernation.

Vitrinidae has so called “zonitoid” type of shell, which characterized by next characters: shell generally flattened, thin-walled, transparent, with very smooth and glossy surface, sculpture of postembryonic whorls consists of fine growth lines and sometimes of narrow spiral grooves, lip and apertural armature absent. In total, the shell has tendency to reduction. The diaphanous shell of a glass snail already shows their strong similarity with a slug. Comparing for example with a pellucid glass snail (*Vitrina pellucida* (Müller, 1774)) and an ear-shaped glass snail (*Eucobresia nivalis* (Dumont et Mortillet, 1854)), it is obvious that while the pellucid glass snail still has a shell in which it is able to withdraw, the ear-shaped glass snail, hence its name, has a relatively smaller shell with less whorls, the last of which is widened in an ear-shape. And the snail is not able to withdraw into its shell.

Differences can be seen in the shape of the mantle: from the pellucid glass snail over to other glass snail species it can be seen that the mantle shield to a growing extent covers the shell from the front. Additionally a mantle flap covers the shell spire. In some species the shell may nearly be covered completely by the mantle.

Systematics and morphology of most representatives of this little group is well known and detailed described in many publications [Forcart, 1944; Schileyko, 1986; Hausdorf, 2002; etc.]. Schileyko [1986] divided the Vitrinidae into three subfamilies – Vitrininae Fitzinger, 1833 (sarcobelum and vaginal gland absent; vagina strongly reduced), Semilimacinae Schileyko, 1986 (there is short vagina and distinct, atrial sarcobelum) and Phenacolimacinae Schileyko, 1986 (there is long vagina and vaginal gland on the proximal vagina). The genus *Eucobresia* is attributed to the subfamily Semilimacinae conditionally: its representatives lacks a sarcobelum and has a vaginal papilla near the atrium possibly homologous to the spout of the sarcobelum [Schileyko, 1986: figs. 11, 12]. Hausdorf [1998] regarded this system as unacceptable, the Vitrininae being polyphyletic, the Semilimacinae paraphyletic, and only the Phenacolimacinae monophyletic. Moreover, the name Phenacolimacinae is a junior synonym of Plutoniinae Cockermell [1893], established for *Plutonia*. Shelley and Backeljau [1995: 150] are proposed spelling Plutoniainae for this taxa. The system of the family Vitrinidae in the present work follows the monograph of Schileyko [2003]. The family Vitrinidae is used for the following genera and subgenera occurring in the territory of central, eastern and southern Palaearctic: *Eucobresia*, *Phenacolimax* s. str., *Phenacolimax* (*Trochovitrina*) *stat. nov.*, *Semilimax* s. str., *Semilimax* (*Hessemilimax*) and *Vitrina*. There is only one change in Schileyko’s system: on the basis of inner morphology, for the former genus *Trochovitrina* here a subgeneric rank is determined. In total, 8 species with one subspecies were established for this area and one species included as possibly present.

ACKNOWLEDGEMENTS

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Distribution maps of representatives of the Vitrinidae in territory of Ukraine are prepared on the basis of the literature data, which were published by Dr. Nina Šverlova [2004] (Lviv, Ukraine) and Dr. Andrea Tappert (Edenkoben, Germany) & Alexei Korniushin (+Kiev, Ukraine) [2001].
Shells of Vitrinidae in natural size

PLATE I: Shells of Vitrinidae in natural size. 1 – *Vitrina p. pellucida*; 2 – *V. p. alaskana*; 3 – *V. exilis*; 4 – *V. rugulosa*; 5 – *Phenacolimax (Ph.) annularis*; 6 – *Ph. (Trochovitrina) lederi*; 7 – *Eucobresia diaphana*; 8 – *E. nivalis*; 9 – *Semilimax (S.) semilimax*; 10 – *S. (Hessemilimax) kotulai*.

Distribution of Vitrinidae in Russia and adjacent territories

**Table I.** Distribution of Vitrinidae in Russia and adjacent territories

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1 — Baltic States
2 — Western Ukraine, Transcarpathian Region
3 — Crimea Peninsula
4 — Southern Ukraine
5 — Western Russia
6 — Eastern Caucasus
7 — Azerbaidjan, Talysh
8 — Central Asia, Pamir-Alai
9 — Siberia, Altai
10 — Magadan Region; Kamchatka Peninsula
11 — Commander Ids., Bering I.
12 — Kurile Ids.
Systematic list

Vitrinidae Fitzinger, 1833
Vitrininae Fitzinger, 1833
Vitrina Draparnaud, 1801
Vitrina exilis Morelet, 1858
V. p. pellucida (Müller, 1774)
V. p. alaskana Dall, 1905
V. rugulosa Martens, 1874
Phenacolimax s. str.
Ph. (Trochovitrina) lederi (O. Boettger, 1879)
Subgenus Semilimax Schileyko, 1986
Subfamily Semilimacinae
Genus Semilimax Agassiz, 1845
Semilimax (S.) semilimax (J.B.L. Ferussac, 1802)
Subgenus Semilimax s. str.
Semilimax (S.) kotulae (Westerlund, 1883)
Subfamily Plutoniainae
Genus Plutonia Cockerell, 1893
Phenacolimax Stabile, 1859
Phenacolimax (Ph.) annularis (Studer, 1820)
Subgenus Trochovitrina O. Boettger, 1879
Ph. (Trochovitrina) lederi (O. Boettger, 1879)
Subgenus Semilimax Schileyko, 1986
Subfamily Semilimacinae
Genus Semilimax Agassiz, 1845
Subgenus Semilimax s. str.
Semilimax (S.) semilimax (J.B.L. Ferussac, 1802)
Subgenus Semilimax s. str.
Semilimax (S.) kotulae (Westerlund, 1883)

Abbreviations used in the text and figures

A – atrium
Ag – albumen gland
CL – conchoyolinic layer
D – diameter of shell
E – East
FO – free oviduct
GL – glandular layer
GT – glandular tissue
H – height of shell
ML – muscular layer
N – North
OVD – orifice of vas deferens
P – penis
Pil – pilaster
PG – penial gland
PR – penial retractor
PS – penial sheath
PSb – papilla of sarcobellum
PT – penial tubercle
RS – receptaculum seminis (spermatheca)
S – South
Sb – sarcobelum
SD – spermathecal duct
SMF – Senckenberg Forschungsinstitut und Naturmuseum (Frankfurt am Main, Germany);
T – talon
Va – vagina
VD – vas deferens
VG – vaginal gland
VP – vaginal papilla
W – West
o.d. – original designation;
s.d. – subsequent designation.
Vitrinoidea Fitzinger, 1833

Superfamily Vitrinoidea Fitzinger, 1833

Shell thin, vitrinooid, auriform to almost plate-like. Mantle in semi-slug taxa large. Sole tripartite. Caudal foss or caudal horn absent. Head wart absent. Jaw oxygnathous. Radula (“lingual membrane” in old literature) musivoglossate, with unpaired central tooth, a few laterals and many marginals. Flagellum or epiphallus missing. Penis short, with variously developed gland in its walls. Penial caecum absent, rarely small process on penis may be present. Sarcobelum vaginal or absent; when present, with or without thorn. Vagina simple or with internal papilla. Atrium lacks appendix. Spermatophores missing. Omnivorous or carnivorous. Holartic; Arabian Peninsula, mountain regions of Central and N Africa, Asia to Far East and W Pacific islands, N America, East-Atlantic islands.

Family Vitrinidae Fitzinger, 1833


Shell rather small, translucent, from low-conic to ear-shaped or plate-like (in semi-slugs), very thin and fragile, consists of 1.5-4.2 whorls in dependence of degree of reduce. Embryonic whorls with fine axial wrinkles or with microscopic dots which composed into spiral rows; or almost smooth. Body whorl very large, often broadly-inflated or widely elongate-plane. Sculpture consists of growth lines and, rarely, of very fine spiral striations visible only under significant magnification. Aperture very wide, margins thin, not reflected, basal and partly columellar margins often form periostracal fringe which may be resorbed. Body of animals medium or rather large, foot up 20-50 mm in active stage (vitrinids of reviewed area not exceeds 20-25 mm in length, usually smaller). Visceral sac reduced in different degree and moved to back end of body in dependence of degree of shell reduction. Also, vanes of mantle enlarged in dependence of shell reduction and partly covers of shell. Sole trilateral. Jaw with single median projection. Female part of genitalia usually with accessory organs (vaginal gland (="glandula amatoria" [Hausdorf, 1995]) often with vaginal papilla or sarcobelum (="dart gland", “love gland”, “atrial stimulator” in some authors) with one or two papillae). Sometimes accessory organs absent. Penis with gland into its widened walls and usually with well developed longitudinal pilaster. Vas deferens penetrated of penial gland. Spermatheca (=receptaculum seminis; bursa copulatrix) developed in various degree, completely reduced in Trochovitrina. Albumen gland comparatively small, irregular-shaped. Representatives of family distributed in North Hemisphere (N America, islands of E Atlantic, Alpine zones of central and northern Africa, Arabian Peninsula, Europe, mountain regions of Asia to Far East and W Pacific islands).

Key to the subfamilies of the family Vitrinidae

1(4). Shell widely- or depressed-conic, consists of not less than 3 whorls.
2(3). Shell smooth, greenish or yellowish, translucent, with rounded periphery. Penial sheath present. Vitrininae
3(2). Shell with irregular wrinkles, dirty-yellow or brownish, with rounded or angulated periphery. Penial sheath absent. Plutoninae
4(1). Shell ear-shaped, consists of not more than 2.5 whorls. Semilimacinae

Subfamily Vitrininae Fitzinger, 1833


Genus *Vitrina* Draparnaud, 1801


Shell globular, body whorl with widely rounded periphery. Mantle lobe very small. Oviduct and spermatheca duct join at common point. Penis small, internally with large longitudinal pilaster. Penial sheath covers lower part of penis; not connected with retractor.

**Type species** – *Helix pellucida* Müller, 1774 (by monotypy).

Key to the species of the genus *Vitrina*

1(4). Shell consists of not less than 3 whorls.

2(3). Spire slightly raised, its height equal or some exceed half of apertural height. Major diameter of shell not exceed 6 mm. *V. p. pellucida*

3(2). Height of spire occupies half or some less of half of apertural height. Major diameter of shell usually exceed 6 mm. *V. pellucida alaskana*

4(1). Shell consists of not more than of 3 whorls.

5(6). Spire obtuse, occupies not more of 0.3 of height of aperture. D/H = 0.57. *V. rugulosa*

6(5). Spire elevated, occupies some more than 0.3 but less than 0.5 of height of aperture. D/H = 0.4. *V. exilis*
Vitrina pellucida pellucida (Müller, 1774)

**Type material.** Neotype of *Vitrina p. pellucida* – Zoological Museum of the University of Copenhagen, Denmark [Forcart, 1955: 159, Taf. 12, figs. 2, 5]; lectotype of *V. globosa* – SMF Nr. 107222 [Zilch, 1979].

Shell very fragile, translucent, widely-conic, consists of 3-3.75 rounded whorls. Spire slightly raised, its height equal or some exceed half of apertural height. Embryonic whorls ornamented with dots which form distinct spiral rows. Suture whitish. Umbilicus pin-hole, very narrow, often completely closed. (Fig. 1 A-C)

Vas deferens, thickened base of spermathecal duct, and joint of penis with atrium arranged approximately at same level. Glandular tissue in lower part of oviduct not founded. Also, ring-shaped folds between atrium and female part of genitalia absent. Penis small, with one large and long rounded pilaster. (Fig. 1 D-E) [Schileyko, 1986].

H (in mm) 3.4 3.0 3.0 2.9
D (in mm) 6.0 5.1 5.0 4.8


**Ecology.** Species mainly lives in litter of wet asp and oak or any deciduous forests, rarely in bushes along reservoirs and on high-grass meadows. (Figs. 11, 12)

**Remarks.** In northern part of area, representatives of this species had less-whorled shell. This form was determined by Likharev, Rammelmeyer [1952] as *Helicolimax (H.) pellucidus* var. *angelicae*. Early, Westerlund [1897: 32] and Luther [1901: 44] in the list of distribution for *V. angelicae* indicated “Solovetsk”. The true *Vitrina angelicae* Beck, 1837 was described from Greenland and according to Forcart [1955] differs from *V. pellucida* in next characters: the vas deferens is mostly free from the penis, but in *V. pellucida*, the vas deferens is enclosed in a large sheath of connective tissue surrounding part of the penis; additionally, the spermathecal duct of *V. pellucida* has a large swelling at its base adjacent to the atrium. Systematic position of this species is unclear. It is possible, that *V. angelicae* is synonym of *V. pellucida*. 
Vitrina pellucida alaskana Dall, 1905

**Type material.** Unknown.

“Vitrina Pfeifferi. – V. testa sub-deprēissa, lēvigata, nitida, pellucida, vireinti-albida; anfr. 3, ultimus permagnis; sutura subtilissima marginata; apertura ampla, obliqua rotundato-ovata; peristene; columella arcuata. Diam. 5 mill. Axis. 2 mill. Hab. Carson Valley.” [original description of V. pfeifferi].

“This species has been referred to as *pellucida*, *limpida* and *exilis*, and when fully grown under favorable conditions the shell may reach 10 mm. in major diameter, though most of the specimens as collected are considerably smaller. The shell is translucent, with a marked greenish tinge, and not over three whorls. It is flatter than *limpida*, larger, and of a different tint, and the size of the whors increases more rapidly. It is less flat and much larger than *V. exilis*, which is also of a different hue.” [original description of V. alaskana].

Diffs from nominative subspecies in next shell characters: shell of adult individuals more large, body whorl significantly more inflated, embryonic whors (up to 1.5) sculptured with dots, which form irregular spiral rows. Height of spire occupies half or some less of half of apertural height. (Fig. 2 A)

Anatomically, subspecies differs from nominative one in next characters: interval between branching of vas deferens and lower margin of penis approximately equal to length of atrium, i. e., their arranged in different levels.

Base of spermathecal duct very widened. Relative length of penis exceeds of same of nominotypical subspecies. (Fig. 2 B). [Schileyko, 1986]. “The lingual membrane has over 50-1-50 teeth, with 10 perfect laterals.” [Binney, 1878: 138].

H (in mm) 6.0  
D (in mm) 10.0


**Ecology.** “It is the most common land shell on most of the islands of Bering Sea and on the continent near the sea, where it usually occurs, but as we move southward we find it occurring at continually greater elevations and entirely absent from the warm dry plains and valleys. It attains from 7,500 to 10,800 feet elevation in the Sierra and Rocky Mountains.” [Dall, 1905: 38].

**Remarks.** Forcart [1955] reviewed the northern species of the genus *Vitrina*, but did not treat *V. alaskana* because the reproductive anatomy was unknown to him. Later however, Bequaert & Miller [1973] placed *V. alaskana* in the synonymy of *Vitrina pellucida* stating that the reproductive anatomy of *V. alaskana* in examples they dissected agreed with that of Eurasian *V. pellucida* as illustrated and described by Forcart. Bequaert & Miller retained “alaskana” as the North American subspecies of *V. pellucida* on the basis of its geographical separation. Anatomical differences between both subspecies were described by Schileyko [1986] with notice that recorded differences may be bound up with seasonal changes. Schileyko also proposed to regard “alaskana” as subspecies of *V. pellucida* on the basis of described anatomical differences and geographical distribution.
**Vitrina exilis** Morelet, 1858

*Vitrina exilis* Morelet, 1858: 8;

*Vitrina exilis* – Binney, 1878: 138-139, fig. 54, Pl. II, fig. B; Dall, 1905: 38; Pearce et al., 2002: 94, 98; Kantor, Sysoev, 2005: 274; Egorov, 2008: 66;

*Helicolimax (H.) pellucidus var. exilis* – Likharev, Rammelmeyer, 1952: 297.

**Type material.** Unknown.

“Shell subperforate, rather convex-depressed, very thin, pellucid, hyaline, very lightly and distantly striate; suture impressed, margined; whorls 3, rapidly increasing, the last broad below, flattened; aperture oblique oval, the termination of the peristome membranous, that of the columella slightly reflected, giving the impression of a punctiform perforation. Greater diameter 7 ½ , lesser 5 mill., height, 3 mill. Allied to *V. pellucida*, but with less broad spire and differing in the perforation.” [Binney’s [1878] translation of the original description]. (Fig. 3)

“This is a small species, of a whitish or translucent glassy hue; smaller and with a more elevated spire than its American representative *V. alaskana*. According to Binney *V. exilis* has the jaw and radula as usual in the genus, the transverse rows of teeth numbering 37.1.37, with seven perfect laterals.” [Dall, 1905].

Anatomy unknown.

H (in mm) 3.0

D (in mm) 7.5

**Distribution.** Russian Far East: “Kamchatka, at Petropavlovsk; Bering Id. (Vega Expd.)” [Dall, 1905]; Kurile Ids.: Iturup, Paramushir, Shumshu, Atlasova Ids. [Pearce et al., 2002]. See Maps 4, 5.

**Remarks.** In Russia, this species is officially protected, and also included in the popular Red Data Book of the Magadan Region (Resolution of the Administration of the Magadan Region from June, 8th, 2007, nr. 193-na).
**Vitrina rugulosa** C. Koch in Martens, 1874

**Type material.** Unknown.

“Testa imperforata, globosodepressa, tenuis, nitida, laevis, pallide flavida; spira brevis, obtusa; anfractus 3; sutura simplex; apertura diagonalis, lunato-rotundata, \( \frac{2}{3} \) diametri fere occupans; margo externus rotundatus, basalis anguste membranaceus, columellaris fere recte descendens. — Diam. maj. 6\( \frac{1}{2} \) — 7\( \frac{1}{2} \) min. 5 — 6, alt. 3 — 4; apert. lat. 4 — 4\( \frac{1}{2} \), alt. 3 — 4 mill.” [original description]

Shell consists of 3 rounded whorls. Spire obtuse, weakly raised, and occupies not more of 0.3 of height of aperture. Embryonic whorl covered with vague pits which not regularly arranged in spiral rows. (Fig. 4 A-C)

Oviduct short but distinctly differentiated. Duct of spermatheca branched considerable below of point of branching of vas deferens. Base of duct of receptaculum seminis not thickened. Wall of lower part of oviduct with glandular tissue, which developed in various degree and arranged opposite of receptaculum seminis. Also, there is ring-shaped thickening in point of transition of oviduct to atrium. This thickening variously developed too at different individuals. Inner surface of vagina without constant folds. Penis small, with only one large rounded pilaster. (Fig. 4 D-E) [Schileyko, 1986].

\[
\begin{array}{ccc}
H \text{ (in mm)} & 4.0 & 3.5 & 3.1 \\
D \text{ (in mm)} & 7.0 & 6.0 & 5.9 \\
\end{array}
\]

**Distribution.** Mountain regions of Central Asia from Kopet-Dagh to Altai and SW Siberia; type locality: “in montibus Kokandensisibus prope Karakasuk” (Karakasuk ravine in vicinity of Kokand, Ferghana valley, Uzbekistan). See Maps 6, 7.

**Remarks.** Martens [1874: 7] stated that this species described “by Dr. C. Koch from Wiesbaden.”
Plutoniinae Cockerell, 1893

Subfamily Plutoniinae Cockerell, 1893


Shell normally developed or slightly ear-shaped, narrow umbilicate, basal margin can form thin periostracal fringe. Vagina long, consists of two parts. Upper part of vagina contained well-developed gland, usually with papilla. Sarcobelum and penial sheath absent.

Genus Phenacolimax Stabile, 1859


Shell widely-conic, consists of 3.5-4.2 convex whorls, spire rather high. Sculpture of definitive whorls consists of axial wrinkles and sometimes of spiral striations. basal margin without periostracal fringe. Talon pigmented with black. Vas deferens comparatively short, enters middle part of penis and piercing penial gland. Penis short, conic or sac-like, without appendices, with 1 or 2 pilasters internally. Free oviduct short. Vagina large, internally with thick-walled papilla which has comparatively broad lumen. Peripheral layer of papilla generally consists of radial muscle bundles, inner layer – of glandular tissue. Receptaculum seminis present or absent.

Distribution. Mountain regions of Palearctic: from Pyrenees and Alps in Europe to Turkey, Caucasus and Central Asia.

Type species – Helico-limax major Férussac, 1807 (s.d. Fischer in Paulucci, 1878: 24).

Key to the species of the genus Phenacolimax

1(2). Shell conoid-globose, whorls with rounded periphery. Receptaculum seminis present. Ph. (Ph.) annularis
2(1). Shell widely-conic, lens-shaped, whorls with angulated periphery. Receptaculum seminis absent. Ph. (T.) lederi

Subgenus Phenacolimax s. str.

Shell conoid-globose, whorls with rounded periphery. Embryonic whorls pitted with tiny, round depressions which more or less arranged in spiral rows. Receptaculum seminis present.
Phenacolimax (Ph.) annularis (Studer, 1820)

**Glischrus (Hyalina) annularis** Studer, 1820: 86;
Vitrina (?) conoidea Martens, 1874: 8, Pl. 1, fig. 5;
Helicarion sieversi Mousson, 1876: 137, Pl. V, fig. 1;
Vitrina subconica Boettger O., 1878: 121; Zilch, 1979: 87, Taf. 8, fig. 15;
Vitrina (Oligolimax) annularis – Tryon, 1885: 145, Pl. 31, figs. 45-48;
Vitrina (Phenacolimax) komarowi Boettger O., 1879: 392, Taf. 10, fig. 4; Zilch, 1979: 87, Taf. 8, fig. 14;
Vitrina (Oligolimax) annularis forma caucasica Westerlund, 1886:
22; Zilch, 1979: 87, Taf. 7, fig. 10;
Vitrina (Oligolimax) raddei Boettger O., 1889: 936, Taf. 27, fig. 5;
Zilch, 1979: 87, Taf. 8, fig. 13;
Vitrina (Teuchovitrina) conoidea – Sturany, 1905: 296;
Oligolimax annularis – Forcart, 1944: 658, Abb. 11, Pl. 2, fig. 8;
Phenacolimax (Gallandia) annularis – Wenz, Zilch, 1959-1960: 237, Abb. 839;
Kerney et al., 1983: 157, Abb.; Helicolimax (Oligolimax) annularis – Likharev, Rammelmeyer, 1952: 299, fig. 227;
Helicolimax (Oligolimax) annularis var. conoidea – Likharev, Rammelmeyer, 1952: 299;
Kantor, Sysoev, 2005: 275; Egorov, 2008: 65, Pl. XII, fig. 16.

**Type material.** Lectotype of Vitrina subconica – SMF Nr. 170220, from type locality: “Kasbeg” [Zilch, 1979];
lectotype of Vitrina (Phenacolimax) komarowi – SMF Nr. 170204, from type locality: “Armenia, Kipchag, Alagez” [Zilch, 1979];
lectotype of Vitrina (Oligolimax) raddei – SMF Nr. 170228, from type locality: “Ardag, Kopetdag” [Zilch, 1979] (Fig. 5D);
lectotype of Vitrina (Oligolimax) annularis forma caucasica – SMF Nr. 160175, from type locality: “Tiflis” [Zilch, 1979].

Shell widely-conic, comparatively thick-walled, with raised spire, consists of 3.5-4.2 regularly rounded convex whorls.

Embryonic whorls with fine axial wrinkles, developed in various degree in dependence of age of molluscs. Definitive whorls covered rather thick and irregularly spaced axial wrinkles. Also, sometimes there is weak spiral striation. Height of spire exceeds 0.5 of height of aperture. Aperture wide, basal edge without periostracal fringe. Umbilicus pin-hole. (Fig. 5 A-D)

Penis short, sac-like or short fusiform. Wall of upper part of penis contains well developed gland. Vas deferens enters through of penial gland and attach to penis in its middle part. In transversal dissection, penial cavity narrow semi-moon in upper part of penis and very widened in its lower part. Penial retractor attached apically to penial gland. Free oviduct rather short, straight; not narrowed before joining with vagina. (Fig. 5 E-F) [Schileyko, 1986].

H (in mm) 4.2 4.0 3.9
D (in mm) 5.8 4.5 6.0


**Ecology.** Moderately humid habitats in mountain regions, scarcely overgrown rocks, rock rubble habitats, also in gorges and at creek margins. Calcareous substrate is preferred, but silicate substrate also tolerated.

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**Phenacolimax (Ph.) annularis** (Studer, 1820)

Fig. 5

A
B
C
D
E
F
Phenacolimax (Trochovitrina) lederi (O. Boettger, 1878)

Subgenus Trochovitrina Schacko in O. Boettger, 1880 stat. nov.


“Sicut Vitr. Lederi Bttg. sectioni Trochovitrinae G. Schackoi, qui nuper apparatum lingualem inspexit, attribuenda.” [original description].

Shell widely-conic, lens-shaped, very fragile, whorls with angulated periphery. Embryonic whorls with fine radial striae. Receptaculum seminis absent.

Endemic of Central Caucasus and Transcaucasia.

**Type species** – Lampadia lederi Boettger, 1878 (s. d. Likharev, Rammelmeyer, 1952: 300).

**Remarks.** Westerlund [1902: 86] attributed the name to Schacko and gave as type Vitrina conoidea Martens, 1874 (junior synonym of Phenacolimax (Ph.) annularis (Studer, 1820)).

In montibus Kasbek Caucasi centralis et Suram Transcaucasiae. Proxirae affinis, ut videtur, V. annulari Ven. Helvetiae.” [original description].

Shell lens-shaped, very fragile, dirty-brownish or sandy, translucent, consists of 2.5-3.5 distinctly angulated whorls. All whorls include embryonic distinctly axially striated. Aperture ovate, oblique. Umbilicus pin-hole, often practically completely closed by inner lip. (Fig. 6 A-E)

Vas deferens short, entering middle part of penis. Penis slightly club-shaped, its thickened upper end bears small tubercle. Penial gland well developed. Internally penis without regular relief. Distal part of female section (free oviduct and vagina) long, its upper portion much enlarged, very thick-walled; walls contain numerous muscular bundles and glands which open by distinct pores into lumen of vagina. Talon rather long, twisted, darkly pigmented. (Fig. 6 F-G) [Schileyko, 1986].

**Type material.** Lectotype of Lampadia Lederi – SMF No. 170216 from type locality [Zilch, 1979]; lectotype of Vitrina (Trochovitrina) subcarinata – SMF 170224 from type locality “Lenkoran” [Zilch, 1979] (Fig. 6 D).

“Lampadia Lederi Boettg. n. sp. T. imperforata, perminute vix rimata, loco umbilici profunde impressa, depresso-conica, tenuissima, fragilis, pellucida, supra sericina, subtus nitidula, fuliginoso-fusca; spira brevis, conica; apex prominulus. Anfr. 3 celeriter accrescentes, supra fere plani, ad carinam subumbricati, basi convexi, sutura profunda disjuncti, superue striis distinctis, fasciculatis, fere costuliformibus, infra falciformibus ornati; ultimus acute carinatus, satis dilatatus, 2/5 latitudinis testae aequans, vix descendens. Apert. perobliqua, ampla, angulato-ovata, intus nitida; peristoma acutum, tenue, margine columellari angustissime membranaceo-marginatum, membrana ad rimam perminute reflexa. — Alt. 23/4, lat. 5, prof. 4 mm.

H (in mm) 3.9 2.1
D (in mm) 5.5 5.1


**Ecology.** In Lenkoran lowland species collected in swampy thickets of bamboo.

Phenacolimax (Trochovitrina) lederi (O. Boettger, 1878)
Subfamily *Semilimacinae* Schileyko, 1986


Shell thin, ear-shaped, basal edge of aperture with periostracal fringe.
Vagina short, not divided into parts, without gland and papilla, or papilla very short. Sarcobelum present (reduced only in *Eucobresia*), with one or two large papillae inside. Penial sheath present.

**Genus Eucobresia** H. Baker, 1929


Shell widely ear-shaped with broad or narrow periostracal fringe and large mantle lobe.
Sarcobelum completely reduced. Penis joins vagina below insertion of spermatheca duct. Vagina with short papilla.
Europe, northern Asia.
**Type species** – *Vitrina diaphana* Draparnaud, 1805 (o. d.).

**Key to the species of the genus Eucobresia**

1(2). Shell consists of 2-2.25 quickly growing whorls, umbilicated. Body whorl occupies not less than 0.5 of shell diameter. Basal periostracal fringe rather wide, reach to columella. *E. diaphana*

2(1). Shell consists of 2.5 rather slow growing whorls, non umbilicated. Body whorl occupies less than 0.5 of shell diameter. Basal periostracal fringe narrow, not reach to columella. *E. nivalis*
**Eucobresia diaphana** (Draparnaud, 1805)

*Vitrina diaphana* Draparnaud, 1805: 120, Pl. 8, figs. 38, 39; – Adam, 1960: 263-264, fig. 98; *Vitrina Heynemann* C. Koch, 1871: 33, Taf. 1, figs. 4, 9; *Phenacolimax (Semilimax) diaphanus* – Mermod, 1930: 97; Forcart, 1944: 641, Abb. 1, 2, Pl. 2, fig. 3; Wenz, Zilch, 1959-1960: 237, Abb. 837; *Eucobresia diaphana* – Gittenberger et al., 1970: 67-68, figs. 81, 85; Damjanov, Likharev 1975: 250; Kerney et al., 1983: 154, text-fig., Pl. 7, fig. 1; Schileyko, 1986: 139-141, fig. 10 A, 12; 2003: 1486, fig. 1917; Falkner 1990: 172.

**Type material.** Lectotype of *Vitrina heynemann* C. Koch, 1871– SMF No. 170096, Germany, Hessen-Nassau: Langen- aubach bei Haiger im Amte Dillenburg [Zilch, 1979].

Shell thin, flat, transparent, consists of 2-2.25 quickly growing whorls, umbilicated. Body (last) whorl occupies not less than 0.5 of shell diameter. Basal periostracal fringe rather wide, occupies about 35-45% of base of whorl, reach to columella. Embryonic whorls with widely spaced microscopic dots which not composed in rows. Umbilicus small, rounded. Animal dark, mantle black, in mountains light grey, cannot withdraw into shell, mantle covers apex entirely. (Fig. 7 A-C)

Spermoviduct long and forms a few curves. Spermatheca with long straight duct and small reservoir. Atrium very short. Connective tissue between oviduct and vagina very weak developed. Penis long, covered by well developed sheath. Penial gland well developed, divided into three parts: two parts symmetrically covers upper part of penis, third unpaired part lies in wall of lower part of penis. Inner space of penis divided by transversal fold into two chambers: rounded upper and rather large lower ones. Both chambers with high well developed longitudinal pilaster inside. Penial retractor attached terminally. (Fig. 7 D-E) [Schileyko, 1986].

H (in mm) 3.0 3.3
D (in mm) 6.0 6.7

**Distribution.** Mountain regions of W Europe: from E France (French Alps), Switzerland, the Netherlands and N Germany to Poland (Sudets), Romania (SE Carpathians), Bulgaria (W Rodopi, Vitosha, Rila and Pirin mountains). The species can be found in W Moldova.

**Ecology.** Humid and cool places, valley plains and mountains. In lowlands in shady and humid habitats in forests, in higher altitudes in open habitats, dwarf shrublands and grasslands with sufficient opportunities to hide. In Switzerland up to 2900 m, in Bulgaria 2600 m. Reproduction cycle presumably annual, in higher altitudes reproduction in the late summer. [AnimalBase].
Eucobresia nivalis (Dumont et Mortillet, 1854)

*Vitrina nivalis* Dumont, Mortillet, 1854: 209; – Westerlund, 1886: 16;
*Phenacolimax (Semilimax) alpina* C. Koch in Hesse, 1923: 92, Taf. 1, fig. 5;
*Vitrina kochi* Forcart, 1954: 266 (non Andreae, 1884);
*Helicolimax (Eucobresia) kochi* (Andreae, 1884) – Likharev, Rammelmeyer, 1952: 298;
*Eucobresia nivalis* – Kerney et al., 1983: 155, Taf. 7, fig. 2a-b;
Baidashnikov, 1985: 57, 64; Schileyko, 1986: 138-139, fig. 10 b, 11;
Falkner, 1990: 172; Sverlova, 2004: 100-103; Pokryszko, Maltz, 2007: 8; Egorov, 2008: 65-66, Pl. XII, fig. 18.

**Type material.** Unknown.

Shell thin, transparent, consists of 2.5 rather slow growing whorls, non umbilicated. Body (last) whorl occupies about 0.4 of shell diameter. Embryonic whorls with microscopic dots which composed in irregular rows. Basal periostracal fringe narrow, not reach to columella. Aperture with weak parietal callus. Animal grey, mantle marbled with grayish spots, mantle appendix relatively small, not covering the apex. (Fig. 8 A-D)

Spermoviduct long and forms a few curves. Spermaphaca with long straight duct and small thin-walled reservoir. Lower part of oviduct and upper part of vagina covered by thin sheath. Oviduct in 1.5-2 times longer than vagina. Ducts of oviduct and receptaculum seminis opens on top of short nipple-shaped papilla, which lacks of glandular elements and similar to enlarged sphincter. Penis rather short, almost completely covered by sheath, which almost reach to attachment of penial retractor. Penial retractor attached terminally. Penial gland weak developed. Penial cavity divided into upper and lower parts by semicircular fold. There are a few little parallel folds inside atrium, which reach to lower part of penis. Vas deferens very short, partly covered by sheath near atrium; joins into penis below upper edge of sheath. (Fig. 8 E-F) [Schileyko, 1986].

H (in mm) 2.8

D (in mm) 5.9

**Distribution.** European highlands, from Alps to E Carpathians. See Map 11.

**Ecology.** Humid mountain meadow and stony slopes above timberline, often near snow fields, also in swampy habitats in high mountain forests. In Ukrainian Carpathians species inhabits in silver fir-tree, fir-tree and alder-tree forests [Baidashnikov, 1985]. (Figs. 13, 14)
Genus *Semilimax* Stabile, 1859


Shell extremely ear-shaped, consists of 1.7-2.3 whors, non-umbilicated, basal edge of aperture with periostracal fringe.

Sheath of sarcobelum attached to lower part of papilla, and its most part not covered by sheath. Walls of papilla glandulous, papillary duct with conchyolinic covers. Receptaculum seminis duct joins into vagina. Vaginal papilla absent.

Europe, from Pyrenees to E Carpathians.

**Type species** – *Vitrina elongata* Draparnaud, 1805 (s. d. by Fischer in Paulucci 1878: 24) = *Helix semilimax* Férussac, 1802.

**Remarks.** The difficult situation with original description and designation of the type species of the genus *Semilimax* shortly described by F. Welter Schultes at: [http://www.animalbase.uni-goettingen.de/zooweb/servlet/AnimalBase/home/genustaxon?id=2549].

Key to the species of the genus *Semilimax*

1(2). Shell very thin, transparent, rather glossy, consists of 2.0-2.2 quickly growing whors. Basal wall of shell not resorbed. Penial retractor absent. *S. (S.) semilimax*

2(1). Shell very thin, flat, transparent, glossy, consists of 1.7-2.0 very quickly growing whors. Basal wall of shell resorbed. *S. (H.) kotulae*

**Subgenus Semilimax** s. str.

Basal wall of shell not resorbed.

Papilla of sarcobelum ended with short hollow conchyolinic thorn. Vas deferens not connected with penial sheath. Penial retractor absent.
**Semilimax (S.) semilimax** (J.B.L. Férussac, 1802)


Other names:

**Type material.** Unknown. Shell very thin, transparent, rather glossy, consists of 2.0-2.2 quickly growing whorls. Body (last) whorl occupies more than 0.6 of shell diameter. Embryonic whorls sculptured with spiral rows, consisting of microscopic dots. Basal part of aperture with wide periostracal fringe. (Fig. 9 A-D) Alive animal’s body light to dark grey (Fig. 16). Spermoviduct rather long. Receptaculum seminis with large thin-walled reservoir and very short duct. Vagina not less than 4 times longer than oviduct. Sarcobelum very large, consists of long papilla which covered by thin sheath. Channel of papilla has concholinic covers. Channel opens in top of short and slightly curved thorn, which in texture similar to needle of syringe. Penis short, its lower part covered by well developed sheath. Upper part of penis contains penial gland. Vas deferens fallen into middle part of penial gland. Penial cavity with long pilaster. (Fig. 9 E-G) [Schileyko, 1986].

**H** (in mm) 2.4

**D** (in mm) 5.0


**Ecology.** Humid habitats in mountain forests, under leaf litter and stones, prefers creek gorges, but also found in open habitats with high precipitations above the timberline. In Ukrainian Carpathians species inhabits in all types of forests, except purely oak [Baidashnikov, 1985]. Annual reproduction cycle. Adults lay 50-90 eggs in 6-9 clutches in the winter season (November to March), maturity is reached after 4-6 months, most animals die in spring, age 12-14 months [Kuenkel, 1933].
Semilimax (Hessemilimax) kotulae (Westerlund, 1883)

Subgenus Hessemilimax Schileyko, 1986


Basal wall of shell resorbed. Papilla of sarcobelum without thorn. Part of vas deferens attached to penis by penial sheath. Penial retractor present.

Type species – Vitrina kotulae Westerlund, 1883 (o. d.).

Vitrina kotulae Westerlund, 1883: 54-55;
Vitrinopugio kotulae – Hesse, 1923: 111; Likharev, Rammelmeyer, 1952: 300, fig. 229;
Semilimax kotulae – Forcart, 1944: 666, Pl. 2, fig. 12; Kerney et al. 1983: 153, Taf. 6, Fig. 4a-b; Falkner, 1991: 102;
Semilimax kotulae – Baidashnikov, 1985: 64; Sverlova, 2004: 102-103; Kantor, Sysoev, 2005: 275;
Semilimax (Hessemilimax) kotulai – Schileyko, 1986: 134-135, fig. 5 B, 7; Egorov, 2008: 66, Pl. XII, fig. 20;
Semilax kotulai – Pokryszko, Maltz, 2007: 8 (err. pro Semilimax).

Type material. Unknown.

“VITRINA KOTULAE WES TERL. N. SP. Testa perdepressa, auriformis, tenuissima, virescente-hyalina, superne sub lente ruguloso-striata; spira planata, 2/5 longitudinis aequans; anfr. 2, fortissime accrescentes, ultimus depressissimus, apertura maxima, fere 1/2, testae longitudinis efficiens, antrorum latior, marginem columellari fortissime exciso usque ad apicem testae, ut infra conspecta spira tota cum vertice bene conspicua, margin superiore parum exciso, margin anteiori rotundato-subtruncato; limbus membranaceus jam ab anfractu penultimo fere ad marginem antioerem prolongatus, medio latissimus et fere 1/2 baseos occupans. Long. 5–6, lat. 31/2–4, alt. 2 mm. Hab. Galicia in M.Tatra, 900–2200’ s. m. praecipue in regione alpina, sub lapidibus non rara. Hanc egregiam speciem detectit et demonstravit amiciss. Prof. Kotula, cui scrutatori naturae meritissimo eam dedicare volui. In vicinitate V. elongatiae locum habet, sed mox et valide ab hac et ab omnibus hucusque cognitis differet marginem columellari toto fortissime arcuato et tam exciso ut spira tota usque ad apicem conspicua sit.” [original description].

Shell very thin, flat, transparent, glossy, greenish-yellow, consists of 1.7-2.0 very quickly growing whorls. Body (last) whor occupies more than 0.6 of shell diameter. Embryonic whorls practically smooth, without dots. Basal part of shell resorbed. (Fig. 10 A-B)

Vas deferens rather long, fallen into penis subapically. Reservoir of spermatheca rather small, slowly transited in short duct which fallen into vagina near at atrium. Vagina very short; oviduct rather long. Sarcobelum without thorn. Penis without longitudinal pilaster, but with one or two circular folds inside. Penial retractor attached to penis terminally. (Fig. 10 C-D) [Schileyko, 1986].

H (in mm) 2.0 2.4
D (in mm) 5.0 5.9


Ecology. Mainly in forests, cool and humid shady habitats, in moist moss, under stones and in soil litter, only in mountains at altitudes above 600 m. Rarely above timber-line in humid shrubs with mosses and on alpine pastures under stones. In Ukrainian Carpathians species lives in mountain fir-woods and in alder groves [Baidashnikov, 1985]. Also, species present in pure coniferous forests [Solymos, Pall-Gergely, 2007]. Biology fairly unknown, adult animals were found in August and September. Species may be suitable indicator for fate of montane species affected by global warming in whole Central Europe [Mueller et al., 2009]. (Fig. 15)
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Fig. 11. *Vitrina p. pellucida*, under low vegetation at N end of Podlavice (Banska Bystrica), on road to Laskomersks valley; Starohoske Verchy, Bansk a Bystrica, Slovakia; photo by J. Grego

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1 — Stavropol’skaya highland  
2 — Yegorlykskiy Ridge  
3 — Markhotskiy Ridge  
4 — Great Caucasus Ridge  
5 — Skalistyi Ridge  
6 — Bokovoiy Ridge  
7 — Terskiy Ridge  
8 — Sunzhenskiy Ridge  
9 — Andiyskiy Ridge  
10 — Bogosskiy Ridge  
11 — Les Ridge  
12 — Samurskiy Ridge  
13 — Kyabyaktepe Ridge  
14 — Bzybskiy Ridge  
15 — Abkhaskskiy Ridge  
16 — Kodorskiy Ridge  
17 — Svanetskiy Ridge  
18 — Egrisskiy Ridge  
19 — Lechkhymskiy Ridge  
20 — Rachinskiy Ridge  
21 — Likhskiy (=Suramskiy) Ridge  
22 — Kartliyskiy Ridge  
23 — Kakhetinskiy Ridge  
24 — Alyatskiy Ridge  
25 — Meskhetskiy Ridge  
26 — Trialetskiy Ridge  
27 — Schavschetskiy Ridge  
28 — Lasistan Ridge  
29 — Arsiyanskiy Ridge  
30 — Dzhavakhetskiy Ridge  
31 — Bazumskiy Ridge  
32 — Kargapazary Ridge  
33 — Pambakskiy Ridge  
34 — Schakhdagskiy Ridge  
35 — Gegamskiy Ridge  
36 — Vardenisskiy Ridge  
37 — Zangezurskiy Ridge  
38 — Muravadag Ridge  
39 — Karabakhskiy Ridge  
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**Tien Shan:**
1 — Zailiyskiy Alatau
2 — Kungey Ala Too
3 — Terskey Ala Too
4 — Naryn Too
5 — Kyrghyz Ala Too
6 — Thalasskiy Ridge
7 — Ugamskiy Ridge
8 — Pskemskiy Ridge
9 — Chatkalskiy Ridge
10 — Kuraminskiy Ridge
11 — Ferganskiy Ridge
12 — Karatau Ridge

**Pamiro-Alai:**
13 — Turkestanskiy Ridge
14 — Zeravshanskiy Ridge
15 — Gissarskiy Ridge
16 — Alaiskiy Ridge
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Maps of distribution


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Maps of distribution

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Map 13. Distribution of *Semilimax kotulae*. 

ADAMS H., ADAMS A., 1853-1858. The genera of Recent Mollusca; arranged according to their organization. In three volumes, John Van Voorst, London [1, 1-256 (1853); 1, 257-484 (1854a); 2, 1-92 (1854b); 2, 93-284 (1855), 2, 285-412 (1856); 2, 413-540 (1857); 2, 541-661 (1858); 3, 138 pls.].


ANIMALBASE. Internet resource: http://www.animalbase.uni-goettingen.de


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The List of Some Internet Resources on Reviewed Vitrinids

Vitrina p. pellucida

http://www.animalbase.uni-goettingen.de/zooweb/servlet/AnimalBase/home/species?id=1243
http://www.animalbase.uni-goettingen.de/zooweb/servlet/AnimalBase/home/speciestaxon?id=10412
http://www.mollbase.de/list/index.php?action=zeige_taxon&id=656
http://www.fugleognatur.dk/wildaboutdenmark/speciesintro.asp?ID=8331
http://arnobrosi.tripod.com/snails/vitrinidae.html
http://data.gbif.org/species/13779652
http://inpn.mnhn.fr/ish/espece/cd_nom/64197/tab/taxo?lg=en
http://www.faunaeur.org/full_results.php?id=431324
http://molluscs.at/gastropoda/terrestrial/vitrinidae.html

Vitrina p. alaskana

http://www.livinglandscapes.bc.ca/cbasin/molluscs/vitrinidae.html

Phenacolimax annularis

http://www.animalbase.uni-goettingen.de/zooweb/servlet/AnimalBase/home/species?id=14252
http://www.animalbase.uni-goettingen.de/zooweb/servlet/AnimalBase/home/species?id=2312
http://data.gbif.org/species/browse/taxon/16084600
http://arnobrosi.tripod.com/snails/vitrinidae.html

Phenacolimax lederi

http://www.animalbase.uni-goettingen.de/zooweb/servlet/AnimalBase/home/species?id=2313
http://www.animalbase.uni-goettingen.de/zooweb/servlet/AnimalBase/home/speciestaxon?id=14385
http://www.bioone.org/doi/abs/10.4002/040.053.0206

Eucobresia diaphana

http://www.animalbase.uni-goettingen.de/zooweb/servlet/AnimalBase/home/species?id=1245
http://www.animalbase.uni-goettingen.de/zooweb/servlet/AnimalBase/home/speciestaxon?id=11540
http://www.animalbase.uni-goettingen.de/zooweb/servlet/AnimalBase/home/picture?id=3718
http://arnobrosi.tripod.com/snails/vitrinidae.html
http://cat.inist.fr/?aModele=afficheN&cpsidt=22242718
http://data.gbif.org/occurrences/207826928
http://data.gbif.org/species/browse/taxon/21799788
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http://www.animalbase.uni-goettingen.de/zooweb/servlet/AnimalBase/home/species?id=2450
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The List of Some Internet Resources on Reviewed Vitrinids

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http://www.animalbase.uni-goettingen.de/zooweb/servlet/AnimalBase/home/speciestaxon?id=11539
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http://data.gbif.org/species/browse/provider/1/taxon/16081117/
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*Semilimax kotulae*

http://www.animalbase.uni-goettingen.de/zooweb/servlet/AnimalBase/home/species?id=2586
http://www.animalbase.uni-goettingen.de/zooweb/servlet/AnimalBase/home/speciestaxon?id=14748
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