

A new subgenus and three new species of the genus *Acrotoma* O. Boettger 1881 (Pulmonata Clausiliidae) from western Transcaucasia

Alexander N. SUVOROV

A.N. Severtzov Institute of Problems of Evolution, Russian Academy of Sciences, Leninski Prospect 33, Moscow 117071, RUSSIA

ABSTRACT. Based on conchological and anatomical study, one new subgenus [*Acrotoma* (*Castelliana*) subgen. nov.] and three new species [*Acrotoma* (*Acrotoma*) *gegika* sp. nov., *Acrotoma* (*Castelliana*) *tunievi* sp. nov. and *Acrotoma* (*Castelliana*) *juliae* sp. nov.] of the clausiliid genus *Acrotoma* O. Boettger, 1881 are described from western Transcaucasia.

The genus *Acrotoma* O. Boettger, 1881 is a very specific Northwest Caucasian clausiliid genus, consisting of species dwelling mostly on lime rocks. One of the most characteristic features of representatives of the genus is the relatively large decollated shell up to 37.5 mm (in decollated condition) consisting of up to 18 whorls when not decollated. The other specific character is well-developed penial caecum. According to the most recent review [Schileyko, 2000] the genus *Acrotoma* consists of three subgenera: *Acrotoma* s.str., *Bzybia* Nordsieck, 1977 and *Acrotomina* Nordsieck, 1977. The first two subgenera contain the only species each – *A. komarowi* O. Boettger, 1881 and *A. claussi* Nordsieck, 1977, correspondingly. The subgenus *Acrotomina* includes three species: *A. semicineta* Boettger, 1881, *A. narzanensis* Rosen, 1901 and *A. laccata* Boettger, 1881.

In summer 2001, I was in an expedition to the south macroslope of west part of the Caucasus. Partly this expedition was within the framework of expedition organized by the Association of Natural Reserves and National Parks of Northern Caucasus in order to make a complex description of flora and fauna of Ritsinsky Relic National Park (Abkhazian Republic).

As a result of the expedition an alcohol material has been obtained, including 4 species of *Acrotoma* genus. The only species of these four was identified as *A. claussi*.

A. claussi specimens were collected in the second half of July, 2001 in the valley of the Bzyb River on the territory of Ritsinsky Relic National Park. More precisely, they were collected from the section of valley of the Bzyb River, limited by Goluboe Lake from below and the first kilometers of road to

tract Kudjba-Iashta from above, and from the section of valley of the Gega River limited by place of junction with the Bzyb River from below and place of confluence with the Jupshara River from above. The species is dwelling on lime rocks and under large stones at the base of the rocks.

Two more species were collected from the territory of Ritsinsky Relic National Park and one from Kavkazsky State Natural Biosphere Reserve. These species are described below.

Abbreviations. ZMMU – Zoological Museum of Moscow State University; H – height of shell; LD – large diameter; HA – height of aperture; WA – width of aperture.

Family Clausiliidae

Genus *Acrotoma* O. Boettger, 1881

Subgenus *Acrotoma* (*Acrotoma*) s. str.

Acrotoma (*Acrotoma*) *gegika*

Suvorov, sp. nov.

(Fig. 1 A-E)

Locus typicus. NW Caucasus, Abkhazian Republic, Ritsinsky Relic National Park, valley of Gega River (right tributary of Bzyb River), surroundings of Gegsky waterfall, on lime rock, coll. A.N. Suvorov, 25.07.2001.

Material. Holotype in ZMMU, No. Lc-25409.

Description. Shell dull, corneous, decollated, fusiform, moderately solid, consists of 6 whorls (after decollation). The last whorl with well-developed basal keel reaching umbilical chink. Postembryonic sculpture of irregular, delicate, radial striation. The last third of body whorl is covered with dense thin ribs especially well pronounced immediately behind the aperture margin and on the basal keel. Aperture uninterrupted, prominent, angulated-ovate, vertical, with basal angle, widely reflected margins and basal groove. Superior lamella high, curved, fully visible through aperture. Its inner end located nearly on one radius with external end of spiral lamella but closer to columella. Inferior lamella strong, with thickened white crest, distinctly spirally curved, does not reach aperture margin. Lamella inserta absent. Lamella

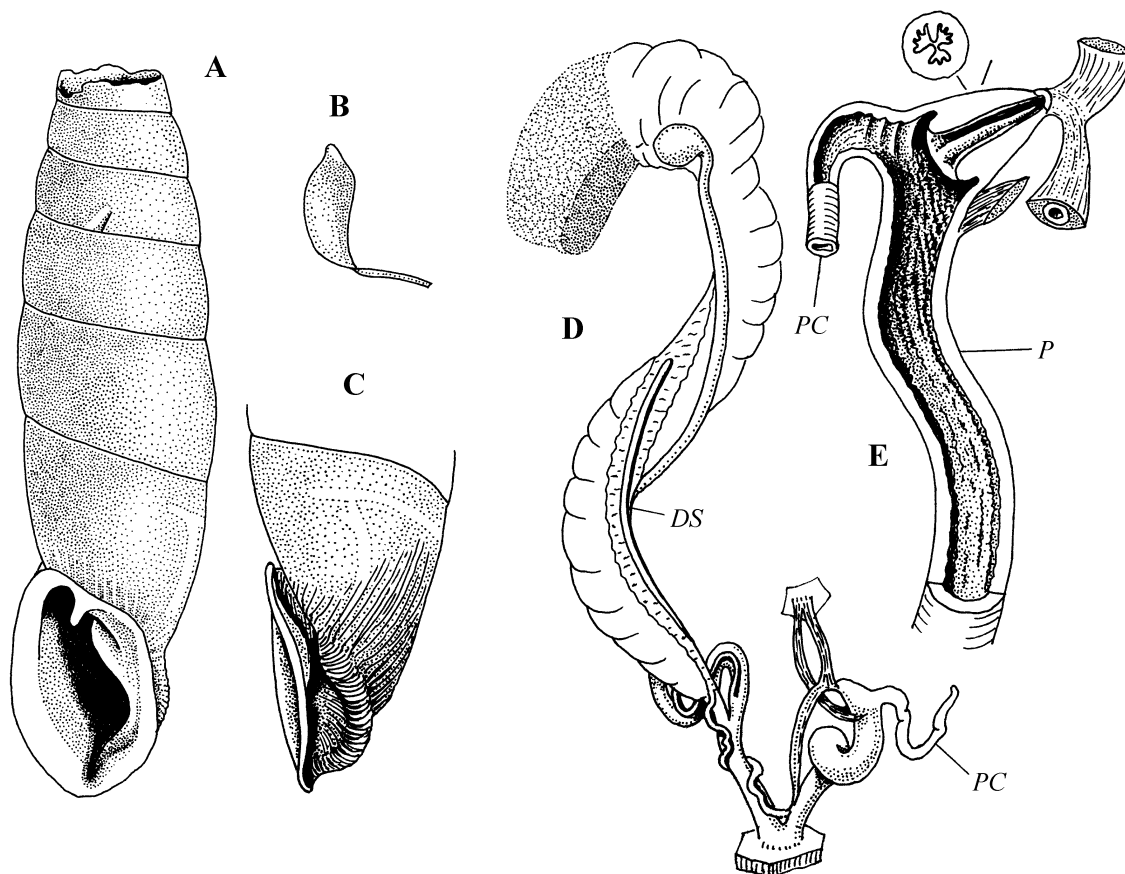


FIG. 1. *Acrotoma (Acrotoma) gegika* Suvorov, sp. nov. Holotype. A – shell; B – clausilium; C – appearance of body whorl from right side; D – reproductive apparatus; E – interior of penis and epiphallus: DS – diverticle of spermatheca; Ep – epiphallus; P – penis; PC – penial caecum.

РИС. 1. *Acrotoma (Acrotoma) gegika* Suvorov, sp. nov. Голотип. А – раковина; В – клаузилий; С – внешний вид последнего оборота справа; D – половой аппарат; E – продольный разрез через пенис и эпифаллус: DS – дивертикул семяприемника; Ep – эпифаллус; P – пенис; PC – пениальный цекум.

subcolumellaris well developed, its end visible through aperture.

Principal plica starting on ventral side, almost half whorl in length. Lunella strong, located on right side of shell; its upper tip deflected backwards fluently. On the contrary, its lower part is deflected forwards. A rudimental plica palatalis located directly behind this part of lunella. Lunella and clausilium not visible through aperture. Palatal callus well developed.

Clausilium lancet-like, with acuminated top.

Dimensions: holotype H 25.0, LD 7.4 HA 8.1, WA 5.4 mm.

Reproductive anatomy (Holotype).

Vas deferens entering epiphallus apically, its section between atrium and epiphallus intertwined with muscular fibres. Epiphallus short, conic, thick-walled, with internal relief consisting of three large longitudinal folds. It juts into penis by a sort of verge. Penial caecum long, thin, vermiform. Penis, a long, spirally twisted cylindrical tube. Its internal surface bears a long, longitudinal, broad fold splitted into numerous small folds in distal part of penis. Penial retractor biramous: one branch attached to proximal

end of epiphallus, the other – to proximal end of penis. Free oviduct shorter than vagina. Spermatheca with compact globular reservoir and long, thin diverticle.

Remarks. Cochologically *A. gegika* differs from all other species of the genus by very deep position of principal plica and lunella. It differs from *A. komarowi* also by spirally curved inferior lamella, non-swollen, cylindrical penis, conic epiphallus and globular spermathecal reservoir.

Besides, *A. gegika* differs from *A. tunievi* Suvorov, sp. nov. and *Acrotoma juliae* Suvorov, sp. nov. by basal keel reaching umbilical chink, clausilium acuminated at its end, absence of spiral sculpture on postembryonic whorls, presence of penial caecum and specific structure of epiphallus.

Habitat. The only specimen, holotype of new species was collected from the lime rock near Gegsky waterfall in the zone of fir-deciduous forest.

Distribution. The species is known only from the type locality.

Derivatio nominis. The species is named after the area of collection – surroundings of Gegsky waterfall in the valley of the Gega River.

[**Диагноз.** Раковина веретеновидная, деколлированная, твердостенная, роговая, матовая, состоит из 6 оборотов (после деколляции). Последний оборот с развитым базальным килем, доходящим до пупочной щели. Постэмбриональные обороты неравномерно тонко исчерчены. Последняя треть последнего оборота с тонкими густо расположенными ребрышками, особенно ярко выраженными непосредственно за отворотом края устья и на базальном киле. Устье цельное, выступающее, угловато-овальное, вертикальное, с базальным углом, широко отвернутыми краями и базальным желобком. Верхняя пластинка высокая, изогнутая, слегка заходит за передний конец спиральной пластинки. Нижняя пластинка мощная, отчетливо спирально изогнутая, с утолщенным гребнем, края устья не достигает. Вставочная пластинка отсутствует. Субколумеллярная пластинка хорошо развита, ее конец виден через устье. Главная палатальная складка начинается на брюшной стороне раковины и занимает почти половину оборота. Полулунная складка мощная, лежит на правой стороне раковины, ее верхняя часть плавно отогнута назад, нижняя, более короткая отогнута вперед. За нижней частью полулунной складки располагается рудимент нижней палатальной складки. Палатальная мозоль хорошо развита. Клаузилий ланцетовидной формы, с заостренной вершиной.

Участок семяпровода между атриумом и эпифаллусом оплетен мускульными волокнами. Эпифаллус толстостенный, короткий, конический, с внутренней скульптурой, состоящей из трех высоких продольных складок. Эпифаллус открывается в просвет пениса очень короткой папиллой. Пениальный цекум длинный, тонкий, червеобразный. Пенис цилиндрический, спирально закручен. Внутренняя поверхность пениса с одной продольной широкой валикообразной складкой, распадающейся в дистальной части пениса на множество тонких складочек. Половой ретрактор двуветвистый. Семяприемник с округлым резервуаром и тонким длинным дивертикулом.]

Subgenus *Castelliana* Suvorov, subgen. nov.

Type species – *Acrotoma (Castelliana) tunievi* Suvorov, sp. nov.

Diagnosis. Shell consists of 5.5-7.5 whorls after decollation. Last whorl with well-developed basal keel not reaching umbilical chink. Postembryonic sculpture of dense, delicate, radial striation and weak spiral lines. Inferior lamella almost vertical. Principal plica starting on dorsal side. Lunella strong, dorsal. Clausilium tongue-like, with rounded end.

Epiphallus short, oviform or oviform-conic. Penial caecum absent. Penis cylindrical. Penial retractor biramous. See also Table 1.

Habitat. Lime rocks.

Distribution. NW Caucasus.

Etymology. The name of new subgenus comes from Roman word *castellum* (castle, fortress) as the type species is known only from ruins of an ancient fortress.

[**Диагноз.** Раковина после деколляции состоит из 5,5-7,5 оборотов. Последний оборот с развитым базальным килем, не доходящим до пупочной щели. Постэмбриональные обороты тонко и густо исчерчены;

имеются также слабые спиральные линии. Нижняя пластинка почти отвесная. Главная палатальная складка начинается на спинной стороне раковины. Полулунная складка лежит на спинной стороне раковины. Клаузилий языковидной формы, с закругленной вершиной. Эпифаллус короткий, овальный или овально-конический. Пениальный цекум отсутствует. Пенис цилиндрический. Половой ретрактор двуветвистый.]

Acrotoma (Castelliana) tunievi Suvorov, sp. nov.

(Fig. 2 A-E)

Locus typicus. NW Caucasus, Russia, Krasnodar Territory, surroundings of Khosta settlement, Kavkazsky State Natural Biosphere Reserve, Khosta yew-box tree wood, on lime walls of fortress ruins, coll. A.N. Suvorov, 08.06.2001.

Material. Holotype (No. Lc-25411) and two paratypes from type locality (No. Lc-25412) in ZMMU.

Description. Shell dull, light corneous, decollated, fusiform to pillar-shaped, moderately solid, consists of 5.5-6 whorls (after decollation). Aperture uninterrupted, prominent, angulated-ovate, vertical, with widely reflected margins and basal groove. Superior lamella short, straight fully visible through aperture. Its inner end located nearly on one radius with external end of spiral lamella but closer to columella. Inferior lamella strong, with white crest thickened and turned to aperture. It is almost vertical, not reaching aperture margin. There is a feebly marked lamella inserta. Lamella subcolumellaris well-developed but thin. Its end visible through aperture.

Principal plica almost half whorl in length. Upper part of lunella deflected backwards abruptly. On the contrary, its lower part deflected forwards. A small plica palatalis located just behind this part of lunella. Lunella visible through aperture only at oblique position of shell. Palatal callus not prominent.

End of clausilium visible through aperture.

Dimensions: H 19.8-22.6, LD 5.4-6.2, HA 5.8-6.3, WA 3.8-4.5 mm; holotype 22.6, 6.2, 6.3 4.5 mm, respectively.

Reproductive anatomy (Holotype and one paratype from type locality).

Vas deferens entering epiphallus apically. Epiphallus oviform-conic, with internal relief consisting of pronounced tubercles and one ctenoid longitudinal pilaster. An abrupt circular fold (sphincter) separates epiphallus from penis. A pinch corresponds to the fold in the external surface. Penis bent. It is a long tube without marked internal sculpture. One branch of penial retractor attached to proximal end of epiphallus, the other – to proximal end of penis. Free oviduct shorter than vagina. Spermatheca with compact oval reservoir and long, thin diverticle.

The dissected paratype was aphallic.

Remarks. *Acrotoma tunievi* differs from *A. komarowi* and *A. gegika* by smaller size, absence of penial caecum, rounded (not acuminate) apex of clausilium and presence of spiral sculpture on postembryonic whorls.

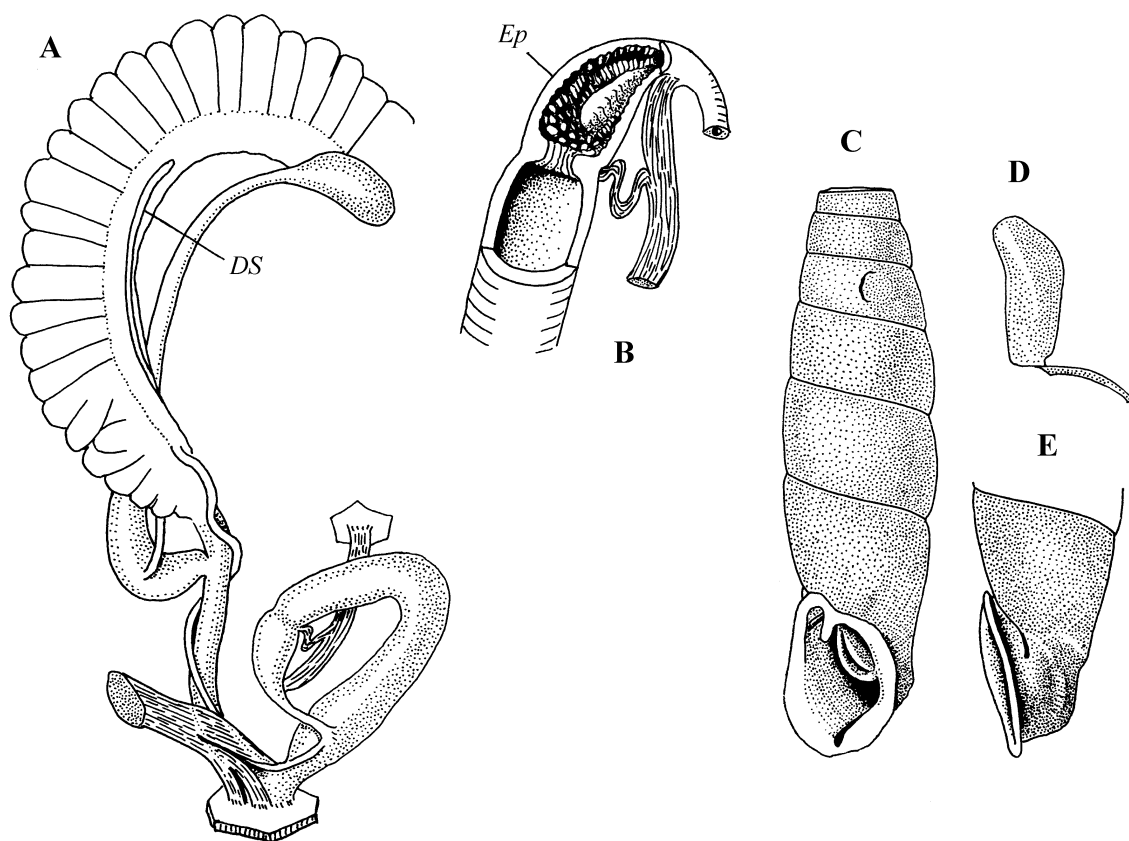


FIG. 2. *Acrotoma (Castelliana) tunievi* Suvorov, sp. nov. Holotype. A – reproductive apparatus; B – interior of penis and epiphallus; C – shell; D – clausilium; E – appearance of body whorl from right side. Abbreviations as in Fig. 1.

РИС. 2. *Acrotoma (Castelliana) tunievi* Suvorov, sp. nov. Голотип. А – половой аппарат; В – продольный разрез через пенис и эпифаллус; С – раковина; D – клаузилий; E – внешний вид последнего оборота справа. Обозначения как на рис. 1.

A. tunievi differs from *A. juliae* by smaller size, feebly marked basal angle of aperture, by shorter descending part of lunella (invisible through the aperture at normal shell position), oviform-conical epiphallus with strong internal relief and absence of longitudinal folds in penis.

Habitat. All three specimens of the new species were collected from lime walls of ruins of ancient fortress situated on the top of hill covered with typical colchic forest. Three subadult specimens of probably the same species I have collected in Akh-Tsu canyon, valley of the Mzymta River, 13.06.2001.

Distribution. The species is known only from the type locality.

Derivatio nominis. The species is named after herpetologist Dr. Boris S. Tuniev, Director of Kavkazsky State Natural Biosphere Reserve, who informed author of *Acrotoma* species living in Khosta yew-box tree wood, on walls of ruins of lime fortress.

[**Диагноз.** Раковина от веретеновидной до цилиндрической, деколлированная, твердостенная, светло-ро-

говая, матовая, состоит из 5,5-6 оборотов (после деколлации). Устье цельное, выступающее, угловато-овальное, вертикальное, с широко отвернутыми краями и базальным желобком. Верхняя пластинка короткая, прямая, слегка заходит за передний конец спиральной пластинки. Нижняя пластинка мощная, с утолщенным гребнем, завернутым в сторону устья, края устья не достигает. Субколумеллярная пластинка хорошо развита, но тонкая. Через устье виден лишь ее конец. Главная палатальная складка лежит на спинной стороне раковины и занимает почти половину оборота. Полулунная складка мощная, ее верхняя часть резко отогнута назад, нижняя, более короткая, отогнута вперед. За нижней частью полулунной складки располагается короткая нижняя палатальная складка.

Эпифаллус овально-конический, с внутренней скульптурой, состоящей из многочисленных бугорков и одной продольной гребневидной складки. Эпифаллус отделен от пениса кольцевым пережимом, которому на внутренней поверхности соответствует высокая кольцевая складка. Пенис согнут вдвое. Внутренняя поверхность пениса без выраженной скульптуры. Семьяприемник с овальным резервуаром и тонким длинным дивертикулом.]

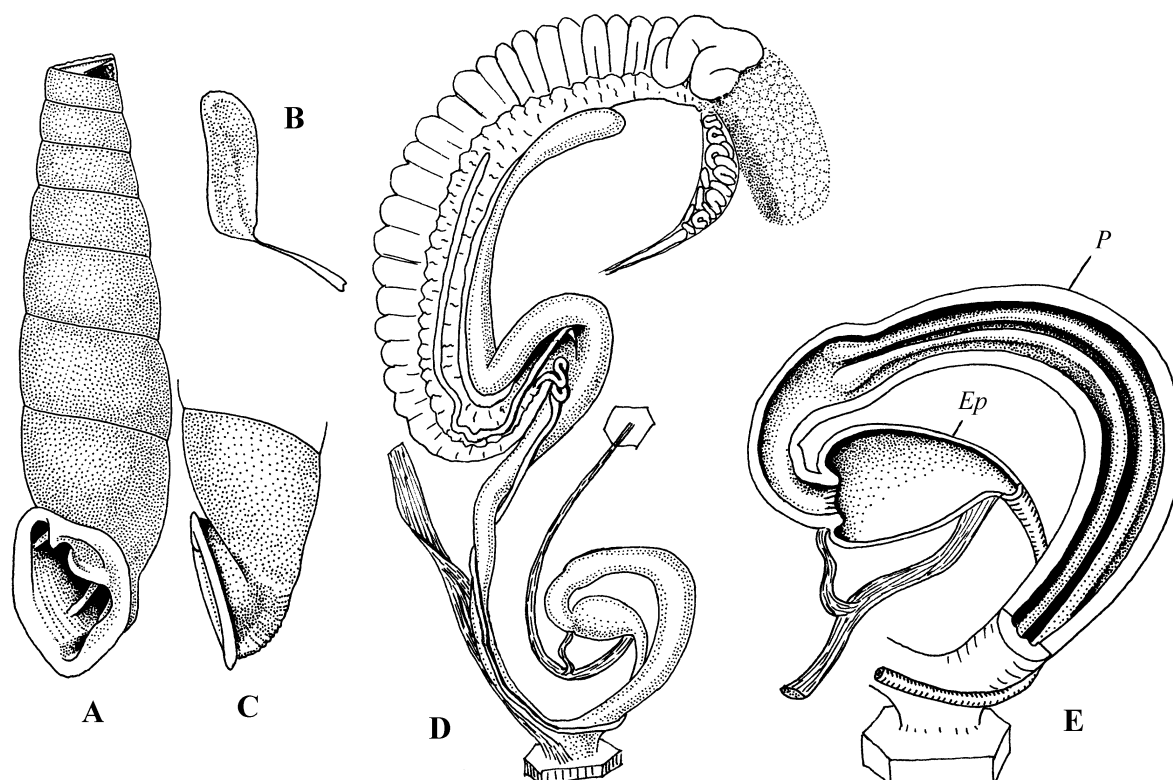


FIG. 3. *Acrotoma (Castelliana) juliae* Suvorov, sp. nov. Holotype. A – shell; B – clausilium; C – appearance of body whorl from right side; D – reproductive apparatus; E – interior of penis and epiphallus. Abbreviations as in Fig. 1.

РИС. 3. *Acrotoma (Castelliana) juliae* Suvorov, sp. nov. Голотип. А – раковина; В – клаузилий; С – внешний вид последнего оборота справа; D – половой аппарат; E – продольный разрез через пенис и эпифаллус. Обозначения как на рис. 1.

Acrotoma (Castelliana) juliae Suvorov,
sp. nov.

(Fig. 3 A-E)

Locus typicus. NW Caucasus, Abkhazian Republic, Ritsinsky Relic National Park, valley of Jupshara River (left tributary of Gega River), canyon “Jupsharskie vorota” (gates of Jupshara), on lime rock, coll. A.N. Suvorov, 22.07.2001.

Material. Holotype in ZMMU, No. Lc-25410.

Description. Shell corneous, decollated fusiform, moderately solid, consists of 7.5 whorls (after decollation). Last fourth of body whorl covered with low, irregular ribs especially well pronounced immediately behind aperture margin and on basal keel. Aperture uninterrupted, prominent, angulated-ovate, vertical, with widely reflected margins, basal angle and basal groove. Superior lamella low, almost straight, fully visible through aperture. Its inner end located nearly on one radius with external end of spiral lamella but closer to columella. Inferior lamella strong, with thickened white crest turned to aperture. It does not reach aperture margin. Lamella subcolumellaris well developed, with end visible through aperture. Principal plica longer than one fourth of whorl in length. Upper part of lunella deflected backwards abruptly and adjoins the beginning

of principal plica. Its lower part deflected forwards, of same length as upper part, and well visible through aperture at normal position of shell. A small plica palatalis located just behind this part of lunella. Palatal callus is a small thickening of palatal wall under external end of principal plica.

Clausilium end visible through the aperture.

Dimensions: holotype H 25.7, LD 6.4, HA 7.3, WA 5.1 mm.

Reproductive anatomy (Holotype).

Vas deferens entering epiphallus apically. Epiphallus swollen, oviform, thin-walled, with smooth internal surface. There is a small verge at the boundary of penis and epiphallus, being directed to the lumen of epiphallus. Penis, a long, fluently curved tube. Its internal sculpture consists of two long parallel folds starting at distal part of penis with two low, oval protuberances. A local thickening of penial tube marks this place. One branch of penial retractor attached to proximal end of epiphallus, the other – to proximal end of penis. Vagina very long, almost of same length as penis. Spermatheca with elongated reservoir and long, thin diverticle. Spermathecal stalk passes into reservoir without clear boundary.

Remarks. *A. juliae* differs from all other species of the genus by very long descending part of lunella (well visible through the aperture at normal shell

Table 1. Comparison of morphological characters of subgenera of the genus *Acrotoma*.

| Features | Subgenus | | | |
|-------------------------|-----------------------------|--------------------------------|-----------------------------|---------------------------------|
| | <i>Acrotoma</i> s. str. | <i>Bzybia</i> | <i>Acrotomina</i> | <i>Castelliana</i> subgen. nov. |
| Shell height | 22.0-37.5 | 20.0-28.6 | 13.7-17.0 | 19.8-25.7 |
| Postembryonic sculpture | Radially striated | Radially and spirally striated | Radially rib-striated | Radially and spirally striated |
| Superior lamella | Curved | Straight | Curved | Almost straight |
| Upper palatal plica | Absent | Present | Absent | Absent |
| Shape of clausilium | Straight with acuminate end | Twisted with rounded end | Straight with acuminate end | Straight with rounded end |
| Basal keel | Reaching umbilical chink | Not reaching umbilical chink | Reaching umbilical chink | Not reaching umbilical chink |
| Penial retractor | Biramous | Unbranched | Biramous | Biramous |
| Penial caecum | Present, long | Absent | Present, short | Absent |
| Penis | Cylindrical or swollen | Cylindrical | Cylindrical | Cylindrical |
| Epiphallus | Conic or cylindrical | Cylindrical | Conic or cylindrical | Conic or ovate |

position). Besides, it differs from *A. komarowi* and *A. gegika* by absence of penial caecum, rounded (not acuminate) apex of clausilium and presence of spiral sculpture on postembryonic whorls.

A. juliae differs also from *A. tunievi* by larger size, pronounced basal angle of aperture, shorter principal plica, sac-shaped, thin-walled oval epiphallus, and presence of longitudinal folds in penis.

Habitat. The holotype was collected from the lime walls of rocks in a very deep and shady canyon of Jupshara River.

Distribution. The species is known only from the type locality.

Derivatio nominis. The species is named after my younger daughter Julia who used to help me with enthusiasm in collecting snails and slugs during expeditions.

[**Диагноз.** Раковина веретеновидная, деколлированная, твердостенная, роговая, состоит из 7,5 оборотов (после деколлации). Устье цельное, выступающее, угловато-овальное, вертикальное, с широко отвернутыми краями, базальным углом и базальным желобком. Верхняя пластинка низкая, почти прямая, слегка заходит за передний конец спиральной пластинки. Нижняя пластинка мощная, с утолщенным гребнем, завернутым в сторону устья, края устья не достигает. Субколумеллярная пластинка хорошо развита, ее конец виден через устье. Главная палатальная складка занимает несколько более четверти оборота. Полулунная складка мощная, ее верхняя часть резко отогнута назад и смыкается с задним концом главной палатальной складки, нижняя часть, напротив, отогнута вперед и хорошо видна сквозь устье при прямом положении раковины. За нижней частью полулунной складки располагается короткая нижняя палатальная складка.

Эпифаллус вздутый, тонкостенный, овальный, с гладкой внутренней поверхностью. Penis открывается в просвет эпифаллуса подобием папиллы. Penis S-образно изогнут. Внутренняя поверхность пениса содержит скульптуру в виде двух параллельных продольных складок. Складки начинаются в дистальной части пениса двумя расплывшимися овальными бу-

горками. Снаружи этим бугоркам соответствует локальное вздутие пениса. Семяприемник с вытянутым резервуаром, слабо обособленным от протока, и тонким длинным дивертикулом.]

Acknowledgements

I am very grateful to all the participants and organizers of expedition of the Association of Natural Reserves and National Parks of Northern Caucasus, especially to Dr. U.A. Semenov, the project manager, and Dr. B.S. Tuniev, who pointed several places inhabited by reach malacofauna. I thank also my wife J.G. Balandina and daughters – M.A. Suvorova and J.A. Suvorova for help in collecting snails. The work was partly supported by the grant No. 01-04-48248 from the Russian Foundation for Basic Research.

Reference

Schileyko A.A. 2000. *Treatise on Recent terrestrial pulmonate molluscs. Part 5. Clausiliidae*. Rutshenica, Supplement 2: 565-729.

Новый подрод и три новых вида рода *Acrotoma* O. Boettger 1881 (Pulmonata Clausiliidae) из западного Закавказья

А.Н. СУВОРОВ

Институт проблем экологии и эволюции им. А.Н. Северцова РАН, Ленинский проспект 33, 117071, Москва, РОССИЯ

РЕЗЮМЕ. На основе конхологического и анатомического анализа материалов, собранных в западном Закавказье, описан новый подрод [*Acrotoma* (*Castelliana*) subgen. nov.] и три новых вида [*Acrotoma* (*Acrotoma*) *gegika* sp. nov., *Acrotoma* (*Castelliana*) *tunievi* sp. nov. and *Acrotoma* (*Castelliana*) *juliae* sp. nov.] рода *Acrotoma* O. Boettger, 1881.