

# REDESCRIPTION OF *GYRAULUS ARGAEICUS* (STURANY 1904) WITH THE DESCRIPTION OF TWO NEW GASTROPOD SPECIES FROM TURKEY (MOLLUSCA: GASTROPODA: BITHYNIIDAE, PLANORBIDAE)

PETER GLÖER<sup>1</sup> & DILIAN GEORGIEV<sup>2</sup>

<sup>1</sup>Schulstrasse 3, D-25491 Hetlingen, Germany

<sup>2</sup>Department of Ecology and Environmental Conservation, University of Plovdiv, Tzar Assen Str. 24, BG-4000 Plovdiv, Bulgaria

*Abstract* New records of freshwater snails from Turkey are presented. Two species new for science *Bithynia yildirimi* and *Gyraulus nedalkovi* are described. In addition the junior author collected *Gyraulus argaeicus* from its type locality, so the anatomy of this species is provided for the first time. Furthermore, new record of *Anisus leucostoma*, confirmed by the study on its anatomy, is given.

*Key words* Bithynia, Gyraulus, *Gyraulus argaeicus*, redescription, new species, Turkey.

## INTRODUCTION

Six species of genus *Bithynia* are known from Turkey (Glöer & Yildirim, 2006; Yildirim, 1999): *B. tentaculata* (Linnaeus 1758), *B. leachii* (Sheppard 1824), *B. pseudemmericia* Schütt 1964, *B. phialensis* (Conrad 1852), *B. badiella* (Küster 1852), and *B. pesicii* Glöer & Yildirim 2006. The closely related genus *Pseudobithynia* is represented in Turkey by *P. pentheri* (Sturany 1904) (Glöer & Yildirim, 2006).

According to Yildirim *et al.* (2008) six *Gyraulus* species are known from Turkey: *Gyraulus albus* (O.F. Müller 1774), *G. laevis* (Alder 1838), *G. piscinarum* (Bourguignat 1852), *G. ehrenbergi* (Beck 1837), *G. euphraticus* (Mousson 1874), *G. parvus* (Say 1817), *G. crista* (Linnaeus 1758), and *G. hebraicus* (Bourguignat 1852). In addition, Glöer & Rähle (2009) recently described *Gyraulus pamphylicus* Glöer & Rähle 2009 from Turkey.

From neighbouring countries some more species of genus *Gyraulus* are known, ie. *G. homsensis* (Dautzenberg 1894) from Syria, (Dautzenberg, 1894: 337), *G. bekaensis* Glöer & Bößneck 2007 from Lebanon (Glöer & Bößneck, 2007: 142–144) and *G. huwaizahensis* Glöer & Naser 2007 from Iraq (Glöer & Naser, 2007: 150–151). Bank (2004) listed following species: *G. albus*, *G. laevis*, and *G. crista* from Greece, and Angelov (2000) mentioned *G. albus*, *G. laevis*, *G. crista* and *G. piscinarum* from Bulgaria.

This paper is aimed at redescrbing *Gyraulus argaeicus* and describing two new species: *Bithynia yildirimi* n. sp. and *Gyraulus nedalkovi* n. sp.

## MATERIAL AND METHODS

The snails were collected with a sieve from the banks of the relevant waters. Sampling sites are given in Fig. 1.

The samples were put into ethanol (75%). The dissections and measurements of the genital organs and the shells were carried out using a stereo microscope (Zeiss, Germany). The



**Figure 1** The map of study area with marked sampling sites. Sampling sites: 1 *Bithynia yildirimi* n. sp., *Gyraulus nedalkovi* n. sp., *Anisus leucostoma*; 2 *Gyraulus argaeicus*.

photographs were made with a digital camera system (Leica R8).

The type material will be deposited in the Zoological Museum Hamburg (ZMH), Germany.

## RESULTS

Conchological and anatomical investigations revealed two new species which belong to the genera *Bithynia* and *Gyraulus*, respectively.

### Family Bithyniidae Troschel 1857

Genus *Bithynia* Leach 1818

Type species: *Bithynia tentaculata* (Linnaeus 1758)

*Bithynia yildirimii* n. sp.

*Material examined* 23 exx. from type locality.

*Holotype* Shell height 4.8 mm, width 2.9 mm, Zoological Museum Hamburg ZMH 79174.

*Paratypes* 5 exx., ZMH 79175.

*Locus typicus* Turkey, Mediterranean Sea coast, a swamp east of Kazanlı village, N36°48'24.7" E34°47'34.8", 13.08.2009 D. Georgiev leg.

*Habitat* A swamp near the Mediterranean coast, densely occupied by water and bank vegetation

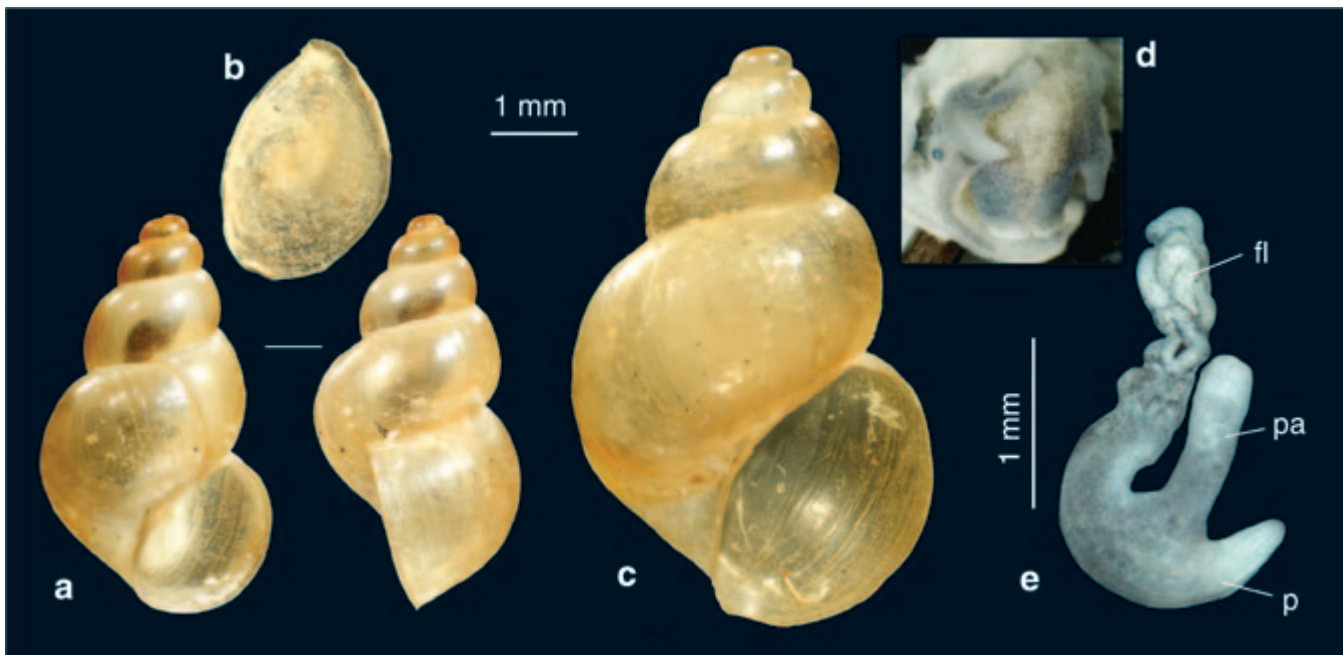
as *Phragmytes australis*, and various bush and trees. Some parts of the swamp completely drying during summer.

*Etymology* Named after Prof. Dr M.Z. Yildirim (Eğridir, Isparta), the outstanding expert on freshwater molluscs of Turkey.

*Diagnosis* The yellowish shell is slim, of 4–5 convex whorls with clear sutures (Fig. 2a). Aperture, also the operculum (Fig. 2b), shows an obtuse angle. Umbilicus slit-like to closed. Nucleus of operculum eccentric. Clear sexual dimorphism shown (Fig. 2a,c). Male shells 4.7–5.1 mm high, 2.9–3.0 mm wide; female shells larger, 5.1–5.4 mm high, 3.6–3.7 mm wide.

*Anatomy* Penial appendix branches off from distal third of penis and is twice longer than distal part of the penis (Fig. 2d). Flagellum short (Fig. 2e).

*Remarks* We do not believe that *Bithynia leachii* occurs in Turkey (Yildirim *et al.*, 2006). This species is distributed in the lowlands of western Europe towards Russia, and the southernmost records known are from Hungary (Glöer & Fehér, 2004). Thus we have to compare *Bithynia yildirimii* sp. nov. with three other *Bythinia* species known from Turkey, i.e. *B. pesicii*, *B. phialensis*, and *B. badiella*. The suture in *B. pesicii*



**Figure 2** *Bithynia yildirimii* n. sp.: a holotype, male, shell; b operculum; c paratype, female, shell; d penis in situ; e Penis with flagellum. Parts: fl flagellum; p penis; pa penial appendix.

is very deep and the whorls are swollen, easily distinguishing the latter species from *B. yildirimi*. Furthermore, the flagellum of *B. pesicii* is much shorter than in *B. yildirimi*. The shell of *B. badiella* is spherical, distinct from *B. yildirimi*. The suture of *B. phialensis* is more flattened and the shell is broader than in *B. yildirimi*. It is worth mentioning that the presence of both the aforementioned species, i.e. *B. phialensis* (type locality in Palestine) and *B. badiella* (type locality: Beirut) in Turkey, are doubtful.

Genus *Gyraulus* Charpentier 1837

Type species: *Planorbis albus* O.F. Müller 1774

*Gyraulus argaeicus* (Sturany  
1904)

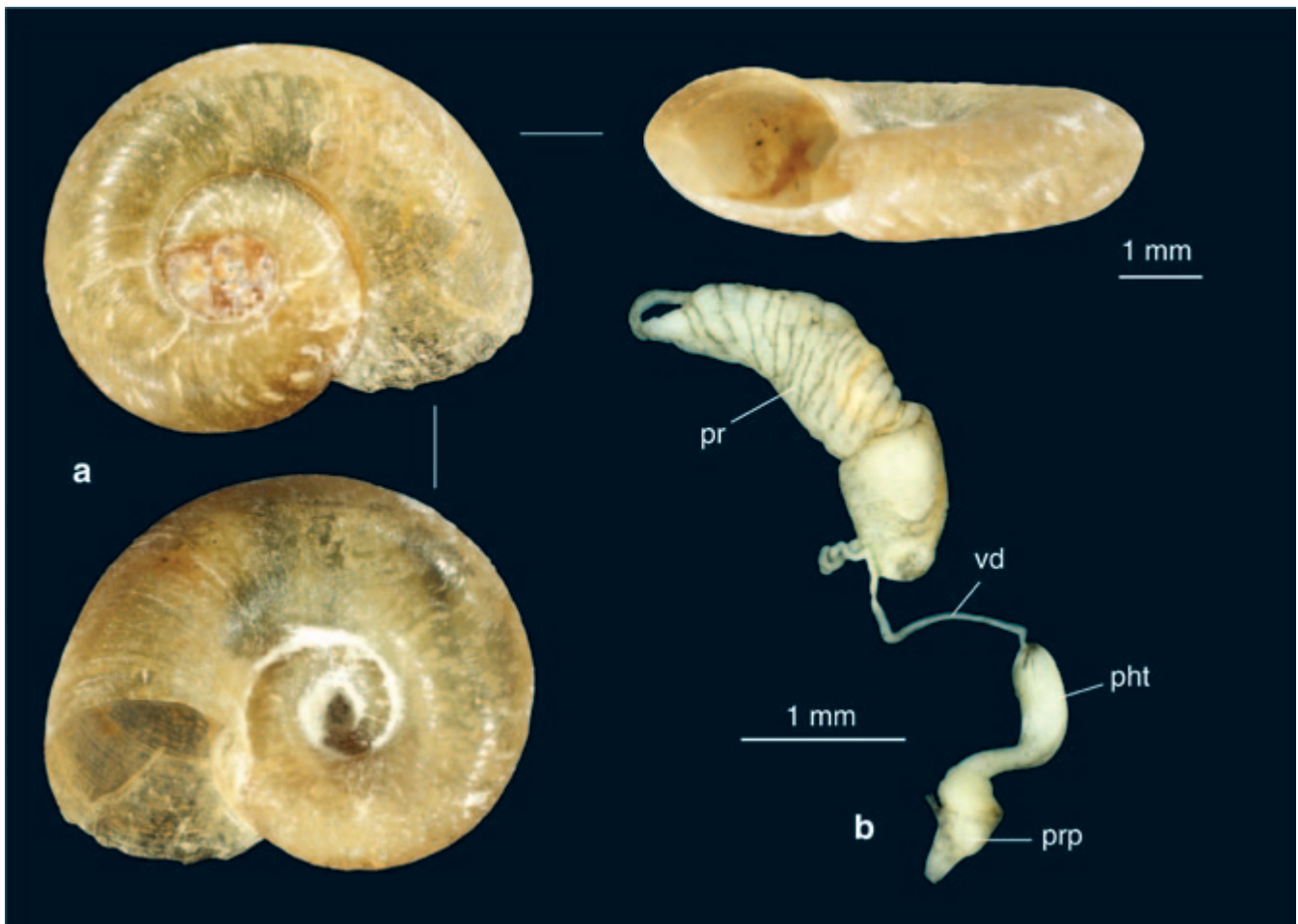
*Material examined* 11 exx. from type locality.

*Locus typicus* Turkey, Lake of Soysali village,  
12.08.2009, D. Georgiev leg.

*Habitat* The Soysali Lake is situated on volcanic rocks, and fed by a big spring with the waters emerging on its northern bank. The water is clear and the lake bottom is covered mainly by gravel with very few sandy or muddy zones. Pollution from garbage from the village of Soysali and cattle watering was observed. The surrounding habitat is typical of steppe in the Anatolian Plateau.

*Description* The light-corneous shell nearly dull and transparent with fine growth lines. The shell consists of 3–4 whorls, which regularly and rapidly increase with a clearly visible to deep suture. The last whorl is slightly deflected (Fig. 3a). The first whorls are immersed on the underside, forming a deep umbilicus. The shell is 6.1–7.1 mm in diameter and 1.5–1.8 mm in height.

*Animal* The animal is light grey with a diffuse mantle pigmentation. The prostate gland bears



**Figure 3** *Gyraulus argaeicus* (Topotype): **a** the shell; **b** sex tract; **pr** prostate gland; **pht** phallotheca; **prp** praepetium; **vd** vas deferens.

1. *Planorbis (Gyraulus) argaeicus* n. sp. — Schale flach, oben und unten etwas konkav, nahezu glanzlos, von grünlich-gelber Farbe, mit vier rasch anwachsenden, durch eine seichte Naht getrennten Windungen, mit zarten und dicht aneinander gerückten Anwachsstreifen und feinsten Spirallinien; letzter Umgang zuweilen in der Mitte gekielt; Mündung schief ohrförmig, Oberrand stark vorgezogen und mit dem genäherten Spindelrande durch einen Callus verbunden.

Schalbreite 7, Schalenhöhe 2.2 mm; Mündung 3 mm breit und 2.7 mm hoch.

Fundort: Soisaly im Erdschasgebiete, Kleinasien (leg. Penther).

**Figure 4** Facsimile of the original description (Sturany, 1904: 115–116).

20–22 long diverticles. The phallotheca is nearly twice as long as the praeputium (Fig. 3b).

*Remarks* *Gyraulus argaeicus* (Sturany 1904), described from Turkey (Soisaly), has not been mentioned since its original description (Sturany,

1904: 115). It was not possible to compare our material with the type material, because the Vienna Museum does not lend holotypes or paratypes for scientific studies. However, the original description (Fig. 4) corresponds well with our specimens.

*Gyraulus nedyalkovi* n. sp.

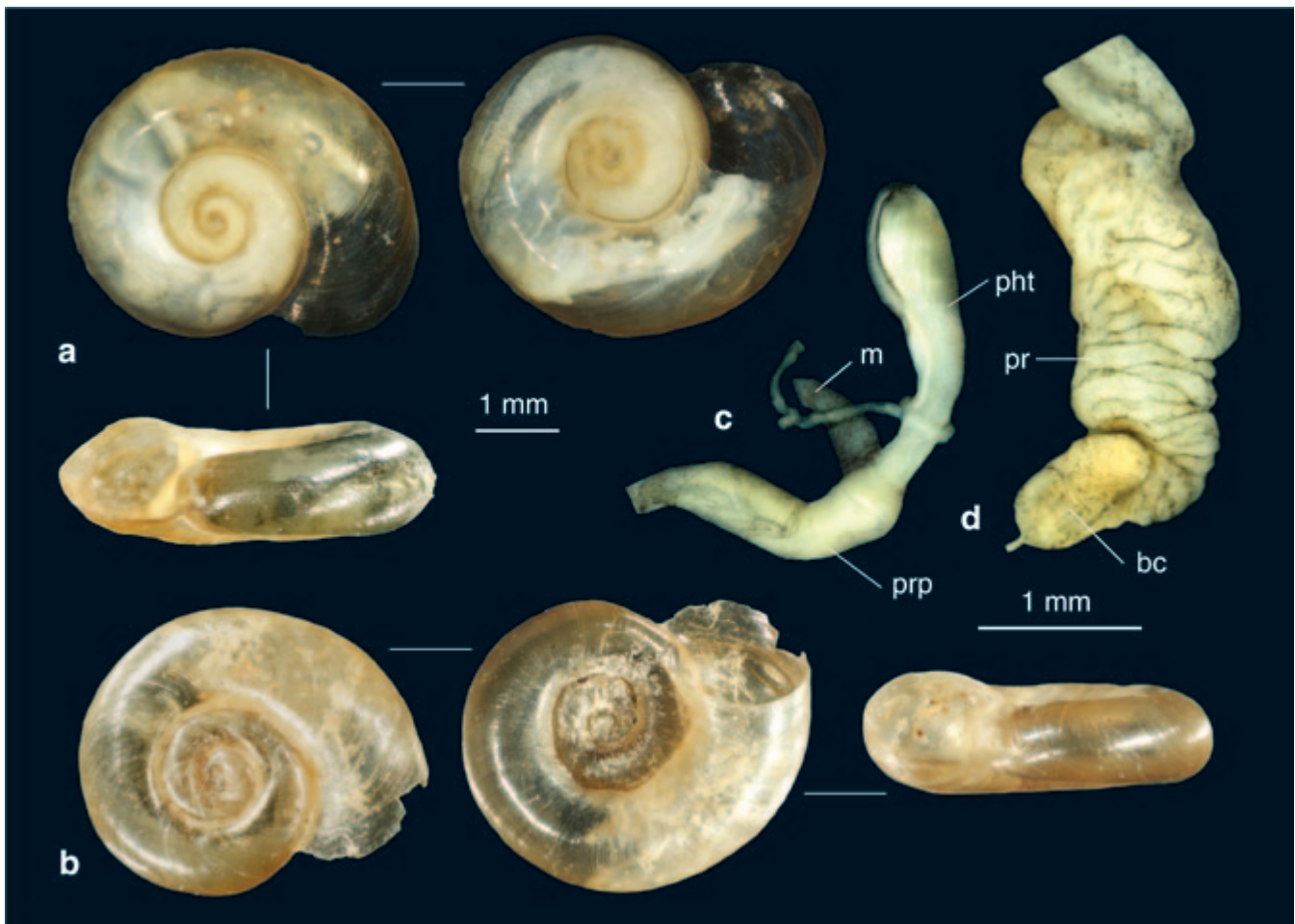
Fig. 5a–d

*Material examined* 14 exx. from type locality.

*Holotype* Shell height 1.4 mm, width 4.4 mm, Zoological Museum Hamburg ZMH 9176.

*Paratypes* 5 exx., ZMH 79177.

*Locus typicus* Turkey, Mediterranean Sea coast, a swamp east of Kazanli village, N36 48 24.7 E34 47 34.8, 13.08.2009 D. Georgiev leg.



**Figure 5** *Gyraulus nedyalkovi* n. sp.: **a** holotype (photographed in ethanol), shell; **b** paratype, shell; **c** male copulatory organ; **d** bursa copulatrix and prostate gland. Parts: **bc** bursa copulatrix; **m** muscle; **pr** prostate gland; **pht** phallotheca; **prp** praeputium; **vd** vas deferens.



**Figure 6** The shells of *Gyraulus* species from the Near East region: 1 *G. pamphylicus*; 2 *G. hebraicus*; 3 *G. euphraticus*; 4 *G. argaeicus* (topotype); 5 *G. homsensis*; 6 *G. ehrenbergi*; 7 *G. huwaizahensis*; 8 *G. piscinarum*; 9 *G. bekaensis*; 10 *G. nedyalkovi* n. sp.

**Table 1** Distinguishing characteristics of *Gyraulus* spp. from the Near East region.

Taxon, type country	max. diameter D [mm]	height of last whorl h [mm]	ratio D: h	keel	no. of whorls	last whorl prominent	umbilicus	no. of prostate diverticles
<i>G. nedyalkovi</i> n. sp. Turkey	3.9	1.0	3.9	no	3–4	yes	wide	18–22
<i>G. pamphylicus</i> , Turkey	7.0	1.0–1.2	7.0–5.8	yes	4	yes	narrow	16–18
<i>G. argaeicus</i> , Turkey	7.0	2.2	3.2	slight	4	yes	wide	18–22
<i>G. hebraicus</i> , Syria	5.0	1.2	4.2	no	4	no	narrow	11–15
<i>G. homsensis</i> , Syria	5.0	1.0	5.0	slight	4.5	yes	wide	20–22
<i>G. piscinarum</i> , Lebanon	4.4	1.1–1.2	4.0–3.7	no	3.5	yes	wide	12–16
<i>G. bekaensis</i> , Lebanon	5.7	1.4–1.5	4.1–3.8	yes	3.5	yes	narrow	18
<i>G. ehrenbergi</i> , Egypt	4.5	1.0	4.5	no	3.5	yes	narrow	14–19
<i>G. huwaizahensis</i> , Iraq	3.0–3.5	1.0	3.0–3.5	no	3.75	yes	narrow	9
<i>G. euphraticus</i> , Iraq	7.0	1.0	7.0	slight	4.5	no	narrow	9–18

**Habitat** A small canal with soil banks occupied with *Phragmites australis* in the surroundings of the village near a group of blocks of flats and greenhouse agricultural lands. Pollution by artificial materials, mainly plastic, was observed.

**Etymology** Named after the mammalogist Nedko Nedyalkov (National Natural History Museum, Sofia, Bulgaria).

**Description** Shell pale corneous, glossy, transparent with fine growth lines (Fig. 5a,b). Comprises 3–4 whorls, which increase rapidly, regularly

with clearly visible to deep suture. Last whorl not deflected. First whorls immersed on both sides. Size small, 3.5–4.4 mm in diameter, 1.0–1.4 mm in height.

**Animal** Animal light grey with diffuse mantle pigmentation. Prostate gland bears 18–22 long diverticles (Fig. 5d). Phallotheca as long as praeputium (Fig. 5c). Bursa copulatrix cylindrical (Fig. 5d).

**Remarks** Due to the small shell (3.5–3.9 mm in diameter) (Fig. 6, Table 1) *Gyraulus nedyalkovi* n.



**Figure 7** *Anisus leucostoma*, swamp east of Kazanli village: shell.

sp. resembles *G. piscinarum*, *G. ehrenbergi*, and *G. huwaizahensis*. The new species differs especially in the numbers of prostate diverticules, the main distinguishing feature between species in the genus *Gyraulus* (see: Meier-Brook, 1983), but also in shell characteristics.

#### *Anisus leucostoma* (Millet 1813)

**Material examined** Four specimens from a swamp east of Kazanli village (N36°48'24.7" E34°47'34.8", fig. 1.3).

A dissection revealed that the prostate gland bears 19 diverticules. This is in accord with Glöer & Meier-Brook (2008: 94) for *Anisus leucostoma*.

**Remarks:** Yıldırım *et al.* (2006) listed *Anisus spirorbis* from Eastern Anatolia and cited Boettger (1957) for reference. However, in their reference list they mentioned only O. Boettger (1905), overlooked C. R. Boettger (1957), who reported *Anisus spirorbis* from a swamp in Erzurum Province.

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