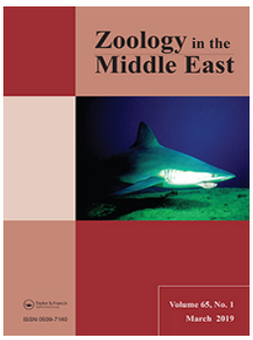

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A new genus and two new species of freshwater Gastropoda from the Ceyhan River Basin in the eastern Mediterranean (Mollusca: Gastropoda: Truncatelloidea)

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In a survey of the mollusc fauna of the Ceyhan River Basin, including rivers, natural lakes, dam lakes and springs between June 2008 and September 2014, a total of 20 species of Gastropoda and 8 species of Bivalvia were identified. Two of these species are new to science, and for one of them a new genus is erected: the hydrobiid *Hemite ceyhanensis* gen. n., sp. n., and the bithyniid *Pseudobithynia cocussusica* sp. n.

http://www.zoobank.org/urn:lsid:zoobank.org:pub:DE5FFC19-13CD-4B81-B74E-80059E781518

Keywords: *Hemite* gen. n.; *Pseudobithynia*; new genus; new species; Ceyhan River

Introduction

Ceyhan River is located in the eastern Mediterranean region of Turkey and rises in the Taurus Mountains at the altitude of 2200 metres. It passes through Kahramanmaraş city center, Osmaniye and Adana provinces, and then flows into the Mediterranean Sea. The river basin covers 20,670 km^2. In a survey of the Mollusca fauna of the Ceyhan River Basin, two new species were found which are described here. They belong to the Bythyniidae and Hydrobiidae.

The family Hydrobiidae occurs in brackish and fresh water on the coastal regions of the Adriatic and Anatolian coasts and is represented in Turkey by 22 genera (Yıldırım, 1999; Yıldırım, Bahadır Koca, Gürlek, & Glöer, 2018). The family Bithyniidae consists in Europe of two genera, one of them being *Pseudobithynia* Glöer & Pešić, 2006. It is represented in Turkey by four species, *P. pentheri* Sturany, 1904, *P. yildirimi* Odabaşı, Kebapçı, & Akbulut, 2013, *P. adiyamanensis* Gürlek, 2017, and *P. guldeni* Gürlek, 2018 (Sturany, 1904; Odabaşı, Kebapçı, & Akbulut, 2013; Gürlek, 2017a; Gürlek, 2018).

Material and Methods

The study was carried out in the Ceyhan River Basin in the eastern Mediterranean region of Turkey between June 2008 and September 2014. In the river basin, 24 collecting stations were selected including rivers and creeks, natural lakes, dam lakes, etc. (Figure 1, Table 1). Samples were collected with an aquatic hand-scoop (Kick-net), which was 65x65 cm in size and had a 200 µm mesh. Some gastropod species were collected on aquatic plants, stones, and rocks. The research on the lakes was carried out by boat. An Ekman Grab was used to collect samples in dam lakes.

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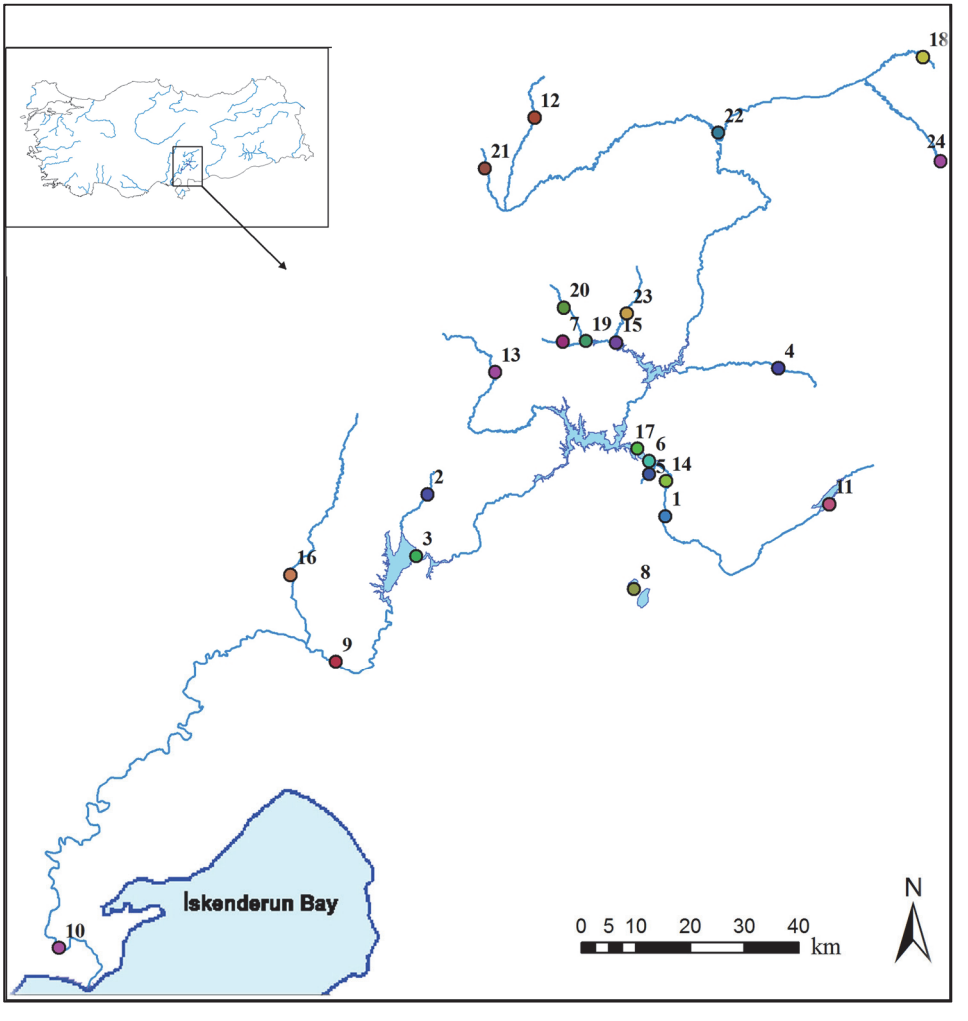

Figure 1. Map of the Ceyhan river system and collecting locations. 1. Aksu stream 2. Andırın stream 3. Aslantaş dam lake 4. Bertiz stream 5. Deliçay stream 6. Fatmalı stream 7. Fırnız stream 8. Gavur lake 9. Ceyhan river (Hemite) 10. Ceyhan river (Karataş) 11. Kartalkaya dam lake 12. Kömür stream 13. Körsulu stream 14. Kumaşır lake 15. Menzelet dam lake 16. Savrun stream 17. Sır dam lake 18. Söğütlü stream 19. Suçatı dam lake 20. Tekir stream 21. Törbüzek stream 22. Göksun stream 23. Zeytin stream 24. Elbistan Pınarbaşı spring.

When no living mollusc samples were found, empty shells were collected from the shores of the rivers or lakes.

Dissections and measurements of the samples were carried out using a stereo microscope (Olympus SZX7) and photographs were taken with a digital camera system (Olympus DP26).

The holotype and some paratypes of the new genus and species are deposited in the Zoological Museum of Hacettepe University, Ankara, Turkey (HUZOM). Other material is deposited in the private collection of the author (coll. Gürlek, Mehmet Akif Ersoy University, Burdur, Turkey).

Table 1. Freshwater molluscs of Ceyhan river basin with sampling sites. The number of sampling sites refer to Table S1 and Figure 1.

Species	**Collecting stations**	**Zoogeographic category**
GASTROPODA		
Theodoxus anatolicus Récluz, 1841	8, 9, 14	Endemic
Theodoxus syriacus Bourguignat, 1853	2	Levant
Valvata piscinalis Müller, 1774	8	Palearctic
Melanopsis buccinoidea Linnaeus, 1789	3, 5, 8, 14, 17	Levantine
Melanopsis costata Olivier, 1804	9, 16	Levantine
Pseudamnicola lindbergi Boettger, 1957	24	Endemic
Pseudamnicola marashi Glöer, Gürlek & Kara, 2014	5	Endemic
Pseudamnicola merali Glöer, Gürlek & Kara, 2014	21	Endemic
Pseudamnicola goksunensis Glöer, Gürlek & Kara, 2014	21	Endemic
Pseudobithynia cocussusica sp. n.	21, 22	Endemic
Hemite ceyhanensis gen. n., sp. n.	9	Endemic
Physella acuta Draparnaud, 1805	1, 4, 6, 14, 22	Holarctic
Galba truncatula Müller, 1774	7, 12, 19, 21	Palaearctic
Radix labiata Rossmässler, 1835	1, 12, 14, 18	Palaearctic
Radix auricularia Linnaeus, 1758	1	Palaearctic
Planorbis planorbis Linnaeus, 1758	21, 22	Holarctic
Gyraulus albus Müller, 1774	8	Holarctic
Gyraulus piscinarum Bourguignat, 1852	14, 22	Palaearctic
Ancylus fluviatilis Müller, 1774	7, 20	Palaearctic
Oxyloma elegans Risso, 1826	12, 19, 21, 22	Holarctic
BIVALVIA		
Dreissena caputlacus Schütt, 1993	11, 15, 17	Endemic
Dreissena polymorpha Pallas, 1771	3, 15, 17	Palaearctic
Corbicula fluminalis Müller, 1774	1, 8, 9, 17	Indotropical
Sphaerium corneum Linnaeus, 1758	7, 12, 20, 21	Holarctic
Pisidium casertanum Poli, 1791	21	Holarctic
Unio delicatus Lea, 1863	8, 9, 17	Levantine
Unio syriacus Lea, 1863	3, 8, 9, 11, 17, 21	Levantine
Potamida semirugata Cuvier, 1798	3, 8, 9	Levantine

Results and Discussion

A total of 20 Gastropoda and 8 Bivalvia species was found in the Ceyhan River Basin (Figures S1–S2; Table 1). In previous studies, the following species were reported from the Ceyhan river basin: *Pseudamnicola lindbergi* Boettger, 1957, *P. merali* Glöer, Gürlek, & Kara, 2014, *P. goksunensis* Glöer, Gürlek, & Kara, 2014, *P. marashi* Glöer, Gürlek, & Kara, 2014, *Melanopsis buccinoidea* Olivier 1801, *Theodoxus anatolicus* Récluz, 1844, *Corbicula fluminalis* Müller, 1774, *Dreissena polymorpha* Pallas, 1771, and *Potamida semirugata* Cuvier, 1798 (Boettger, 1957; Schütt, 1964; Kara & Şimşekli, 2009; Gürlek, Kara & Kebapçı, 2012; Glöer, Gürlek, & Kara, 2014; Froufe et. al., 2016;

Gürlek 2017b). The remaining 19 species are newly recorded for the basin. *Pseudamnicola natolica* Schütt, 1965 was recorded by Schütt (1965) from Aksu stream but this species could not be found again, although searches were made for it at the collecting locality.

The basin has high endemism. The presence of European elements in the basin as well species of the Middle-East and Levant origin suggests that the region is a transitional zone.

***Hemite* gen. n. (Family: Hydrobiidae Stimpson, 1865)**

Description: Shell yellowish, elongated conical with 3.0–3.5 whorls separated by a deep suture. Umbilicus closed. Aperture ovoid. Mantel dark; eyes clearly visible. Unpigmented penis large and getting narrower towards the distal end. Tentacles unpigmented. Female genital tract with a bursa copulatrix and black oviduct. Operculum dark yellow.

Differential diagnosis: The genus is similar to *Pseudamnicola* Paulucci, 1878, *Graecoanatolica* Radoman, 1973 and S*hadinia* Akramowski, 1976 in the shell morphology, but can be distinguished from *Pseudamnicola* and *Graecoanatolica* by the penis morphology. At the same time *Hemite* n. gen. has a black pigmented oviduct. The oviducts of *Pseudamnicola* and *Graecoanatolica* are generally white and unpigmented. Both *Hemite* gen. n. and S*hadinia* have a spinous process (hooked) on the distal part of the penis, but S*hadinia* has a black point spot at the distal end.

Etymology: Named after the village where the species has been collected.

Type species: *Hemite ceyhanensis* sp. n.

Hemite ceyhanensis sp. n. (Figure 2A–I)

Holotype: Male. Osmaniye Hemite bridge (under the north side of the bridge; collecting station 9), (37°11'39"N, 36°04'56"E), 37 m asl, 8.vi.2014, M. E. Gürlek leg.; shell height 2.53 mm, width 1.56 mm, HUZOM M1113. – Paratypes: Same data as holotype. 3 ex. in HUZOM M1114, 15 ex. in coll. Gürlek (Mehmet Akif Ersoy University, Burdur, Turkey).

Differential diagnosis: *Graecoanatolica kocapinarica* Radoman, 1973 is the only species with a similar shell shape but it can be distinguished by the shell whorl numbers (4.0–4.5 in *H. ceyhanensis* as 4–5 in *G. kocapinarica*) and the umbilicus type. The umbilicus is closed in *H. ceyhanensis* sp. n. and slit-like in *G. kocapinarica* Radoman, 1973. It differs from *Shadinia bjniensis* Bößneck, Walther, & Neiber, 2016 by the unpigmented penis and the shell whorl numbers. It is further distinguished from *S. bjniensis* which has 5.5 whorls with a deep suture (4.0–4.5 in *H. ceyhanensis* sp. n.).

Description: Shell yellowish with 4.0–4.5 whorls and a deep suture. Umbilicus closed. Aperture ovoid (Figure 2A–C). Shell height 2.53 mm, width 1.56 mm. Penis unpigmented, large and becoming narrower towards the distal part. Female genital tract with a bursa copulatrix and black oviduct (Figure 2I). Mantel dark, eyes clearly visible.

Remarks: The habitat of *Hemite ceyhanensis* sp. n. is the main bed of Ceyhan River. Samples were collected on stones. Other species living in the same habitat are *Theodoxus anatolicus* Recluz, 1841, *Melanopsis costata* Olivier, 1804, *Corbicula fluminalis* Müller, 1774, *Unio delicatus* Lea, 1863, *Unio syriacus* Lea, 1863.

Etymology: Named after Ceyhan River where the species has been found.

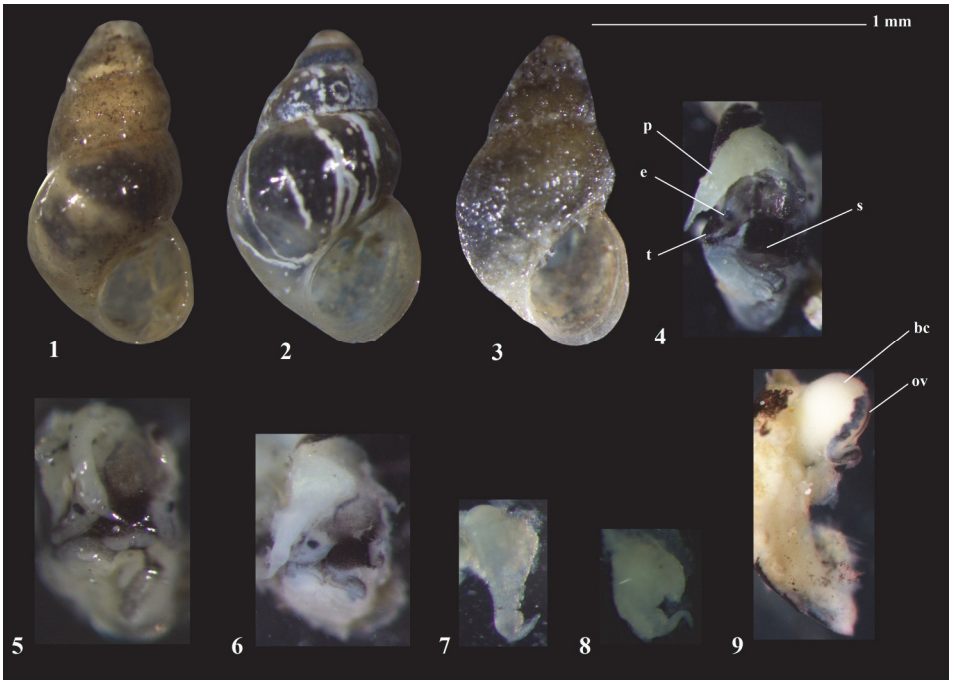

Figure 2. *Hemite ceyhanensis* n. gen., n. sp. A–C: Shell of holotype, D–F: Penis in situ, G,H: Penis, I: Female genital tract. Abbreviations: p = penis, e = eye spot, s = snout, t = tentacle, bc = bursa copulatrix, ov = oviduct.

Family: Bithyniidae Gray, 1857
Genus: *Pseudobithynia* Glöer & Pešić, 2006

Pseudobithynia cocussusica sp. n. (Figure 3A–F)
Holotype: Male. Kahramanmaraş-Göksun Törbüzek stream (38°10'50″N 37°13'10″E) 1394 m asl, 7.x.2009, Shell height 4.62 mm, width 3.14 mm, M. E. Gürlek leg., HUZOM M1115. – Paratypes (all same data as holotype): 3 ex. in HUZOM M1116, 12 ex. in coll. Gürlek (Mehmet Akif Ersoy University, Burdur, Turkey).

Differential diagnosis: Four species of *Pseudobithynia* have been found in Turkey so far. *P. cocussusica* sp. n. has 4.0–4.5 whorls and it can be distinguished from *P. adiyamanensis* and *P. pentheri* by the shell shape and the number of whorls. *Pseudobithynia adiyamanensis* has greater whorls. *Pseudobithynia yildirimi* is more conical than *P. cocussusica* sp. n. Its umbilicus is open and aperture oval. The tentacle shape of *P. cocussusica* sp. n. is similar to *P. yildirimi* but they are distinguished from each other by penis morphology. *Pseudobithynia adiyamanensis* and *P. pentheri* show a swelling on the penis but *P. yildirimi* and *P. cocussusica* sp. n. penes have a swelling or are simple. *Pseudobithynia guldeni* is the smallest *Pseudobithynia* species in Turkey and its shell is not similar in size to the new species. *Pseudobithynia cocussusica* sp. n.is similar to the Levant species *Pseudobithynia saulcyi* Bourguignat, 1853 by the shell shape but *P. saulcyi* has a broad and blunt penis shape (Glöer, Dia & Falkner, 2012). The penis of *P. cocussusica* sp. n. is simple, with folds on the middle part and thin at the distal end.

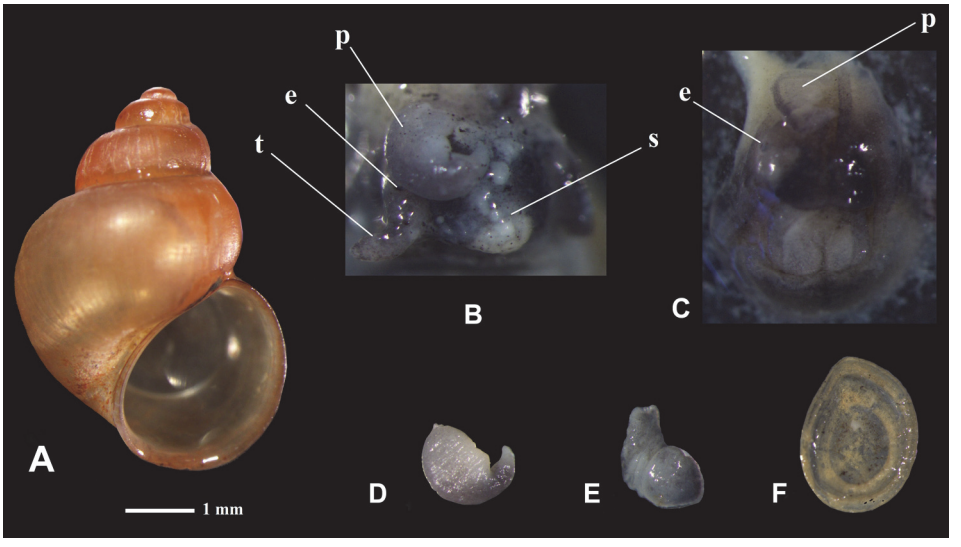

Figure 3. *Pseudobithynia cocussusica* n. sp. A: shell, B, C: penis in situ. D, E: types of penis, F: operculum. – Abbreviations: e = eye spot, p = penis, s = snout, t = tentacle.

Description: The conical shell is horn-coloured and consists of 4.0–4.5 whorls. Height up to 7.77 mm, width: 5.20 mm. deep. Umbilicus semi-open. Aperture ovoid and angled at the top. Its outer edge with a white lip. The calcareous operculum oval, concentric and yellowish circles clear (Figure 3F). – *Soft parts:* Penis simple without flagellum and appendix; shape and colour variable within the same population and distinct stream populations. Especially the penis of the samples from Göksun stream is more blunt than in the material from Törbüzek stream (Figure 3B–E). Tentacles cylindrical-like. Eyes visible. Colour of the body and mantel changes from white to dark.

Etymology: Named after the Latin name of the Göksun city 'Cocussus'.

Remarks: *Pseudobithynia cocussusica* sp. n.was found at two locations, in Törbüzek stream and Göksun stream. Both locations are close to each other. There are stony and vegetated areas at the sampling sites.

Supplementary Material

Table S1 and Figures S1 and S2 are given as a Supplementary Annex, which is available via the "Supplementary" tab on the article's online page (http://dx.doi.org/10.1080/09397140.2018.1540153).

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Disclosure statement

No potential conflict of interest was reported by the author.

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