SYNOPSIS OF THE EGYPTIAN FRESHWATER SNAIL FAUNA

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ABSTRACT: Egypt harbours many species of freshwater snails that transmit parasites causing serious diseases in humans and animals. Due to their significance, it is important to up-date the faunal list regularly. Our objective was to present such an up-date. The twenty eight species known to exist in the country are reviewed, including their synonymy, type localities, diagnostic features and parasitological importance; the shell morphology is illustrated. Besides, snail species thought to be extinct in the country are noted. This review can be used as a field guide for identification of the various species of snails colonising freshwater habitats in Egypt.

KEYWORDS: snail, freshwater, Egypt, field guide

INTRODUCTION

Freshwater snails play an important role in their ecosystems and many of them have great medical and veterinary importance. Worldwide, about 350 snail species are estimated to be possible hosts of parasites which cause human and animal diseases (Rozendaal 1997). The Egyptian freshwater snail fauna includes many species that transmit serious parasitic diseases such as schistosomiasis and fascioliasis. Though the fauna has been studied for a long time (Friedrich 1874, Leiper 1916a, Sattmann & Kinzelbach 1988, Ibrahim et al. 1999), considering the new data and the taxonomic changes, it is important to up-date the information regularly. The present work was carried out with the aim to present an up-to-date review of freshwater snails of Egypt and their distribution (Fig. 1). All species known to exist in the country are covered, regardless of their medical and veterinary importance.

The taxonomy of class Gastropoda, snails and slugs, is changing rapidly and it will be some time before a classification system for higher taxa becomes generally accepted (Haszprunar 1988, Ponder & Lindberg 1997, Bouche et al. 2005). The simplified, now informal system based on the respiratory organs (Thiele 1931) is used here. It includes three major groups: prosobranchs (gills anterior to the heart), opisthobranchs (gills posterior and right to the heart) and pulmonates (pallial lung instead of gills). The freshwater snails found in Africa, including Egypt, are either prosobranchs or pulmonates (Brown 1994).

PROSOBRANCHS

Prosobranch snails have thick-walled shells equipped with opercula. They have pectinate gills, called branchia or ctenidia, situated within the mantle cavity. Most prosobranchs are dioecious (Brown 1994). In the Egyptian freshwater fauna they are represented by nine families.
FAMILY NERITIDAE RAFINESQUE, 1815

Neritids are small to medium-sized snails, sometimes exceeding 20 mm in length, which inhabit saltwater and freshwater. They have cap-like (hemispherical) shells with few whorls and greatly expanded body whorl. The aperture is D-shaped, and the operculum is strongly calcified, with one or two internal apophyses. The family is represented in Egypt by only one species (BROWN 1994): *Theodoxus niloticus* (Reeve, 1856). *Theodoxus anatolicus* (Récluz, 1841) was reported from Fayoum (GRABNER et al. 2014), but the record needs to be confirmed as the species had not been reported from Africa before (BROWN 1994).

1. *Theodoxus niloticus* (Reeve, 1856)

*Neritina nilotica* Reeve, 1856

**Type locality:** Egypt, Nile Delta.

**Distinctive characters** (Fig. 2): When fully grown, the shell is 9 × 8 mm in size. Its colour and pattern are highly variable, but commonly with purplish-brown zigzag bands. The operculum is equipped with two apophyses (GARDNER 1932, BROWN 1994, IBRAHIM et al. 1999).

**Distribution** (Fig. 1): The species is tolerant to some degree of salinity and is thus usually found in fresh and brackish waters. It is more common in the coastal areas of Lower Egypt (SATTMANN & KINZELBACH 1988, BROWN 1994), but was also found in Upper Egypt and Lake Nasser (SATTMANN & KINZELBACH 1988, IBRAHIM et al. 1999, ABD EL-WAKEIL et al. 2013). It was also reported in Sinai (EL-KADY et al. 2000, IBRAHIM et al. 2006). Besides, it was abundant in the extinct fauna of aquatic molluscs in the Fayoum Depression (GARDNER 1932).

**Parasitological importance:** Unknown.

FAMILY VIVIPARIDAE GRAY, 1847

Viviparids are freshwater snails. Their dextral shells are more than 10 mm high. The whorls are...
generally more numerous than in the neritids. Also, the spire is higher and more conical. The operculum is entirely corneous and concentric. The animal is viviparous and the embryos develop in the lower oviduct. The right tentacle in males is modified as a copulatory organ. The radula is taenioglossate. The central tooth is wide and without basal denticles (Brown 1994). Only one species occurs in Egypt: Bellamya unicolor (Olivier, 1804).

2. Bellamya unicolor (Olivier, 1804)

Cyclostoma unicolor Olivier, 1804
Vivipara unicolor (Olivier, 1804)

Type locality: Egypt, Alexandria.
Distinctive characters (Fig. 3): Fully grown shells are 30 × 20 mm, with the aperture usually occupying about half of the total shell height. The body whorl is slightly flattened at the periphery producing a keel. The umbilicus is either narrow or closed. Spiral rows of small bristles may occur on the shell surface (Mandahl-Barth 1973a, Brown 1994).

Distribution (Fig. 1): This species is widely distributed in the Nile Valley and Delta (Sattmann & Kinzelbach 1988, Brown 1994, El-Shazly et al. 2012, Abd El-Wakeil et al. 2013). It was found in Lake Nasser (Ibrahim et al. 1999). Besides, it was recorded from Sinai (El-Kady et al. 2000, Ibrahim et al. 2006).

Parasitological importance: Unknown.

FAMILY AMPULLARIIDAE GRAY, 1824 (PILIDAE PRESTON, 1915)

Ampullariids are medium to large snails. Fully grown shells exceed 15 mm in height. The shell is depressed to ovate, and externally may appear either dextral or sinistral. The whorls are strongly rounded, either angular or carinate. The operculum is concentric, either entirely corneous or with calcareous inner layer. In addition to the tentacles, there is a tentacle-like process (pseudopodium) on each side of the snout. Near each tentacle there is an epipodial lobe: the left lobe forms an inhalent siphon and the right one forms an exhalent siphon. The snails are oviparous. The male copulatory organ is formed by a modified part of the mantle edge. The central tooth is broad and without basal denticles (Brown 1994). This family is represented in Egypt by only two species: Lanistes carinatus (Olivier, 1804) and Pila ovata (Olivier, 1804). Two other species: Lanistes varicus (O. F. Muller, 1774) and Pila wernei (Philippi, 1851) were mentioned among the snails rarely found in Egypt (Ibrahim et al. 1999) and reported from Assiut (Abd El-Wakeil et al. 2013). However, none of the two was mentioned among the Egyptian freshwater snails (Brown 1994). Based on the data accumulated during our previous malacological survey in Egypt (Lotfy et al. 2005), and after a comprehensive literature review we conclude that the presence of the two species in the country needs to be confirmed by further studies.

3. Lanistes carinatus (Olivier, 1804)

Lanistes bolteni (Chemnitz, 1786)
Lanistes boltenianus (Röding, 1798)
Ampullaria carinata Olivier, 1804

Type locality: Egypt, Alexandria.
Distinctive characters (Fig. 4): The shell appears sinistral and is 25 × 35 mm in size. It is depressed to ovate conic. The whorls vary from evenly curved to angular and carinate. The umbilicus may be widely open or closed. The operculum is entirely corneous. The eggs are deposited on aquatic vegetation as gelatinous clusters (Brown 1994, Ibrahim et al. 1999).

Distribution (Fig. 1): The species is widely distributed in the Nile Valley and Delta (Sattmann & Kinzelbach 1988, Brown 1994, El-Shazly et al. 2012, Abd El-Wakeil et al. 2013). It was also found in Sinai (El-Kady et al. 2000, Ibrahim et al. 2006).
Parasitological importance: The snail was reported to transmit the rat lung-worm *Parastrongylus cantonensis* in Egypt (Yousif & Ibrahim 1978, El-Shazly et al. 2002a, Ibrahim 2007). Experimental infection with the parasite was successful, and the first stage larvae reached the infective third stage in the snail (Yousif & Lammler 1975).

Remarks: *Lanistes carinatus* (Oliver) and *L. bolteniatus* (Röding) were previously regarded as distinct species. However, according to Brown (1994) and Abdelmordy et al. (1997) they are conspecific.

4. *Pila ovata* (Olivier, 1804) 
*Ampullaria ovata* Olivier, 1804

**Type locality:** Egypt, Alexandria.

**Distinctive characters** (Fig. 5): The shell is dextral, when fully grown 115 × 108 mm in size. The whorls are more or less regularly convex. The operculum has a calcareous inner layer. Females deposit clusters of eggs, with calcareous capsules, just above the water surface amongst stones or in crevices in the soil. The male copulatory organ is comparatively elaborate (Berthold 1989, Brown 1994).

**Distribution** (Fig. 1): Besides the Nile Valley in Upper Egypt (Abd El-Wakeil et al. 2013) and Lake Nasser (Ibrahim et al. 1999), isolated populations were reported in Fayoum (Ibrahim et al. 1999) and Siwa Oasis (Crawford 1949, Ibrahim 1975, Sattmann & Kinzelbach 1988).

**Parasitological importance:** Unknown.

**Family Valvatidae Gray, 1840**

Valvatids have dextral discoid to ovate smooth shells. Their fully grown shell is less than 10 mm in height and has a large umbilicus. The aperture is circular and the operculum is multispiral. Valvatids are hermaphroditic and oviparous. They have a feather-like gill and a tentacle-like appendage on the mantle edge, on the right side. The central tooth has no basal denticles (Brown 1994).

5. *Valvata nilotica* Jickeli, 1874
*Valvata saulci* Bourguignat, 1853

**Type locality:** Egypt, Alexandria.

**Distinctive characters** (Fig. 6): The shell, of 3.3 × 5.0 mm, is colourless or pale brown, depressed with very fine ribs and spiral sculpture. The spire height and umbilicus size are highly variable (Innes 1884, Brown 1994).

**Distribution** (Fig. 1): The species was reported in the Nile Valley and Delta (Sattmann & Kinzelbach 1988, Brown 1994, Abd El-Wakeil et al. 2013). It was found also in Lake Nasser (Sattmann & Kinzelbach 1988, Ibrahim et al. 1999) and Sinai (Tchernov 1971, El-Kady et al. 2000).

**Parasitological importance:** Unknown.

**Family Hydrobiidae Troschel, 1857**

Hydrobiids have smooth colourless shells, less than 10 mm in height, and higher than wide. The operculum is ovate, entirely conensive and paucispiral. The radula has no accessory plate. This family is represented in Egypt by *Hydrobia musaensis* Frauenfeld, 1855 and *Ecrobia ventrosa* (Montagu, 1803) (Brown 1994). A third species, *Hydrobia aponensis* Martens, 1858, was reported from Fayoum and Upper Egypt (Gardner 1932, Gauthier 1980). Most probably it is now extinct in the country (Ibrahim et al. 1999). Recently this species was reported from Assiut (Abd El-Wakeil et al. 2013), but as mentioned before the results of this survey need to be confirmed by further studies.
6. *Hydrobia musaensis* Frauenfeld, 1855

**Type locality**: North Africa.

**Distinctive characters** (Fig. 7): Compared with other species of the genus this snail has a small, relatively broad shell, consisting of six whorls. The whorls are rather flat and the sutures are shallow (*BROWN* 1994, *IBRAHIM* et al. 1999). The shell length is 3 mm, while the width of the body whorl reaches 1 mm. The aperture is oval but asymmetrical, the outer lip being more rounded than the inner one (*TCHERNOV* 1971).

**Distribution** (Fig. 1): It was originally described by *FRAUENFELD* in 1855 from Suez. It inhabits fresh and brackish waters in the Nile Delta, Fayoum, Sinai (*CRAWFORD* 1949, *TCHERNOV* 1971, *VAN DAMME* 1984, *ABO-MADYAN* et al. 2005), Quseir, and Siwa Oasis (*CRAWFORD* 1949, *SATTMANN* & *KINZELBACH* 1988).

**Parasitological importance**: Unknown.

7. *Ecrobia ventrosa* (Montagu, 1803)

* Turbo ventrosus* Montagu, 1803
* Hydrobia ventrosa* (Montagu, 1803)
* Ventrosia ventrosa* (Montagu, 1803)

**Type locality**: Europe.

**Distinctive characters** (Fig. 8): The shell is 3–4 × 1.5–2 mm in size. It has 5–7 convex whorls. It is slender, with deep and distinctly oblique suture. The aperture is rounded above (or only slightly pointed). The lip is weakly developed. The shell is very finely striated and translucent, glossy yellow-brown, the colour being usually hidden by a matt deposit (*BROWN* 1994, *IBRAHIM* et al. 1999).

**Distribution** (Fig. 1): The species inhabits brackish waters of the northern lakes of the Delta (*IBRAHIM* et al. 1999), Lake Qarun in Fayoum (*VAN DAMME* 1984), and Siwa Oasis (*CRAWFORD* 1949, *IBRAHIM* 1975, *SATTMANN* & *KINZELBACH* 1988).

**Parasitological importance**: Unknown.

**FAMILY BITHYNIIDAE TROSCHEL, 1857**

The bithyniid shell is small to medium-sized (less than 15 mm in height). It is dextral and depressed to ovately conical. The aperture is fairly large, with a continuous thickened and often dark peristome. The operculum is thick and calcareous with outer concentric area and usually a spiral nucleus. In fully grown specimens the operculum fits into the peristome. The exhalent siphon (epitaenial fold) is usually present on the right side, in connection with the ciliary feeding mechanism. The snails are oviparous. The penis is equipped with an accessory appendage and duct (hold-fast organ). Egg capsules have exit holes closed by plugs. The central radular tooth is usually provided with basal denticles (*BROWN* 1994). According to *BROWN* (1994), there is no species of *Bithynia* known to occur in Egypt, and the family is represented by only one species, *Gabbiella senaariensis* (*Küster*, 1852) (*BROWN* 1994). However, there are some reports of the genus *Bithynia* from Egypt (*GARDNER* 1932, *TOHAMY* & *MOHAMED* 2006, *ABD EL-WAKEIL* et al. 2013). Such reports need to be confirmed by more detailed taxonomic studies.

8. *Gabbiella senaariensis* (*Küster*, 1852)

* Paludina senaariensis* *Küster*, 1852

**Type locality**: Sudan, Senaar.

**Distinctive characters** (Fig. 9): The shell is 8.5 × 5.5 mm in size. The spire is distinctly higher than the aperture, and is often decollate. In the fully grown shell the total of four whorls are completed at about 5 mm height (*BROWN* 1994, *IBRAHIM* et al. 1999).

**Distribution** (Fig. 1): The species was reported from the Nile Valley and Delta (*SATTMANN* & *KINZELBACH* 2006).
FAMILY THIARIDAE TROSCHEL, 1857

The thiarid shell is small to large, dextral, ovately to narrowly conical. The fully grown shell is more than 10 mm in height. It is commonly thick-walled and strongly sculptured. The basal margin of aperture is entire. The operculum is entirely corneous, and is either paucispiral or concentric with spiral nucleus. The mantle edge is either with or without papillae. The snails are commonly ovoviviparous; species of some genera are parthenogenic. The offspring develops in a brood pouch. The males lack penis, except in *Tiphobia*, and are rare or unknown for some species. Thiarids inhabit fresh and brackish waters (*Brown* 1994). Results of molecular studies have shown the family to be polyphyletic (*Lydeard* et al. 2002).

**9. Cleopatra bulimoides** (Olivier, 1804)

*Cyclostoma bulimoides* Olivier, 1804
*Cleopatra cyclostomoides* (Küster, 1852)

**Type locality:** Egypt, Alexandria.

**Distinctive characters** (Fig. 10): It is a very variable, polytypic species including many named forms whose conspecificity needs to be tested by further evidence, especially genetic. The typical form measures 16 × 9 mm, while the slender form measures 22 × 9 mm. The typical form has lower whorls, evenly curved and smooth, carinations are confined to the apical whorls; usually with one or more dark brown bands (*Brown* 1994).


**Parasitological importance:** It is the first intermediate host of the digenean *Prohemistomum vivax* which parasitises the Egyptian kite (*Abdel-Azim* 1933) and may infect humans (*Nasr* 1941, *Witenberg* 1964). It also transmits the paramphistome *Gastrodiscus aegyptiacus* – an intestinal parasite of African equines (*Malek* 1971, *Fahmy et al.* 1977). In addition, the snail was found to be naturally infected with larvae of *P. cantonensis* in Egypt (*El-Shazly et al.* 2002a, *Ibrahim* 2007).


**10. Melanoides tuberculata** (O. F. Müller, 1774)

*Melania tuberculata* O. F. Müller, 1774

**Type locality:** India, Coromandel Coast.

**Distinctive characters** (Fig. 11): The shell measures 27 × 9 mm (complete shell with 11 whorls). However, some morphs are smaller (less than 20 mm high) or larger (nearly 50 mm high). The shell is narrowly conical, and the whorls are regularly increasing, moderately convex, with ribs and spiral ridges forming a highly varied sculpture, though commonly tuberculate. The shell colour is often pale with reddish-brown patches aligned with the ribs (making flame-like markings), sometimes uniformly brownish. The central tooth has 7–12 cusps (*Brown* 1994). Conchological variations could be due partly to parthenogenic propagation of clones, as some populations are predominantly or perhaps entirely females.
However, males occur quite commonly in some localities, for example in Israel and Sinai (Livshits et al. 1984, Heller & Farstey 1990). It is noteworthy that males can be recognised by their reddish testis showing as a dark area in the upper whorls (Heller & Farstey 1989).

**Distribution (Fig. 1):** The snail is tolerant of moderate brackishness in coastal localities and abundant in shell deposits representing the last molluscan faunas where inland lakes have entirely evaporated or have become too saline for freshwater organisms (Brown 1994). It is widely distributed in the Nile Valley and Delta (Youisf et al. 2009, Abd El-Wakeil et al. 2013). Also, it was reported from Lake Manzala, Wadi El-Natroun, Wadi El-Hammamad (El-Hammamat), Quseir, and Baharia, Dakha, Farafra, Kharga, and Siwa Oases (Sattmann & Kinzelbach 1988). Besides, it was reported from Sinai (tchernov 1971, El-Kady et al. 2000, ibrahim et al. 2006, Youisf et al. 2009).

**Parasitological importance:** At least 37 species of digeneans are known to be transmitted by *M. tuberculata* worldwide. Eleven of those parasites may affect human health (Pinto & de Melo 2011). Besides, it was reported to transmit the nematode *P. cantonensis* in Egypt (Ibrahim 2007).

**FAMILY MELANOPSIDAE H. ADAMS ET A. ADAMS, 1854**

Melanopsids are medium to large snails with fully grown shells more than 10 mm in height. The shell is ovately or more narrowly conical, smooth or strongly sculptured. The operculum is paucispiral with basal nucleus. The mantle edge is smooth. Both sexes are present. The snails are oviparous (Morrison 1954, Houbrick 1988, Brown 1994).

**11. *Melanopsis praemorsa* (Linnaeus, 1758)**

*Buclinum praemorsum* Linnaeus, 1758

**Type locality:** South Europe.

**Distinctive characters (Fig. 12):** The shell measures 20 × 11 mm. It is ovate, with a short spire, and a large elongated body whorl. The outer lip of the aperture is thin, but the inner lip has a smooth parietal callus, thickened into a pad over the parietal wall. It is either smooth or with strong spiral ridges or ribs. Four species of *Melanopsis* were distinguished in Northwest Africa based on shell characters by Chevallier (1969), and two by Dupouy et al. (1980). There is no direct evidence of genetic differences between these different shell morphs and they all seem to belong to a single, circum-Mediterranean superspecies (Glaubrecht 1992, 1993).

**Distribution (Fig. 1):** The snail inhabits various waterbodies; it can tolerate high temperature, desiccation and high content of dissolved chemicals (Dupouy 1979, Dupouy et al. 1980, Meier-Brook et al. 1987). In Egypt, it was found only in Sinai (tchernov 1971).

**Parasitological importance:** Unknown.

**FAMILY POTAMIDIDAE H. ADAMS ET A. ADAMS, 1854**

Potamidids are medium to large snails with fully grown shells more than 10 mm in height. The shell is dextral, narrowly conical, and sculptured. A notch is present at the basal margin of the aperture. The operculum is multispiral. The family is restricted to brackish waters, usually at the coast (Brown 1994). Early studies suggested that the family was polyphyl-
etnic (Houbrick 1988, 1991), but more recent studies showed it to be monophyletic (Lydeard et al. 2002, Strong et al. 2011).

12. Potamides conicus (de Blainville, 1829)

Cerithium conicum de Blainville, 1829
Pirenella conica (de Blainville, 1829)

Type locality: Mediterranean region.

Distinctive characters (Fig. 13): The shell is medium-sized, of 20 × 17 mm. It has 2–4 spiral rows of nodules. It is variously coloured with white, grey and brown. The mantle edge with papillae (Demian et al. 1966, Brown 1994).

Distribution: The species occurs patchily along coastal habitats in the eastern and southern Mediterranean, the Red Sea and the Persian Gulf, as well as in Libya, Sardinia and Malta (TarascheWsKi & Paperna 1981). In Egypt (Fig. 1), it is common in the brackish lakes of the Nile Delta (Martin 1959), and in inland saline lakes of the Siwa Depression (Crawford 1949, Ibrahim 1975) and Lake Qarun in Fayoum (Demian et al. 1963, Sattmann & Kinzelbach 1988). In Sinai, P. conicus has been reported from the Bardawil lagoon, the Bitter Lakes and Lake Timshah in the Suez region (Tillier & Bavay 1905, Martin 1959, Demian et al. 1963, Barash & Danin 1971, 1972/1973, Por 1971), and from the mangrove lagoons and the pool of Dahab on the coast of the Gulf of Aqaba (Por & Dor 1975, Por et al. 1977).

Parasitological importance: Worldwide, this snail acts as the first intermediate host of many species of the digenean families Heterophyidae, Echinostomatidae, Microphallidae, Notocotylidae, Haplororidae, Haplosplanchnidae, Cyathocotylidae, and Strigeidae (TarascheWsKi & Paperna 1981). In Egypt, the most important parasite transmitted by the snail is H. heterophyes (El-Gindy & Hanna 1963, TarascheWsKi & Paperna 1982).

PULMONATES

They are non-operculate snails with thin-walled shells. They lack gills, and the mantle cavity serves as an air-breathing organ (Brown 1994).

FAMILY PHYSIDAE FITZINGER, 1833

Physids are medium-sized sinistral snails with sharply pointed spire and smooth whorls. The tentacles are long and slender. The foot is pointed. The pseudobranch is absent. The mantle is expanded to fringy, simple penis, oblique rows of radular teeth, and the lack of both pseudobranch and blood haemoglobin. Their eggs are deposited in soft elongate masses unlike the capsules of Bulinus which are flatter, firm and circular in outline (Brown 1994). The classification of the family at any level is far from stability (Te 1980, Taylor 1988, Brown 1994).

13. Haitia acuta (Drarpinauda, 1805)

Physa acuta Drarpinauda, 1805
Physella acuta (Drarpinauda, 1805)
Physa heterostropha (Say, 1817)
Physa subopaca (Lamarck, 1822)

Type locality: France, River Garonne.

Distinctive characters (Fig. 14): The shell measures 15 × 9 mm, and resembles that of Bulinus truncatus (Ibrahim et al. 1999). For quick identification it could be distinguished from B. truncatus by the following characters: the shell is stronger, more conical and pointed at the spire, whorls without shoulder angle, twisted columella; the body whorl has no umbilicus, and upon crushing a living H. acuta a bluish blood oozes out, instead of the reddish coloured blood that comes out of B. truncatus (Brown 1994).

Distribution (Fig. 1): The snail is widely distributed in the freshwater habitats of the Nile Valley and Delta (Sattmann & Kinzelbach 1988, Abd El-Wakeil et al. 2013), Lake Nasser (Sattmann & Kinzelbach 1988, Ibrahim et al. 1999), Fayoum (Grabner et al. 2014), and Sinai (Tchernov 1971, El-Kady et al. 2000, Ibrahim et al. 2006).
Parasitological importance: *Haitia acuta* serves as intermediate host of several species of bird trematodes including schistosomes. An unconfirmed experimental infection with *Schistosoma haematobium* was reported (Magzoub & KasiM 1980), but there is no other evidence that it could be a host. The Egyptian strain of *H. acuta* was highly susceptible to infection with the digenean *Echinostoma liei* (Christensen et al. 1980). *Haitia acuta* proved to be susceptible to infection with the nematode *P. cantonensis*, and the first stage larvae reached the infective third stage (Yousif & Lammler 1975). Also, *H. acuta* naturally infected with *P. cantonensis* was reported in Egypt (Abo-Madyan et al. 2005).

**FAMILY LYMNAEIDAE RAFINESQUE, 1815**

Lymnaeids are small to large snails with dextral shells and pointed spires which vary widely in height. Their tentacles are flat and triangular. They lack both pseudobranch and blood haemoglobin. The two genital orifices are situated on the right side. The eggs are deposited in elongated gelatinous capsules. Hubendick (1951) considered many genera as synonyms of *Lymnaea*, but it seems justifiable to retain some of these groups, at least as subgenera (Brown 1994, Bargues & Mas-Coma 2005). Nowadays, five species of lymnaeids are present in Egypt: *Galba truncatula* (O. F. Müller, 1774); *Galba schirazensis* (Küster, 1863); *Lymnaea stagnalis* (Linnaeus, 1758); *Pseudosuccinea columella* (Say, 1817); and *Radix natalensis* (Krauss, 1848). Although *Lymnaea alexandrina* (Bourguignat, 1883) is synonymous (Kendall 1974) with *Radix natalensis*, some Egyptian authors still report *Lymnaea alexandrina* as a separate species (El-Bahi 1997, El-Shazly et al. 2002a). Some fossilised shells of *Radix peregra* (O. F. Müller, 1774) were collected from Kom Ombo in Upper Egypt (Leigh & Butzer 1968). Van Damme (1988) claimed that this species was not present in the country. *Radix auricularia* (Linnaeus, 1758) was recorded from Fayoum (Gardner 1932) and Kom Ombo (Leigh & Butzer 1968), but the lack of recent records may indicate that it is now extinct in Egypt (Ibrahim et al. 1999). Similarly, fossilised shells of *Stagnicola palustris* (O. F. Müller, 1774) were reported in Fayoum (Blanckenhorn 1901) and Kom Ombo (Leigh & Butzer 1968), but currently the snail is extinct in the country (Ibrahim et al. 1999). On the other hand, snails identified as *Stagnicola* sp. were collected from different sites in Upper Egypt and Lake Nasser by Kinzelbach in 1985 (Sattmann & Kinzelbach 1988).

**14. Galba truncatula** (O. F. Müller, 1774)

*Lymnaea truncatula* O. F. Müller, 1774

**Type locality:** Germany, Thangelstedt in Thuringia (near Weimar).

**Distinctive characters** (Fig. 15): The species is the smallest African lymnaeid (up to 11 × 6 mm), characterised by a spire equal in height to the aperture. The shell consists of 5–6 convex whorls. The collumellar margin is straighter and more broadly reflected than in *Radix natalensis* (Brown 1994, Ibrahim et al. 1999).

**Distribution** (Fig. 1): The snail inhabits small streams, seepages and temporary pools of rainwater (Brown 1994). It was recorded from the Nile Valley and Delta (Leiper 1916a, Pallary 1924, El-Shazly et al. 2002b, 2012); Baharia, Dakhla, and Kharga Oases (Nagaty et al. 1959, Frandsen 1983, Brown 1994); the New Valley (Abdel-Ghani 1965, 1976); and Sinai (El-Kady et al. 2000).

Fig. 14. *Haitia acuta*

Fig. 15. *Galba truncatula*
Parasitological importance: It is the most common intermediate host of Fasciola hepatica worldwide (Bargues et al. 2012). Egyptian populations of this snail were found to be naturally infected with Fasciola sp. (El-Shazly et al. 2002b, 2012). Successful experimental infections with F. hepatica and F. gigantica were obtained under laboratory conditions (Dar et al. 2003a, b, 2004). The snail also serves as an intermediate host of Paramphistomum daubneyi in some African countries (Dinnik 1962). However, this paramphistome was not reported to be present in Egypt (Sey 1977).

15. Galba schirazensis (Küster, 1863)

*Lymnaea schirazensis* Küster, 1863

**Type locality:** Iran, Shiraz.

**Distinctive characters** (Fig. 16): The species is phenotypically very close to *G. truncatula* and has always been confused with it (Bargues et al. 2011). Although many phenotypic characteristics may be helpful in preliminary identification, specimens can only be determined by sequencing of at least one of the molecular markers used, for example ribosomal DNA markers ITS-2 and ITS-1; mitochondrial DNA markers: 16SrDNA and COX1 (Bargues et al. 2012). However, some characteristics may be useful in identification of *G. schirazensis*: maximum shell height of 8.06 mm, regularly convex whorls, straight columella. The first bilateral teeth are mostly bicuspid. The praeputium/penis sheath length ratio is 1.20–2.23 (mean 1.60) (Bargues et al. 2011, 2012).

**Distribution** (Fig. 1): The snail is often amphibious. Mixed populations of *G. truncatula* and *G. schirazensis* have already been described (Bargues et al. 2012). The presence of this species in the Nile Delta has been confirmed (Bargues et al. 2011, Agramunt 2013). Parasitological importance: Unlike the morphologically similar *G. truncatula*, this species does not transmit *F. hepatica* (Bargues et al. 2011, 2012).

16. *Lymnaea stagnalis* (Linnaeus, 1758)

*Helix stagnalis* Linnaeus, 1758

**Type locality:** Europe.

**Distinctive characters** (Fig. 17): The species is commonly called the great pond snail. It has a large shell (45 × 25 mm) with slender and sharply pointed spire (Brown 1994). The shell consists of 6–8 whorls, with large, expanded body whorl. Aperture large, ovate, usually equal to half of the shell height. The umbilicus usually covered. Shell colour variable, the initial whorls usually darker.

**Distribution** (Fig. 1): The species was reported in the Nile Delta (El-Shazly et al. 2012), Kom Ombo (Leigh & Butzer 1968), Wadi El-Natroun (Abdel-Ghani 1953, Sattmann & Kinzelbach 1988), and Fayoum (Gardner 1932).

Parasitological importance: This species acts as an intermediate host of *F. hepatica* (Kendall 1949). It may transmit a range of digeneans in Europe and Russia, such as Molinella anceps (Yurlova et al. 2006, Kudlai 2009), Echinoparyphium recurvatum, Opisthiogyphyla tanae, Plagiorchis elegans, Diplostomum pseudospathaceum, Echinostoma revolutum, Trichobilharzia szidati (Soldanova et al. 2010), and Elaphostrongylus rangiferi (Skorping 1985). In Egypt, *L. stagnalis* was found to be naturally infected with *Fasciola* sp. (El-Shazly et al. 2012). Experimental infection of the snail with *P. cantonensis* was possible, and the first stage larvae reached the infective third stage in the snail (Yousif & Lammler 1975).
17. *Pseudosuccinea columella* (Say, 1817)

*Lymnaea columella* Say, 1817

**Type locality:** North America (probably near Philadelphia).

**Distinctive characters** (Fig. 18): The shell (up to 17 × 9 mm) is narrower than that of *L. natalensis*, and is easily distinguished from it by the close-set spiral lines, which result in a reticulated pattern. The shell consists of 6–8 whorls, with large, expanded body whorl. Aperture large, ovate, usually equal to half of the shell height. Umbilicus usually covered. Shell colour variable, the initial whorls usually darker.

**Distribution** (Fig. 1): This American species is now well-established in Africa. It was reported from the Nile Valley and Delta, Fayoum, and Sinai (NAGATY et al. 1959, AHMED & RAMZY 1999, EL-KADY et al. 2000, EL-SHAZLY et al. 2002a, 2012, ABD EL-WAKEIL et al. 2013, GRABNER et al. 2014).

**Parasitological importance:** The snail is a major intermediate host for *F. gigantica* in Egypt (BROWN 1994, LOTFY et al. 2001). Experimental infection of *R. natalensis* with *F. hepatica* was successful. Thus, *R. natalensis* can be considered a potential intermediate host of *F. hepatica* in Egypt (LOTFY et al. 2001, DAR et al. 2010). In addition, this species was found to be naturally infected with the larvae of *P. cantonensis* in Egypt (EL-SHAZLY et al. 2002a, IBRAHIM 2007). In addition, experimental infection with the parasite was possible, and the first stage larvae reached the infective third stage in the snail (YOUSIF & LAMMLER 1975).

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18. *Radix natalensis* (Krauss, 1848)

*Limnaeus natalensis* Krauss, 1848

*Lymnaea natalensis* (Krauss, 1848)

*Limnaea alexandrina* Bourguignat, 1883

*Lymnaea alexandrina* (Bourguignat, 1883)

*Lymnaea cailliaudi* Bourguignat, 1883

**Type locality:** South Africa, Natal.
FAMILY PLANORBIDAE RAFINESQUE, 1815

Planorids are small to medium-sized snails with long slender tentacles and reddish blood containing haemoglobin. The pseudobranch is present. The shell and anatomy are diverse, especially the male copulatory organ and prostate gland (BROWN 1994).

SUBFAMILY PLANORBINAEE RAFINESQUE, 1815

Members of this subfamily usually have pseudodextral discoid or lenticular shell. The shell appears dextral, because it is carried inverted so that the side corresponding to the apical side in other snails is the lower side of the planorbine shell. Also, it is considered by some authors as dextral shell but with sinistral animal. The pseudobranch has the form of a simple lobe. One or more prostatic tubules open either directly into the sperm duct or into a separate prostatic duct. The structure of the copulatory organ varies, though it has no ‘ultrapenis’ of the Bulininae (BROWN 1994). Eight species of planorines have been confirmed to be present in Egypt: *Africanogyrus coretus* (de Blainville, 1826), *Biomphalaria alexandrina* (Ehrenberg, 1831), *Biomphalaria glabrata* (Say, 1818), *Gyraulus costulatus* (Krauss, 1848), *Gyraulus ehrenbergi* (Beck, 1837), *Planorbella duryi* (Wetherby, 1879), *Planorbis planorbis* (Linnaeus, 1758) and *Segmentorbis angustus* (Jickeli, 1874). IBRAHIM et al. (1999) treated *Afrogyrus coretus* (de Blainville, 1826) as the same species, but BROWN (1994) synonymised the two names. *Biomphalaria pfeifferi* (Krauss, 1848) was reported from Fayoum (GARDNER 1932, IBRAHIM et al. 1999, ABO-MADAYAN et al. 2005), and some sites in Lower Egypt (IBRAHIM et al. 1999). However, the snail was not found during our previous malacological survey in Egypt (LOTFY et al. 2005). In addition, it was not mentioned by BROWN (1994) to be present in Egypt. Its occurrence in the country needs to be confirmed by a taxonomical study. *Segmentorbis eussoensis* (Preston, 1912) was reported once to occur in Egypt (MANDAH-IBAROTH 1973b), but further studies are needed to confirm that it is not synonymous with *Segmentorbis angustus* (BROWN 1994).

19. Africanogyrus coretus (de Blainville, 1826)

*Planorbus coretus* de Blainville 1826
*Afrogyrus coretus* (de Blainville, 1826)
*Anisus oasiensis* Demian, 1962
*Afrogyrus oasiensis* (Demian, 1962)

**Type locality**: Senegal, Podor.

**Distinctive characters** (Fig. 20): The shell is very small, brownish yellow, discoid, flat on both sides; when fully grown it is 0.7 × 2.1–2.5 mm, with 4–5 slowly increasing whorls. The aperture is small, slightly broader than high and not modified by any conspicuous carina. The peristome is simple and very thin. The sculpture consists of fine, close-set, curved growth lines. The umbilicus diameter equals about half of the total shell diameter. The penis has a subterminal orifice and a cup-like stylet (BROWN 1994, IBRAHIM et al. 1999).

**Distribution** (Fig. 1): This snail was reported from Lower Nile (IBRAHIM et al. 1999), Dakhla and Kharga Oases (DEMIAN 1962, VAN DAMME 1988).

**Parasitological importance**: Unknown.

20. Biomphalaria alexandrina (Ehrenberg, 1831)

*Planorbus alexandrinus* Ehrenberg, 1831
*Planorbus boissyi* Potiez et Michaud, 1838

**Type locality**: Nile Delta between Alexandria and Rosetta.
Distinctive characters (Fig. 21): The shell measures 4.8 × 14.2 mm. It is thin to rather thick and sometimes fragile; it has about 5 spirally coiled whorls. It is umbilicated on the left side and has a more depressed spire with a deep suture on the right side. The sculpture includes slightly curved regular growth lines. The aperture is suboval, distinctly wider than high. The inner lip is closely applied to the columella. The umbilicus is open and wide. The prostatic duct and preputial gland are absent (BROWN 1994, IBRAHIM et al. 1999).

Distribution (Fig. 1): Originally, this snail was restricted to the Nile Delta. Starting from the late 1970s, this snail was found at increasing distances upstream as far as Lake Nasser at Aswan and Abu Simbel (SATTMANN & KINZELBACH 1988, VRIJENHOEK & GRAVEN 1992, LOTFY et al. 2005). The changes in the hydrology of the Nile Valley and Delta, the controlled water flow, and the new irrigation networks following construction of the Low and High Dams at Aswan, in 1902 and 1968, respectively, have resulted in providing the snail with an increasing number of appropriate habitats (EL-GINDY 1957, VRIJENHOEK & GRAVEN 1992). Nowadays, the species is widely distributed in the Nile Valley and Delta. Also, it was found in Lake Nasser, Wadi El-Natroun (SATTMANN & KINZELBACH 1988), and Sinai (EL-KADY et al. 2000, IBRAHIM et al. 2006).

Parasitological importance: This species serves as the intermediate host of Schistosoma mansoni in Egypt (LEIPER 1916b, EL-GINDY 1957, LOTFY 2009, ABOU-EL-NAQA 2013). Biomphalaria alexandrina was reported to be naturally infected with F. gigantica (DAMALI & EL-SAYAD 1995) and Fasciola sp. (EL-SHAILY et al. 2002b). However, the snail was not susceptible to infection with F. gigantica under experimental conditions (MOHAMED et al. 1998). Also, it was found to be naturally infected with Echinostoma liei (JEYARASINGAM et al. 1972). The species was found to be naturally infected with larvae of P. cantonensis in Egypt (EL-SHAILY et al. 2002a, IBRAHIM 2007). Besides, experimental infection with the parasite was successful, and the first stage larvae reached the infective third stage in the snail (YOUSIF & LAMMLER 1975).

21. Biomphalaria glabrata (Say, 1818)

Planorbis glabratu Say, 1818

Type locality: South America.

Distinctive characters (Fig. 22): The shell (5–8 × 20–27 mm) is widely umbilicate and larger than that of B. alexandrina. The number of whorls increases more rapidly in B. alexandrina than in B. glabrata. Unlike B. alexandrina, B. glabrata has a renal ridge which is not observed in any African Biomphalaria species (BROWN 1994, IBRAHIM et al. 1999).

Distribution (Fig. 1): In the early 1980s, B. glabrata was reported to be introduced into the Egyptian freshwater habitats in the Nile Delta (PFLUGER 1982, YOUSIF et al. 1996, 1998a, b, KRISTENSEN et al. 1999, CAMPBELL et al. 2000).

Parasitological importance: This species is the major intermediate host for S. mansoni in the Neotropics (POINTIER et al. 2005). Experimentally, B. glabrata was found to be susceptible to the Egyptian strains of S. mansoni but showed lower susceptibility than B. alexandrina. Unfortunately, the duration of cercarial shedding was longer and the numbers of cercariae shed per snail were higher in B. glabrata than in B. alexandrina (YOUSIF et al. 1998b). The snail was reported to be infected with the larvae of P. cantonensis under natural conditions (EL-SHAILY et al. 2002a). Also, experimental infection with the parasite was successful, and the first stage larvae reached the infective third stage in the snail (YOUSIF & LAMMLER 1975). The NIH strain of B. glabrata could easily be infected with the Egyptian strain of Echinostoma liei in the laboratory (JEYARASINGAM et al. 1972). The presence of snails naturally infected with this echinostome needs to be confirmed.

22. Gyraulus ehrenbergi (Beck, 1837)

Planorbis ehrenbergi Beck, 1837

Type locality: Egypt.

Distinctive characters (Fig. 23): The shell is discoid, flat on both sides; when fully grown it is 1.7 × 6.8 mm in size, in most cases composed of 3–4 rapidly increasing whorls. The shell often has an angled periphery (BROWN 1994, IBRAHIM et al. 1999).
23. *Gyraulus costulatus* (Krauss, 1848)

*Planorbis costulatus* Krauss, 1848

**Type locality:** South Africa, Natal, Umgeni River.

**Distinctive characters** (Fig. 24): The shell measures 1.5 × 6.6 mm. The typical form is depressed, with rapidly increasing whorls and strong, regularly-spaced ribs. The periphery bears a carina with a periosotral fringe. The shape of the whorls varies widely (BROWN 1994).

**Distribution** (Fig. 1): The snail is found mainly in the Nile Valley and Delta (SATTMANN & KINZELBACH 1988, BROWN 1994, ABD EL-WAKEIL et al. 2013).

**Parasitological importance:** Unknown.

24. *Planorbella duryi* (Wetherby, 1879)

*Planorbis duryi* Wetherby, 1879

*Helisoma duryi* (Wetherby, 1879)

**Type locality:** North America.

**Distinctive characters** (Fig. 25): During the earlier fieldwork, it was noticed that some Egyptian field workers misidentified *P. duryi* as *B. glabrata* (LOTFY et al. 2005). There were similar reports of misidentification of *P. duryi* as *Biomphalaria* in other parts of the world. The typical form of *P. duryi* can be distinguished from *Biomphalaria* spp. by the presence of prostatic duct and reproductual gland, higher shell (7 × 18 mm), more regular whorls, flat surface within the umbilicus, and deeply concave upper side (VAN BRUGGEN 1974, APPLETON 1977, IBRAHIM et al. 1999).

**Distribution** (Fig. 1): The species was introduced into Egypt (PFLUGER & ROUSHDY 1980). It was studied in field trials as a competitor of intermediate hosts of schistosomes in Egypt (FRANDSEN & MADSEN 1979). It was first recorded in Egypt in 1980 and 1981, a few kilometres north of Cairo (PFLUGER & ROUSHDY 1980, ROUSHDY & EL-EMAM 1981). In the early 1990s, the snail was reported to be present further north into the Nile Delta (YOUSIF et al. 1993). The distribution of *P. duryi* was reported to be further extended as it was found in Kafr El-Sheikh (North-Central Delta), Ismailia (Eastern Delta), Aswan (LOTFY et al. 2005), and Lake Nasser (IBRAHIM et al. 1999). Nowadays, the species is widely distributed in the Nile Valley and Delta. Also, it was found in Al-Salam Irrigation Canal, North Sinai (IBRAHIM et al. 2006).

**Parasitological importance:** Experimental infection of *Planorbelia* sp. with *P. cantonensis* was successful, and the first stage larvae reached the infective third stage in the snail (YOUSIF & LAMMLER 1975).
25. *Planorbis planorbis* (Linnaeus, 1758)

*Helix planorbis* Linnaeus, 1758  
*Planorbis umbilicatus* O. F. Müller, 1774  
*Planorbis marginatus* Draparnaud, 1805  
*Planorbis submarginatus* de Cristofori et Jan, 1832  
*Planorbis subcarinatus* Pfeiffer, 1894  
*Planorbis philippii* Germain, 1908

**Type locality:** Europe.  
**Distinctive characters** (Fig. 26): The shell is more than 2 mm in height (2.5 × 10 mm), characterised by a distinct angle below the periphery. The whorls at the apex form a depression that is almost as deep as the suture. Thus the suture on the right side appears more deeply impressed than on the left, showing a shallow umbilicus (Brown 1994, Ibrahim et al. 1999).

**Distribution** (Fig. 1): This is the only species of *Planorbis* found in Egypt (Brown 1994). Other species recorded by Egyptian workers (Hiekal & El-Sokkary 1987, El-Bahy 1997, El-Khayat et al. 2011) are either synonymous or misidentified. It was reported from the Nile Valley and Delta, Lake Manzala, Wadi El-Natroun, and Siwa Oasis (Crawford 1949, Hiekal & El-Sokkary 1987, Sattmann & Kinzelbach 1988, El-Bahy 1997, El-Khayat et al. 2011).

**Parasitological importance:** Unknown.

Fig. 26. *Planorbis planorbis*

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26. *Segmentorbis angustus* (Jickeli, 1874)

*Segmentina angustus* Jickeli, 1874

**Type locality:** Ethiopia, Hamasen Province, Toquor River at Mekerka (west of Asmara).  
**Distinctive characters** (Fig. 27): The shell is lenticular, with convex upper side and flat underside; its size is 2 × 5.5 mm. When fully grown it is about 3 times broader than high, with usually no more than 3 sets of internal septa (Brown 1994).

**Distribution** (Fig. 1): Egypt is not a typical area for this species, and its major distribution is further south in Africa (Brown 1994). It was recorded from Lower and Upper Nile in Egypt. It was found also in Lake Nasser, Lake Qarun, the edge of Lake Maryut, and west of Alexandria, but it is rare in these sites (Van Damme 1984, Sattmann & Kinzelbach 1988, Ibrahim et al. 1999).

**Parasitological importance:** Unknown.

SUBFAMILY BULININAE FISCHER ET CROSSE, 1880

Bulinines have small to medium-sized sinistral shells, reaching 25 mm in height or diameter. The shell is either spired (*Bulinus*) or discoid (*Indoplanorbis*). The pseudobranch is large, deeply folded, and highly vascularised. The penis does not project freely into the penis sheath, but is a long and coiled eversible tube called “ultra-penis”, attached at both upper and lower ends of the sheath. Numerous prostatic tubules are concentrated into a compact organ. Only two genera are known; *Bulinus* found mainly in Africa and *Indoplanorbis* in Asia. However, *Indoplanorbis* was reported, probably introduced, in Africa (Brown 1994).

Only two species: *Bulinus forskalii* (Ehrenberg, 1831) and *Bulinus truncatus* (Audouin, 1827), are known to exist in Egypt (El-Gindy & Rushdi 1962, Brown 1994). Another two species were mentioned by Ibrahim et al. (1999): *Bulinus guernei* (Dautzenberg, 1890) and *Bulinus natalensis* (Küster, 1841). Analyses of morphology and enzymes indicated that *B. guernei* was conspecific with and indistinguishable from *B. truncatus* (Brown et al. 1986, Jelnes 1986). *Bulinus natalensis* was not mentioned among the Egyptian freshwater snails (Brown 1994). The species is distributed mainly in eastern Africa from Ethiopia to the coastal region of Natal (Brown 1994). Based on the data accumulated during our previous malacological survey in Egypt (Lotfy et al. 2005), and after a comprehensive literature review we concluded that the presence of *B. natalensis* in the country needed to be confirmed by more studies.
27. *Bulinus forskalii* (Ehrenberg, 1831)
*Isidora forskalii* Ehrenberg, 1831
*Pyrgophysa forskalii* (Ehrenberg, 1831)
*Physa micropleura* Bourguignat, 1876

**Type locality:** Egypt, Damietta.

**Distinctive characters** (Fig. 28): The shell measures 17 × 5.4 mm (smaller in many localities). The spire is high and slender in fully grown specimens. The whorls are shouldered to some degree and sometimes carinate. Strong ribs are commonly present and may bear fringes of periostracum. The copulatory organ with penis sheath is almost equal in length to the preputium (Brown 1994).

**Distribution** (Fig. 1): The snail is essentially Afrotropical, reaching the Mediterranean only in Lower Egypt (Van Damme 1984). It was reported from the Nile Valley and Delta, Lake Nasser, Fayoum, and Kharga Oases (Sattmann & Kinzelbach 1988, Ibrahim et al. 1999, Ab Madyan et al. 2005).

**Parasitological importance:** Despite some inconclusive reports, there is no confirmed locality for transmission of *S. haematobium* by *B. forskalii* worldwide (Brown 1994). However, the snail can serve as an intermediate host for other schistosomes, like *Schistosoma bovis* (Kinoti 1964), *Schistosoma guineensis* (Gow et al. 2004), and *Schistosoma marginbowiei* (Wright et al. 1979a). It also serves as an intermediate host for many species of paramphistomes, including *Calicophoron microbothrium* (Graber & Daynes 1974), *Carmyerius* sp. (Wright et al. 1979b), *Gastroidiscus aegyptiacus* (de Kock & Wolmarans 2005), *Paramphistomum philerouxi* (Dinnik 1961), and *P. togolense* (Albaret et al. 1978). In Egypt, the parasites transmitted by this snail need to be confirmed.

28. *Bulinus truncatus* (Audouin, 1827)
*Physa truncata* Audouin, 1827
*Physa alexandrina* Bourguignat, 1876

**Type locality:** Egypt.

**Distinctive characters** (Fig. 29): The shell measures 9.5 × 6 mm (slender form), 9.5 × 7.5 (broad form), and sometimes is almost 20 mm high (Brown 1994). The type specimen is small (only 5 mm high), with a depressed spire (Bouchet & Danrigal 1982). This species is characterised by a combination of characters which is not easy to define: the uneven curvature of the whorls tends to produce a blunt shoulder, the columellar margin is usually narrow and more or less twisted, and the shell colour is pale. The spire height, shape of columellar margin and umbilicus size vary widely. The spire is shorter than the aperture and the apex ranges from obtuse to rather elevated. The umbilicus varies from small to rather big. The aperture varies from elongate ovate to ovoid and almost round (Brown 1994, Ibrahim et al. 1999).

**Distribution** (Fig. 1): The species is widely distributed in the Nile Valley and Delta, and Lake Nasser (Sattmann & Kinzelbach 1988, Ibrahim et al. 1999, Abd El-Wakeil et al. 2013). It was also found in Sinai (El-Kady et al. 2000, Ibrahim et al. 2006).

**Parasitological importance:** It serves as the intermediate host of *S. haematobium* (Leiper 1915). It was reported to serve as an intermediate host of *F. hepatica* in Tunisia (Hamed et al. 2009, 2014). This species is the main intermediate host of the paramphistome *Calicophoron microbothrium* in North Africa including Egypt (Dinnik 1965, Rysavy et al. 1974). This parasite is the most widely reported species causing harm to domestic livestock in Africa (Eduardo 1983). *Bulinus truncatus* was found to be naturally infected with larvae of *P. cantonensis* in Egypt (El-Shazly et al. 2002a). Experimental infection with this nematode was successful, and the first stage larvae reached the infective third stage in the snail (Yousif & Lammler 1975).
CONCLUDING REMARKS

This review covers a total of 28 snail species currently present in freshwater habitats of Egypt. These species include two which were introduced during the last few decades. The presence of other snail species in the country is questionable and needs to be confirmed by detailed taxonomic studies. The Egyptian freshwater snail fauna and its geographical distribution are changing over time, and some snails are now extinct in the country, and therefore it is crucial to update the available information regarding the surviving species and their biogeography.

Of 28 snail species found in Egypt, 15 can transmit human and animal parasites. The nematode *P. cantonensis* is transmitted by *L. carinatus, C. bulimoide*, *M. tuberculata, H. acuta, L. stagnalis, R. natator*, *B. alexandrina, B. glabrata, P. duryi, P. planorbis and B. truncatus*; echinostomes by *P. conicus, H. acuta, L. stagnalis, P. columella, B. alexandrina and B. glabrata*; fasciolids by *G. truncatula, L. stagnalis, P. columella, R. natator* and *B. alexandrina*. *H. heterophyes* is transmitted by *P. conicus*. Paramphistomes are transmitted by *C. bulimoide*, *B. forskalii and B. truncatus*; schistosomes by *L. stagnalis, B. alexandrina, B. glabrata, B. forskalii* and *B. truncatus*.

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