

**The Turkish Enidae:
the genus *Buliminus* Beck (Gastropoda Pulmonata: Pupillacea)**

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The genus *Buliminus* Beck, 1837, is reported from Turkey with nine species, two of which with two subspecies. *Pene* Pallary, 1929, is considered a subgenus. *B. (B.) akkumensis* spec. nov., *B. (B.) corpulentus* spec. nov. and *B. (Pene) coluplicatus* spec. nov. are described as new. Our actual knowledge concerning the taxa is summarized in an identification key and distribution maps.

Key words: Gastropoda, Pulmonata, Enidae, *Buliminus*, *Pene*, taxonomy, distribution, Turkey.

INTRODUCTION

The non-marine molluscan fauna of Turkey is still poorly known. Only scattered data are found in the literature and even a simple check-list is not available. Therefore, Forcart's (1940) monograph on the Turkish Enidae is highly exceptional. In this exemplary work the speciose family is dealt with thoroughly. In a series of papers, our knowledge concerning the Turkish Enidae should be brought up to date again, without repeating the wealth of valuable information contained in Forcart's monograph, which will remain an indispensable base for future research. Only amendments are discussed and the literature on the subject that was published after 1940 is reviewed. All the species and subspecies distinguished by Forcart are dealt with, but synonymy lists are not repeated. Much new material that could be studied, most of which collected by the second author, is reported upon. See Gittenberger & Menkhorst (in press) for another paper in the series on Enidae, dealing with the genus *Turanena* Lindholm, 1922.

A revised key to identify the species and subspecies of *Buliminus* after conchological characters has been composed and the various taxa are shortly characterized. The aberrant "*Buliminus*" *lycicus* Pfeiffer, 1846, is not dealt with. All the available distribution data are presented on UTM 10 km square distribution maps, as recommended by the committee of the European Invertebrate Survey. For various reasons, not all the localities mentioned in the literature, or on labels, could be located in such a way that their UTM codes could be established. An indication like "20 km E. of" is less vague than simply "E. of", or "near", but still problematic, as long as it remains unclear whether the distance has been measured along the road (mainly convenient

for field work) or as the crow flies. In the present paper the distances are given according to the latter principle. "The Times, Atlas of the World" ("comprehensive edition" 7, 1986) is used as atlas of reference. Unless stated otherwise, the descriptions and notes apply to material from Turkish localities. Only when the figures cited in the synonymy lists do not apply to shells, but to e.g. genitalia, this is mentioned in the text. The conchological descriptions are based on Forcart (1940), data in the more recent literature, and data derived from own additional material. The number of whorls of the shell is counted as in e.g. Kerney & Cameron (1979: 13).

Unless stated otherwise, figured specimens are in the Nationaal Natuurhistorisch Museum, Leiden.

Abbreviations. — The reference "Forcart, 1940" is abbreviated F. For collections the following abbreviations are used: IZPAN, Instytut Zoologiczny, Polska Akademia Nauk (Warszawa), MEN, H.P.M.G. Menkhorst (Krimpen aan de IJssel); NEU, W.H. Neuteboom (Heemskerk); NEUB, E. Neubert (Darmstadt); NNM, Nationaal Natuurhistorisch Museum (formerly the Rijksmuseum van Natuurlijke Historie) (Leiden); SCH, P. Schnell (Kerpen-Buir); SUB, P. Subai (Aachen).

For parts of the genitalia the following abbreviations are used: a, penial appendix; d, spermathecal duct; e, epiphallus; fp, penial flagellum; fe, epiphallian flagellum; g, glandula albuminifera; h, hermaphroditic duct; i, diverticulum; m, retractor muscle; o, oviduct; p, penis; r, prostata; s, spermatheca; so, spermoviduct; v, vagina; vd, vas deferens.

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CONCHOLOGICAL IDENTIFICATION KEY

1. Apex dome-shaped; parietal interruption of the apertural lip and columellar lip about equally long (*Buliminus* s.s.) 2
- Apex conical; parietal interruption of the apertural lip much shorter than the columellar lip (*Pene*) 8
2. Over 12 mm broad 3
- Less than 12 mm broad 5
3. Over 18 mm broad *corpulentus*
- Less than 18 mm broad (*labrosus*) 4
4. Spindle-shaped *labrosus egregius*
- Slender ovoid *labrosus* s.s.
5. All whorls increasing regularly in width *exquisitus*
- Different 6
6. Less than 6 mm broad *akkumensis*
- Over 6 mm broad 7
7. Apertural height 40-50% of total height *alepensis*
- Apertural height less than 40% of total height *carneus*
8. With a (very) prominent columellar lamella *coluplicatus*
- Without a prominent columellar lamella 9

9. Over 6 mm broad (*kotschyi*) 10
 — Less than 6 mm broad *sidoniensis edessanus*
 10. Less than 8.3 mm broad; upper half of spire conical *kotschyi* s.s.
 — Over 8.3 mm broad; spire predominantly cylindrical *kotschyi naegelei*

SYSTEMATIC REVIEW

Buliminus Beck, 1837

Heller (1974: 259) considered *Pene* Pallary, 1929, a separate genus and not a subgenus of *Buliminus* because of (1) constant differences in the shape of the protoconch and initial teleoconch whorls and (2) the sympatric occurrence of *Pene* and *Buliminus* species, whereas in *Pene* and *Buliminus* the species are generally allo- or parapatric. In addition, both taxa can be distinguished conchologically by the form of the apertural lip, but it remains subjective how to interpret this taxonomically. After all, subgenera should have diagnostic characters. Anatomical differences are not obvious. Several molluscan taxa which are generally considered subgenera should be raised to genera if Heller's reasoning would be followed. Also, the nomenclature would lose its present informative content concerning a close (probably sister-group) relationship. The advantages of changing the generic name of several species remain unclear in this case. Therefore we prefer to follow both Forcart (1940) and Zilch (1959: 190) in giving subgeneric status to *Pene*.

The shells of the Turkish *Buliminus* species, including the protoconch, are not provided with any (micro)sculpture apart from inconspicuous growth-lines. Usually they are creamy or light corneous to whitish. Few species have violet-brown shells, which is then mentioned in the description. The umbilicus is inconspicuous or closed completely.

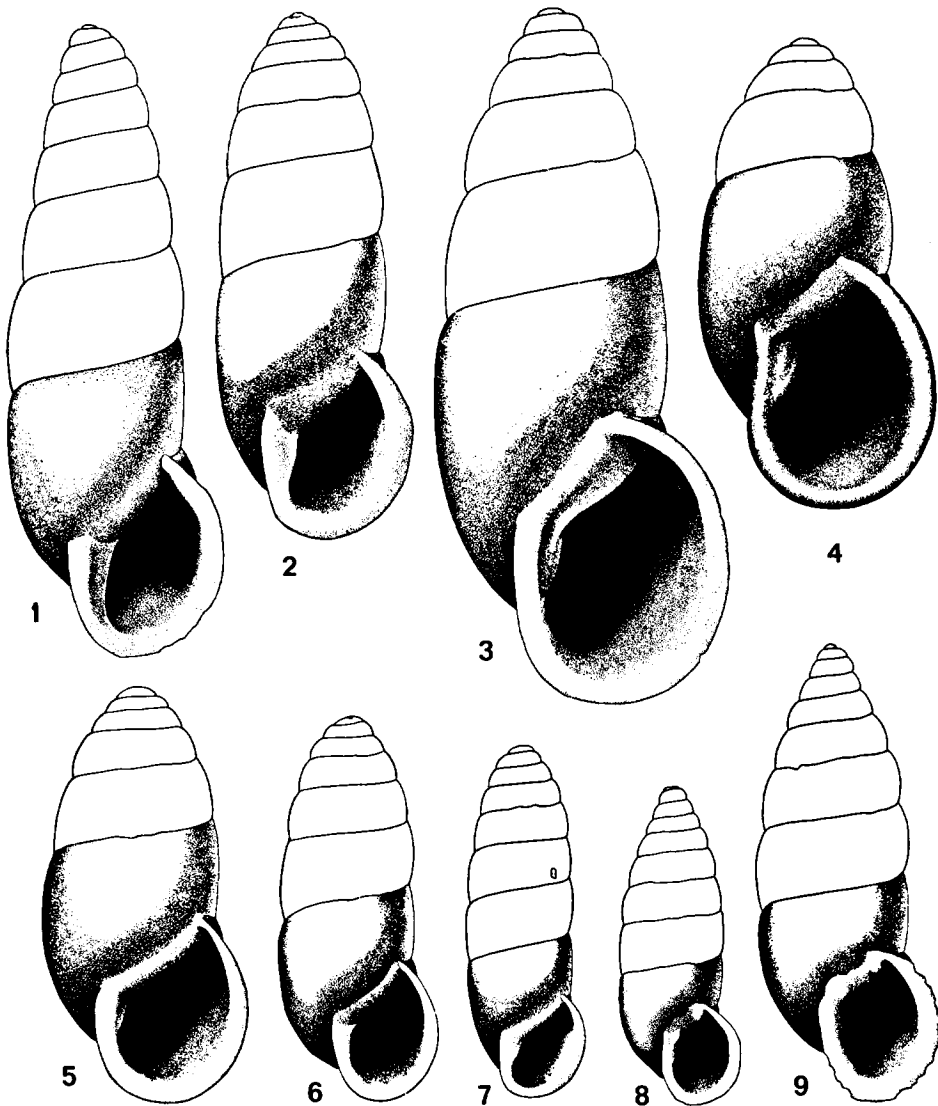
Buliminus s.s.

***Buliminus* (B.) *akkumensis* spec. nov.**
 (figs. 7, 19, 29)

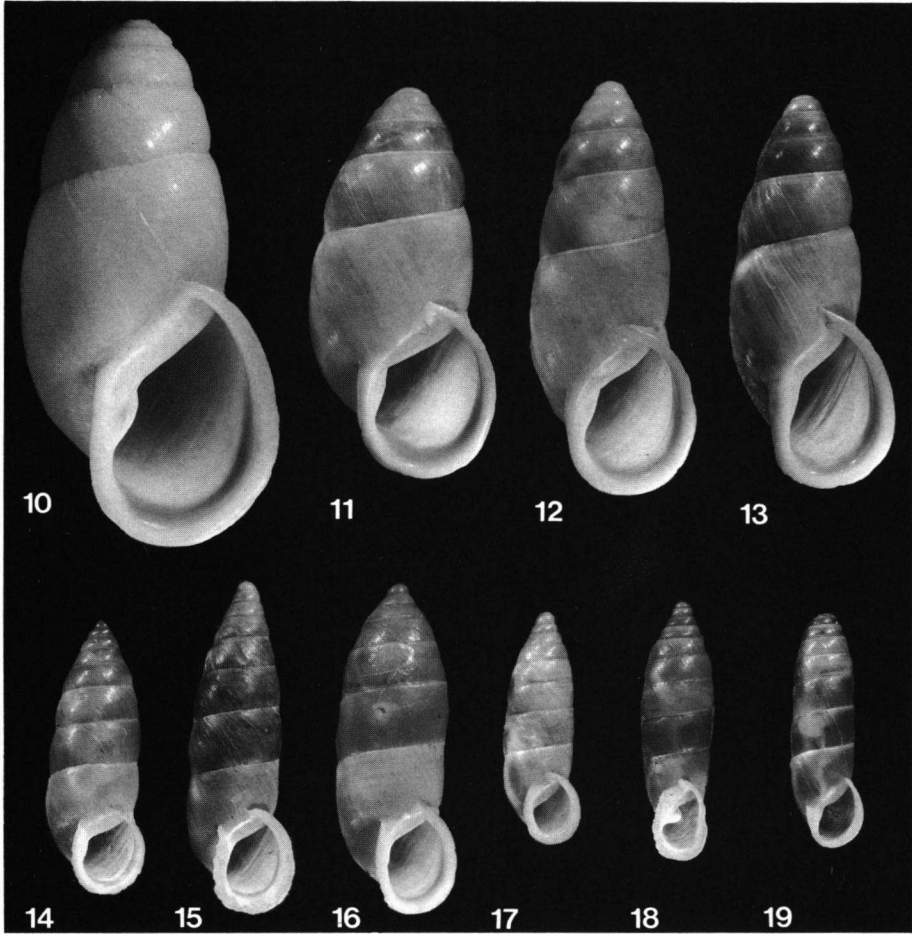
Material (holotype and paratypes). — İçel: high rocks near the bay 2 km W. of Akkum, 24 km NE. of Silifke, 0-50 alt., XF03 (MEN/23; NNM 56515/holotype, 56516/4); Narlikuyu Mağarası, c. 20 km NE. of Silifke, XF03 (MEN/2). Not in fig. 29 (added in proof): Koçaşlı, 8 km NW. of Ovaçık, WF50 (NEU/1); 1 km N. of Silifke, WF82 (NEU/3).

Diagnosis. — A species of *Buliminus* s. str., differentiated conchologically by its slender sub-cylindrical shape and small size, being less than 6 mm broad with seven to nine whorls.

Shell (figs. 7, 19). — Shell very slender sub-cylindrical, with $7\frac{1}{4}$ to 9 whorls, separated by somewhat indented sutures. Initial whorls moderately inflated and gradually increasing in width; the final three whorls (strongly) flattened and about equally broad. Aperture not broadly rounded below, oblique, narrow elliptical. Apertural height between $\frac{1}{3}$ and $\frac{1}{4}$ of that of the shell. Parietal callus simple. Columellar ledge simple, in front view clearly narrower than the columellar lip and reaching down to just below its middle.



Figs. 1-9. *Buliminus* spec. 1-7, *Buliminus* (*B.*) spec.; 8, 9, *Buliminus* (*Pene*) spec. 1, *exquisitus*, Içel, 58 km NE. of Mersin (actual height 27.6 mm); 2, 6, *carneus*, Antalya, 20 km ESE. of Korkuteli (2: actual height 23.3 mm) and Perge (6: actual height 18.2 mm); 3, *labrosus egregius*, Seyhan, Kozan (actual height 32.5 mm); 4, *corpulentus*, holotype, Içel, 3 km W. of Aydıncık (actual height 41.8 mm); 5, *alepensis*, Kahramanmaraş, 140 km SW. of Malatya (actual height 19.5 mm); 7, *akkumensis*, paratype, Içel, 2 km W. of Akkum (actual height 16.5 mm); 8, *sidoniensis edessanus*, Kahramanmaraş, 140 km SW. of Malatya (actual height 15.2 mm); 9, *k. kotschyi*, Içel, 2 km N. of Gülek (actual height 21.2 mm). Mrs. I.M. den Boer-van Noortwijk & F.J.A. Driessen del.



Figs. 10-19. *Buliminus* spec. 10-13, 19, *Buliminus* (*B.*) spec.; 14-18, *Buliminus* (*Pene*) spec. 10, *corpulentus*, paratype, İçel, 3 km W. of Aydıncık (actual height 42.0 mm); 11, *l. labrosus*, Gaziantep, 20 km E. of Sakcagözü (actual height 29.8 mm); 12, 13, *labrosus egregius*, Seyhan, Kozan (actual height 32.5 mm) and Hatay, Sariseki (actual height 30.9 mm); 14, 15, *k. kotschyi*, İçel, Gülek (= Çamalan) (14: actual height 21.6 mm) and Hatay, Sariseki (15: actual height 24.4 mm); 16, *kotschyi naegelei*, Gaziantep, Aydınoğlu (actual height 26.0 mm); 17, *sidoniensis edessanus*, Urfa, Urfa (actual height 16.7 mm); 18, *coluplicatus*, holotype, Hatay, 6.5 km S. of Harbiye (actual height 18.9 mm); 19, *akkumensis*, holotype, İçel, 2 km W. of Akkum (actual height 17.1 mm). Photographs E. G.

H. 15.1-19.0 mm; B. 5.3-5.8 mm (without apertural lip: 4.7-5.2 mm).

Genitalia. — Unknown.

Range (fig. 29). — The species is only known from a restricted area in the coastal part of the province of İçel. Two records that became known while this paper was in press could not be recorded anymore in fig. 29.

Notes. — This species is not particularly similar to any other Turkish *Buliminus*. At first sight it recalls a *Pene* species by its shape and size, but the apical whorls and the apertural lip are typical for *Buliminus* s. s.

Derivatio nominis. — The epithet *akkumensis* refers to the type locality, situated near Akkum.

Buliminus (B.) alepensis (Pfeiffer, 1841)
(figs. 5, 20, 29)

Petraeus (Petraeus) halepensis; Forcart, 1940: 165, pl. 2 figs. 30, 31.

Material. — Adıyaman: 24 km NE. of Kâhta along the road from Horik to the summit of the Nemrud Dağı, DB69 (NEUB); "Arsameia" and "Nymphaion", 20 km NNE. of Kâhta, DB69 (MEN); Cendere Köprüsü, 16 km N. of Kâhta, DB69 (MEN). Elâzığ: Harput, EC28 (SCH; SUB). Gaziantep: 1.5 km E. of Yeşilce, 30 km E. of Sackagözü, CB41 (MEN); 2 km E. of Gaziantep, CB50 (MEN). Hatay: 2 km SW. of Kırıkhan, BA64 (MEN; NNM). Kahramanmaraş: 140 km SW. of Malatya, CB66 (Gittenberger, 1967: 140); Elbistan, 1200 m alt., CC43 (MEN; NNM). Malatya: Malatya, DC44 (F: 167). Mardin: monastery Deir az-Zafaran, 8 km E. of Mardin, FB63 (NEUB). Siirt: Siirt, GC50 (F: 167). Sivas: 17 km SE. of Gürün, CC68 (MEN; NNM). Urfa: Harran (= Altınbasak), DA98 (MEN); Birecik, DB10 (F: 168); 8 km W. of Urfa, DB71 (MEN); 10 km SSE. of Urfa, 500 m alt., DB80 (MEN; NNM); Urfa, DB81 (F: 168; MEN; NNM); 13 km SW. of Hilvan, DB95 (MEN); 10 km NE. of Hilvan, 500 m alt., DB96 (MEN); 50 km E. of Urfa, EB31 (NEUB).

Shell (fig. 5). — Shell elongate-ovoid to nearly subcylindrical, with $6\frac{1}{2}$ - $7\frac{1}{2}$ slightly inflated whorls, separated by somewhat indented sutures. The penultimate whorl is hardly narrower than the body whorl; both are somewhat flattened laterally. Aperture broadly rounded below; it accounts for 41-49% of the total shell height. Parietal callus simple. Columellar ledge simple, much narrower than the columellar lip and reaching to below its middle.

H. 15.8-26.2 mm; B. 7.6-10.7 mm.

Genitalia (fig. 20). — A single specimen could be studied. The various segments of the penial appendix are unusually broad. An inconspicuous caecum takes the place of the penial flagellum. The epiphallian flagellum is somewhat shorter than the penis. The diverticulum hardly reaches beyond the spermatheca along the spermoviduct; it does not reach the glandula albuminifera.

Range (fig. 29). — The species is known from southern Turkey between 36° and 42° E.

Notes. — Both conchologically and anatomically this species is most similar to the vicariant *B. (B.) carneus*, which might be its sister-species. Because intermediate populations are unknown, the two taxa are considered species, mainly to remain in line with the literature.

Following the ICZN (Art. 32), the original spelling *alepensis* is used.

Buliminus (B.) carneus (Pfeiffer, 1846)
(figs. 2, 6, 21-23, 29)

Petraeus (Petraeus) carneus carneus; Forcart, 1940: 168, pl. 2 fig. 33.

Petraeus (Petraeus) carneus glabratus; Forcart, 1940: 169, pl. 2 fig. 32.

Material. — Antalya: Yeniçe pass, 20 km ESE. of Korkuteli, 950 m alt., TF79 (F: 168; MEN; NNM; SUB); Termessos, 24 km NW. of Antalya, TF79 (MEN); Antalya, TF98 (F: 170; SUB); 5 km N. of

Antalya, TF99 (MEN); 9 km N. of Antalya, TF99 (NNM); 2 km W. of Korkuteli, TG50 (MEN); Karain cave, 6 km NW. of Yeniköy, 30 km NNW. of Antalya, TG80 (MEN; NEU; NNM); Lara, 5 km SE. of Antalya, UF08 (NNM); 6 km NE. of Antalya, UF08 (MEN); 8 km E. of Antalya, UF08 (MEN); Perge, UF09 (IZPAN; MEN; NNM); ruins of Sillyon, 24 km NE. of Antalya, 240 m alt., UF19 (NEUB). Burdur: Burdur Gölü, c. TG57 (NEUB). İçel: Çubukkoyuğu, 20 km E. of Anamur, WE09 (MEN); Haclishakli, 29 km WSW. of Taşucu, WF50 (MEN); 15 km W. of Silifke, WF62 (IZPAN); 3 km S. of Uzuncaburç, 20 km N. of Silifke, WF84 (NEUB); Narlikuyu Mağarası, 20 km NE. of Silifke, XF03 (MEN); Cennet ve Cehennem (= 20 km NE. of Silifke), XF03 (NEUB); Yemiskuma, 7 km SW. of Erdemli, XF14 (MEN; NNM); Arslankoy, XF19 (IZPAN); Limonlu, 10 km SW. of Mersin, XF36 (MEN). Konya: 35 km W. of Konya, 1000 m alt., VG19 (NNM). Niğde: Bulgar Maden mtn. in the Bulgar Dağ, 1500-1600 m alt., XG34 (F: 170).

Shell (figs. 2, 6). — Shell sub-cylindrical to very slender conical, with a more quickly tapering apical part; with 7-8 $\frac{3}{4}$ moderately convex whorls, separated by somewhat indented sutures. Especially the body whorl is clearly flattened laterally. The aperture is broadly rounded below; it accounts for (clearly) less than 40% of the total shell height. Parietal callus simple. The columellar ledge is simple, clearly less broad than the columellar lip or even not discernible at all in front view; it may reach downward to c. halfway the columellar border.

H. 16.3-25.1 mm; B. 6.9-9.5 mm.

Genitalia (figs. 21-23). — Three specimens in total, from two localities, could be studied. An obsolete caecum takes the place of the penial flagellum. The epiphallian flagellum is about as long as the penis (figs. 21, 23) or clearly longer (fig. 22). The diverticulum reaches (very) clearly beyond the spermatheca; it reaches the basis of the glandula albuminifera in natural position. The diverticulum may be conspicuously enlarged when it contains a spermatophore (fig. 23).

Range (fig. 29). — The species is known from southern Turkey, between the provinces of Antalya and Burdur in the west and Niğde and İçel in the east.

Notes. — Forcart (1940: 169) argued that *B. (B.) carneus* can be divided into two subspecies after the dimensions of the shells. With more material available for study now, we cannot share this view. *B. (B.) carneus* turned out to be one of several Turkish enid species that varies conspicuously in dimensions.

Very slender, but otherwise normal specimens (up to 21.8-7.1 mm, with 8 $\frac{3}{4}$ whorls) have been found 15 km W. of Silifke.

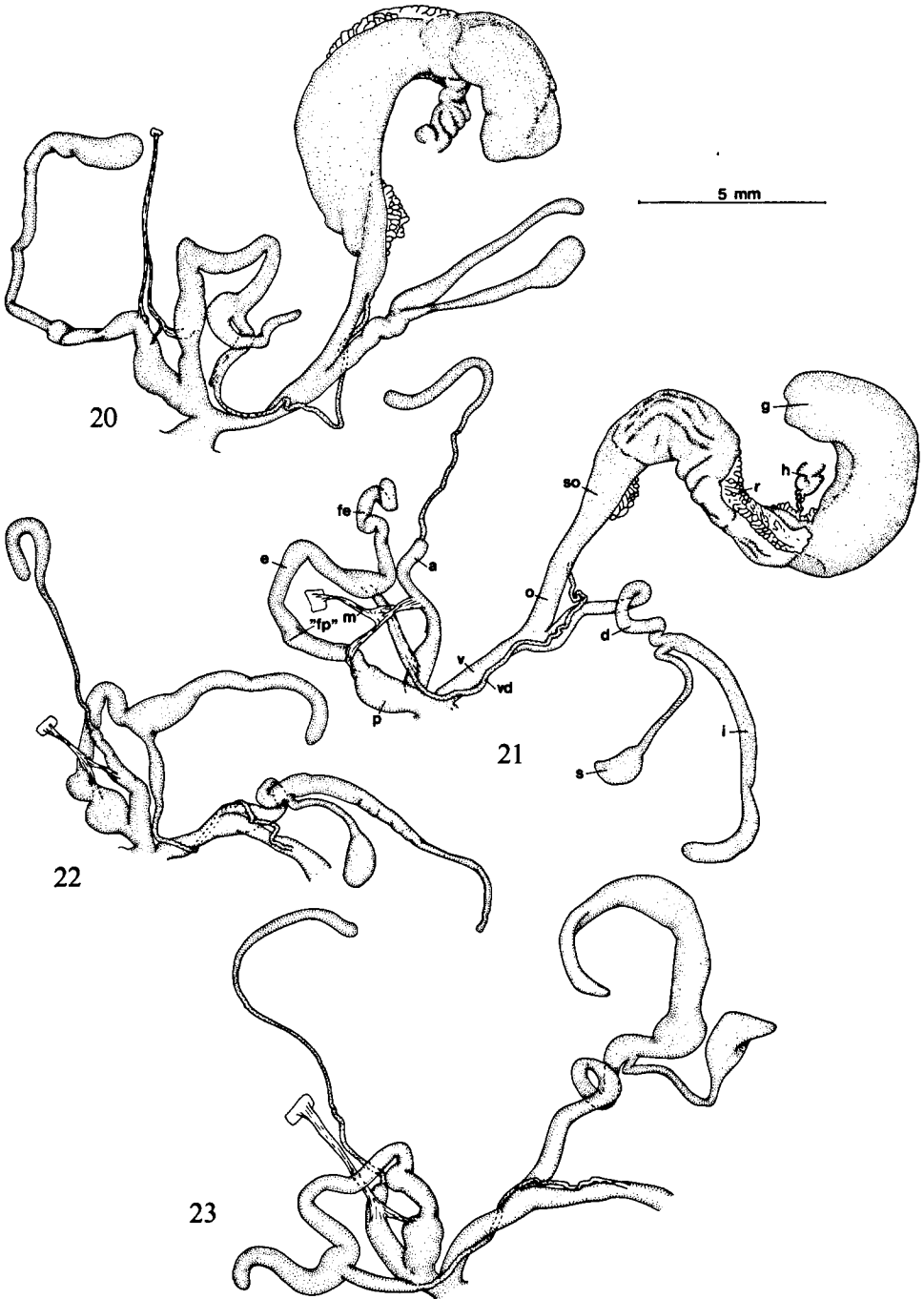
B. (B.) carneus differs from *B. (B.) alepensis* most clearly by the more slender shape of the shell, which has a relatively lower aperture. Apart from these differences the two species are so similar that a subspecific status should be given serious consideration (see also the notes with *B. (B.) alepensis*).

***Buliminus (B.) corpulentus* spec. nov.**

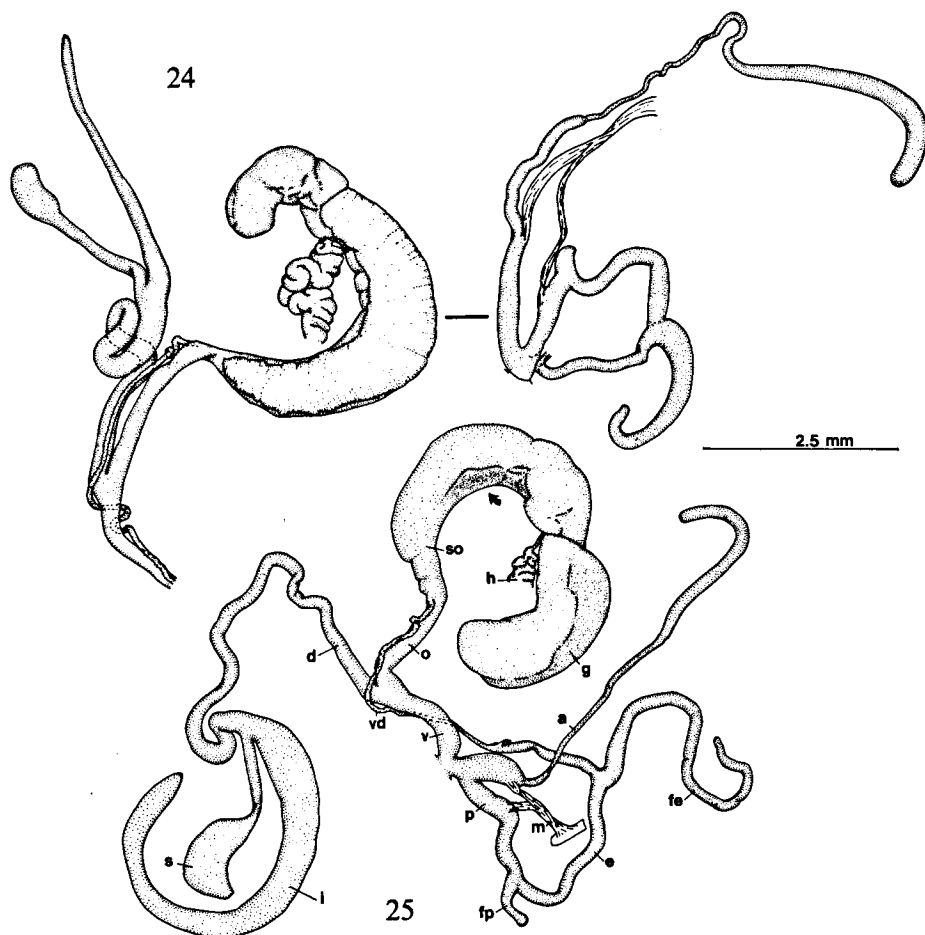
(figs. 4, 10, 24, 29)

Material (holotype and paratypes). — İçel: 3 km W. of Aydıncık (= Gilindire), 0-50 m alt., WE 29 (MEN/25; NEU/4; NNM 56517/holotype, 56518/4, alc. 9260/1); 2 km E. of Sipahili, 52 km WSW. of Taşucu, 0-50 m alt., WF40 (MEN/1; NEU/2).

Diagnosis. — A very big *Buliminus* s. str., differing from congeneric species conchologically by the combination of a slender ovoid general shape and a large ovoid aperture with a prominent, curved columellar ledge.



Figs. 20-23. Genitalia of *Buliminus* (*B.*) spec. 20, *alepensis*, Urfa, 10 km SSE. of Urfa; 21-23, *carneus*; 21, 22, Antalya, Perge (IZPAN) & 23, 25 km W. of Silifke (IZPAN). E. G. del.



Figs. 24, 25. Genitalia of *Buliminus* (*B.*) spec. 24, *corpulentus* (male and female parts separate), paratype (shell: fig. 10), İçel, 3 km W. of Aydınçık; 25, *labrosus egregius*, Seyhan, Kozan (IZPAN). E. G. del.

Shell (figs. 4, 10). — Shell very big, slender ovoid, with $5\frac{3}{4}$ -6 moderately convex whorls, separated by indented sutures; body whorl somewhat flattened laterally. Apertural lip c. 2 mm broad, white, not flattened, its outer margin clearly reflected backward. Aperture measuring 48-54% of the total height of the shell, ovoid, broadly rounded below. Parietal callus low, but sharply delimited in front. Columellar ledge very prominent, forming a curved pseudolamella, which extends downward to about the middle of the columellar side of the aperture.

H. 37.0-42.0 mm; B. 19.5-21.8 mm.

Genitalia (fig. 24). — One specimen could be studied. Between the penis and the

slightly longer epiphallus there is a penial flagellum, measuring less than half the length of the penis. At its basis, the very slowly tapering epiphallian flagellum is broader than the penis; it is somewhat longer than the epiphallus. The diverticulum reaches clearly beyond the spermatheca; in its natural position it borders the basis of the glandula albuminifera.

Range (fig. 29). — This species is only known from two localities along the coast of the province of İçel.

Notes. — It is rather surprising that this largest of all *Buliminus* species had been overlooked up till now. *B. (B.) l. labrosus* is most similar in shell shape and size.

Derivatio nominis. — The epithet *corpulentus* refers to the size and general shape of the shell.

Buliminus (B.) exquisitus Nägele, 1901
(figs. 1, 29)

Petraeus (Petraeus) exquisitus; Forcart, 1940: 170, pl. 2 fig. 34.

Buliminus (Buliminus) exquisitus; Gittenberger, 1967: 140.

Material. — Hatay: "Çeikli" near Alexandrette (= Iskenderun), c. BA55 (F: 171). İçel: 58 km NE. of Mersin, western slope near the northern entrance to the pass 15 km SW. of Pozantı, 1100-1900 m alt., XG53 (NNM - Gittenberger, 1967: 140); Kölek Boğazı, 8 km N. of Gülek, XG62 (Nägele, 1901: 25).

Shell (fig. 1). — Shell very slender conical to somewhat spindle-shaped, with 8½-9 slightly convex whorls, which are separated by moderately indented sutures. Apertural lip broadly reflected. Apertural base somewhat narrowed, not broadly rounded; columellar border simple, straight.

H. 25.7-28.8 mm; B. 8.2-9.5 mm.

Genitalia. — According to Forcart (1940: 171) the genitalia are similar to those of *B. (B.) alepensis*, but a penial flagellum is lacking completely.

Range (fig. 29). — The species is known from only three localities in Turkey. With Forcart (1940: 171) we doubt its occurrence in Eskişehir; we have not indicated this record in fig. 29.

Buliminus (B.) labrosus egregius Nägele, 1902
(figs. 3, 12, 13, 25, 29)

Petraeus (Petraeus) labrosus egregius; Forcart, 1940: 162, pl. 2 fig. 35.

Material. — Hatay: Sarıseki, 11 km NE. of Iskenderun, BA56 (MEN; NNM). Seyhan: Kozan (= Sis), YG44 (F: 165; IZPAN; NNM); 5 km NNE. of Kozan, YG55 (IZPAN). Siirt: Siirt, GC50 (F: 165).

Shell (figs. 3, 12, 13). — Shell spindle-shaped, with 6½ to 7 moderately convex whorls. Aperture broadly rounded below; the columellar ledge reaches to halfway the columellar side or somewhat further down. The aperture measures 41-47% of the total shell height.

H. 28.8-34.8 mm; B. 11.9-16.2 mm.

Genitalia (fig. 25). — A single specimen could be studied. The penial flagellum

measures about half the length of the penis, which is slightly shorter than the epiphallus. The epiphallian flagellum is clearly longer than the epiphallus. The diverticulum reaches far beyond the spermatheca; its end is situated next to the basis of the glandula albuminifera.

Range (fig. 29). — This subspecies is known from the central southern part of Turkey, where it has been recorded in the provinces of Hatay (not in the southernmost part) and Seyhan. Its occurrence further eastward, in the province of Siirt, is unlikely (see the notes).

Notes. — After having studied syntypes, Forcart (1940: 163) considered the var. *sertensis* Nägele, 1910, from Siirt, a form of this subspecies. He did so with some doubt. In view of the distribution of the nominate subspecies, we prefer to leave this question open for further study.

Buliminus (B.) labrosus labrosus (Olivier, 1804)
(figs. 11, 29)

Bulimus labrosus Olivier, 1804: 222, pl. 31 fig. 10a, b (near Beirut, Lebanon). Syntypes could not be traced (Tillier & Mordan, 1983: 159).

Material. — Gaziantep: 17 km E. of Sakcagözü, CB31 (NEUB); 20 km E. of Sakcagözü, 1000 m alt., CB31 (MEN; NNM); 1.5 km E. of Yeşilce, 30 km E. of Sakcagözü, CB41 (MEN; NNM). Hatay: 6 km NE. of Samandağ, 300 m alt., BV39 (MEN). Urfa: Urfa, DB81 (F: 165).

Shell (fig. 11). — Shell slender ovoid, because the upper whorls increase more quickly in width than they do in the preceding subspecies. Aperture measuring 43-50% of the total shell height.

Range (fig. 29). — This subspecies is known from the southernmost part of the province of Hatay eastward to the province of Urfa.

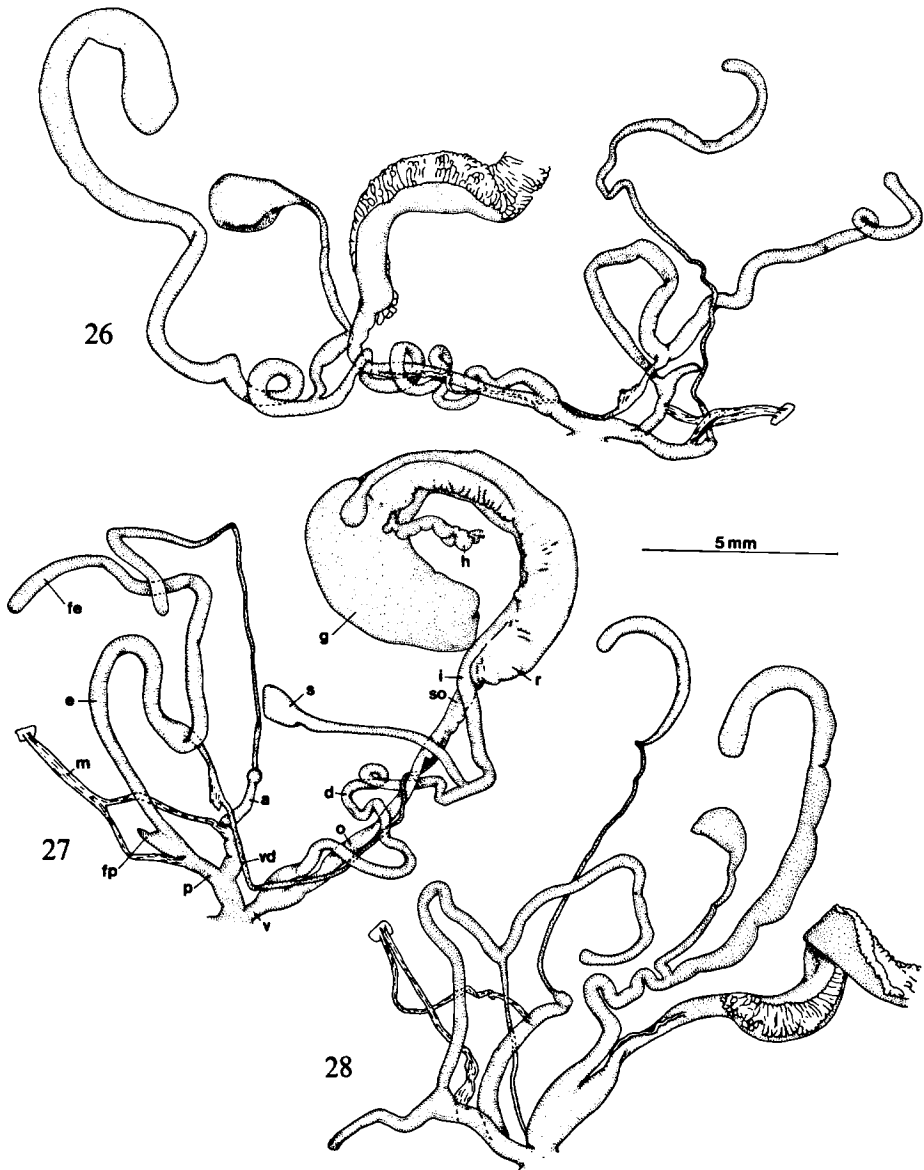
Notes. — This subspecies was not reported from Turkey by Forcart (1940). For biogeographic reasons we have provisionally listed here a sample reported from Urfa; the material in question was not actually studied by Forcart (1940: 165). See also the notes with the preceding subspecies.

Buliminus, subgenus *Pene* Pallary, 1929.

Buliminus (Pene) sidoniensis edessanus Kobelt, 1899
(figs. 8, 17, 28, 30)

Petraeus (Pene) sidoniensis edessanus; Forcart, 1940: 175.

Material. — Adıyaman: 10 km N. of Kâhta, DB69 (MEN; NNM). Diyarbakır: Diyarbakır, FB09 (F: 176). Gaziantep: 60 km E. of Bahçe, 1000 m alt., CB31 (MEN; NNM); 17 km E. of Sakcagözü, CB31 (NEUB); 20 km E. of Sakcagözü, 1000 m alt., CB31 (MEN); 24 km E. of Sakcagözü, 900 m alt., CB41 (MEN); 1.5 km E. of Yeşilce, 30 km E. of Sakcagözü, CB41 (MEN; NNM); 2 km E. of Gaziantep, 850 m alt., CB50 (MEN; NNM). Kahramanmaraş: 140 km SW. of Malatya, CB66 (Gittenberger, 1967: 140). Urfa: Birecik, DA09 (F: 176); 10 km SSE. of Urfa, 500 m alt., DB80 (MEN; NNM); Urfa, DB81 (F: 176; MEN); Siverek, EB27 (F: 176).



Figs. 26-28. Genitalia of *Buliminus* (*Pene*) spec. 26, 27, *kotschy*, Seyhan, Tumlu Kalesi (26) and Içel, Gülek (27); 28, *sidoniensis edessanus*, Urfa, 10 km SSE. of Urfa. E. G. del.

Shell (figs. 8, 17). — Lower half of the shell cylindrical, upper half high conical. Shell with $9\frac{1}{4}$ - $10\frac{1}{2}$ whorls, separated by indented sutures, the initial ones clearly more convex than the flattened lower ones. The aperture measures 29-33% of the total shell height.

H. 13.7-18.2 mm; B. 4.5-5.4 mm.

Genitalia (fig. 28). — Three specimens of the same population were studied. The penial flagellum and the penis are about equally long and about half as long as the epiphallus. The epiphallian flagellum is about as long as the epiphallus. The diverticulum reaches far beyond the spermatheca and forms a furrow on most of the glandula albuminifera.

Range (fig. 30). — This (sub)species is known from southeastern Turkey, from the province of Gaziantep eastward to the province of Diyarbakır.

Notes. — According to Heller (1974: 264, 267), the northernmost populations of *B. (P.) sidoniensis* (Férussac, 1821) cannot be distinguished as a separate subspecies. His view is supported by our data concerning the structure of the genitalia (see Heller, 1974: 270, fig. 10). We have not studied material from near the type locality, Lebanon, Beyrouth, and elsewhere in the wide, southern range of the species and provisionally still follow Forcart's view.

Buliminus (Pene) kotschy kotschy (Pfeiffer, 1854)
(figs. 9, 14, 15, 26, 27, 30)

Petraeus (Pene) sidoniensis kotschy; Forcart, 1940: 173, pl. 2 fig. 37.

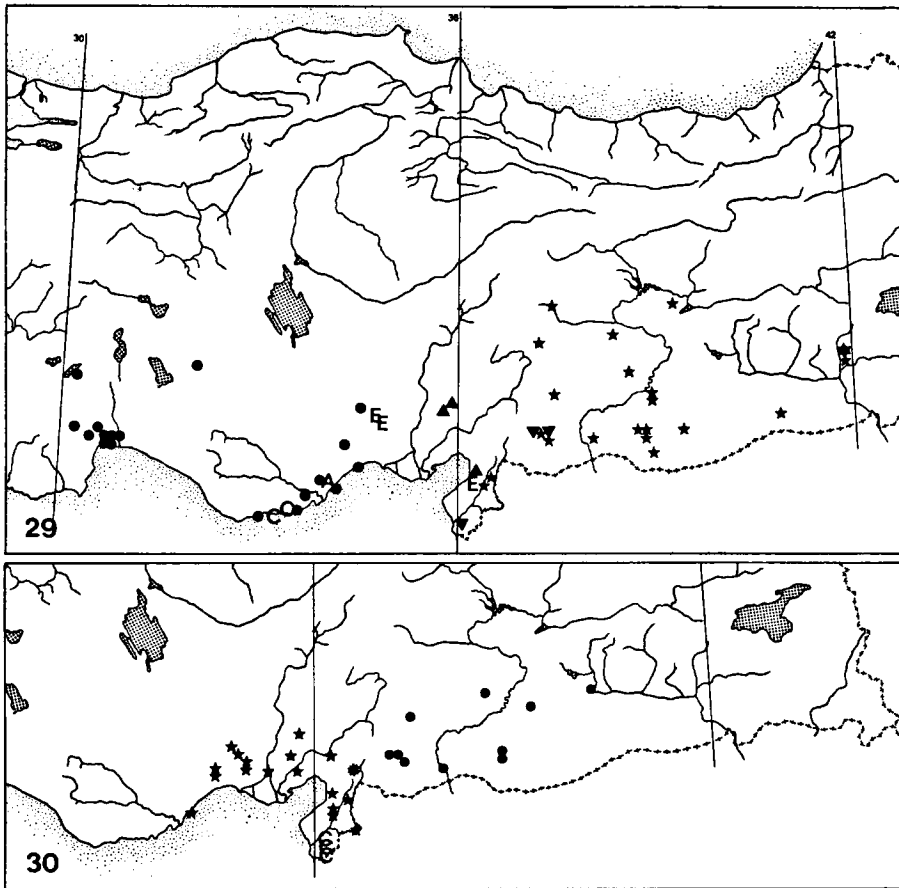
Material. — Hatay: 7 km N. of Serinyol (? = Bedirge), BA53 (MEN; NNM); Topboğazı, 12 km SE. of Iskenderun, 750 m alt., BA54 (MEN; NNM); gorge at Sariseki, 11 km NE. of Iskenderun, BA56 (MEN; NNM); castle Bektaşlı, 8 km SW. of Güveç, BA75 (MEN; NNM); Yemişçir, 4 km S. of Reyhanlı, BA81 (MEN); Hierapolis ruins, 10 km N. of Osmaniye, BB51 (NEUB). İçel: Kızkalesi, 4 km SW. of Corycus, XF03 (NEUB); 5 km S. of Gözne, 15 km N. of Mersin, XF38 (IZPAN); Gözne (= Giosna), XF39 (F: 175); Taşobası Köyü, 18 km N. of Tarsus, XG70 (MEN; NNM); 10 km NE. of Tarsus, XF79 (MEN); Gülek (= Çamalan), XG52 (MEN; NNM); 8 km S. of Gülek, XG52 (MEN); 2 km N. of Gülek (= Çamalan), XG61 (IZPAN). Seyhan: Adana, YF09 (F: 175); Tumlu Kalesi, 12 km NW. of Mercimek, YG31 (MEN; NNM); (W-side of) Kozan, YG44 (F: 175; IZPAN; MEN); Yılanlı Kale, 6 km SW. of Ceyhan, YF49 (MEN).

Shell (figs. 9, 14, 15). — Lower half of the shell cylindrical and apical part conical, with $7\frac{3}{4}$ - $9\frac{1}{4}$ moderately inflated whorls. Aperture elliptical, its axis nearly vertical; measuring 31-37% of the total shell height. Apertural lip broadly reflected all around; with an obsolete angular denticle on the prominent parietal callus.

H. 18.0-23.6 mm; B. 6.3-8.5 mm (5.2-7.5 mm if measured behind the reflected lip). A specimen from Kızkalesi (Neubert leg.) measures 22.6×9.0 mm.

Genitalia (figs. 26, 27). — Two specimens were studied. The penial flagellum is tapering towards its end and measures about half the length of the penis. The epiphallus is about four times longer than the penis and the epiphallian flagellum is even somewhat longer than this. The diverticulum reaches far beyond the spermatheca and borders the basis of the glandula albuminifera (fig. 27).

Range (fig. 30). — This subspecies is known from the central southern part of Turkey, from the province of Hatay to the province of İçel.



Figs. 29, 30. UTM distribution maps with records of *Buliminus* spec. 29, *Buliminus* (*B.*) spec.; 30, *Buliminus* (*Pene*) spec. 29, *akkumensis* (A), *alepensis* (stars), *carneus* (dots), *corpulentus* (C), *exquisitus* (E), *l. labrosus* (triangles pointing down), *labrosus egregius* (triangles pointing upward), *labrosus* subsp.?, *coluplicatus* (C), *k. kotschyi* (stars), *kotschyi naegelei* (asterisk), *sidoniensis edessanus* (dots).

Notes. — According to the structure of the genitalia, especially the relative lengths of the flagella, this taxon cannot be considered a subspecies of the vicariant *B. (P.) sidoniensis*. Intermediate populations are unknown as well. We consider it a separate species, anatomically similar to *B. (P.) syriacus* (Pfeiffer, 1846) (see Heller, 1974: 261, fig. 2), which might be its sister-species.

The relatively big specimens from Sariseki differ by a more violet-brown colour and a slender spire.

Buliminus (Pene) kotschy naegelei Boettger, 1898
(figs. 16, 30)

Buliminus (Petraeus) naegelei Boettger, 1898: 25 ("In der Umgebung des Klosters La Trappe in Cheikli bei Alexandrette" [near the monastery La Trappe at Cheikli near Iskenderun]). Kobelt, 1901: 694, pl. 104 figs. 12-15.

Material. — Gaziantep: rocks in the centre of Aydınoğlu, 12 km WSW. of Islâhiye, 600 m alt., BA89 (MEN; NNM).

Shell (fig. 16). — The shells differ from those of the nominate subspecies by a relatively shorter conical upper part and by being bigger, especially broader.

H. 22.0-27.6 mm; B. 8.4-9.8 mm.

Genitalia. — Unknown.

Range (fig. 30). — Apart from the type locality, that could not be located exactly, this subspecies is only known from the locality mentioned.

Notes. — This taxon was not mentioned by Forcart (1940). However, it occurs in an area that he did not yet consider Turkish territory.

Buliminus (Pene) coluplicatus spec. nov.
(figs. 18, 30)

Material (holotype and paratypes). — Hatay: 2 km SE. of Antakya Kalesi, BA40 (MEN/4); 1.5 km S. of Harbiye, 8 km S. of Antakya, BA40 (MEN/8; NNM 56520/2); cave of St. Peter, 2 km N. of Antakya, BA41 (MEN/2; NEU/1); 4 km S. of crossroad to Senköy, 20 km S. of Antakya, BV48 (MEN/2); 6.5 km S. of Harbiye, 14 km S. of Antakya, BV49 (MEN/15; NNM 56521/holotype, 56519/3).

Diagnosis. — A *Pene* species, differing from consubgeneric species by a prominent columellar lamella and a clearly spindle-shaped spire.

Shell (fig. 18). — Shell slender spindle-shaped, with more or less clearly narrowing lower whorls. There are 9-10 whorls, the lowest ones flattened and separated by very shallow sutures. Aperture elliptical, its axis parallel to the columella, measuring 28-34% of the total shell height. Parietal callus prominent, but in the middle often somewhat more obsolete. Apertural lip up to nearly 1 mm broad, reflected and concave (not curved backward). On the columella there is a (very) prominent, nearly horizontal lamella, which may be followed inside the body whorl. Fresh specimens are violet-brown.

H. 16.0-21.1 mm; B. 5.3-6.1 mm.

Genitalia. — Unknown.

Range (fig. 30). — This species is only known from the southernmost part of the province of Hatay.

Notes. — Material from three more localities in the province of Hatay is characterized by a (much) less prominent columellar lamella. These shells are not considered paratypes.

Derivatio nominis. — The epithet *coluplicatus* refers to the columella that is provided with a lamella.

REFERENCES

- BOETTGER, O., 1898. Bemerkungen über einige Buliminus aus Kleinasien, Syrien und Cypern, nebst Beschreibung neuer Arten. — *NachrBl. dt. malakozool. Ges.* 30: 19-27.
- FORCART, L., 1940. Monographie der türkischen Enidae. — *Verh. naturf. Ges. Basel* 51: 106-263.
- GITTENBERGER, E., 1967. Die Enidae (Gastropoda, Pulmonata) gesammelt von der niederländischen biologischen Expedition in die Türkei in 1959. — *Zool. Meded. Leiden* 42: 125-141.
- , & H.P.M.G. MENKHORST, in press. Die türkischen Enidae: die Gattung Turanena Lindholm (Pulmonata: Pupillacea). — *Arch. Molluskenk.*
- HELLER, J., 1974. Systematics and distribution of the land snail *Pene* (Pulmonata: Enidae) in Israel. — *Zool. J. Linn. Soc.* 54: 257-276.
- , 1975. The taxonomy, distribution and faunal succession of *Buliminus* (Pulmonata: Enidae) in Israel. — *Zool. J. Linn. Soc.* 57: 1-57.
- KERNEY, M.P., & R.A.D. CAMERON, 1979. A field guide to the land snails of Britain and North-west Europe: 1-288. London.
- KOBELT, W., 1901. Die Familie Buliminidae. In: MARTINI & CHEMNITZ, *Syst. Conch.-Cab.* I, 13 (2): 685-724.
- NÄGELE, G., 1901. Einige Neuheiten aus Vorderasien. — *NachrBl. dt. malakozool. Ges.* 33: 16-31.
- OLIVIER, G.A., 1804. *Voyage dans l'empire Othoman, l'Egypte et la Perse ...* 2: 1-466. Atlas: i-vii, pls. 18-32. Paris. [Not seen].
- TILLIER, S., & P. MORDAN, 1983. The conchological collections of Bruguière and Olivier from the Ottoman empire (1792-1798). — *J. Conch. Lond.* 31: 153-160.
- ZILCH, A., 1959. Gastropoda, Teil 2. Euthyneura. In: O.H. SCHINDEWOLF (ed.), *Handbuch der Paläozoologie* 6 (2): 1-200.