قســـــم . علم الحيـــوان - كلية العـلوم - جا معـــة أســـيوط
رئيس القسم : أ.د / محمـد خليل النفـــار

ملاحظات على القوقع المصرى " بيللا ميا ينيكولور " مع الاشـــــاره الى وضعه التصنيفى

عبد المونيس بدينى ، منى حمـــادة

يتناول هذا البحث نوعا معينا من أنواع قواقع المياه العذبة الشائعة فى جمهورية مصر العربية وهو " بيللا ميا ينيكولور " وهـو ينتمى الى فصيلة " فيفيبارد ى " من طويئفة " أما ميات الخياشيم " من طائفة " البطنقد ميات " ويوجد هذا النوع موضوع الد راســه بالمجارى المائيةقليلة الحركة بالقرب من الشاطئ وزاحفا على القاع أو مطمورا جزئيا فى الطمى وبين الأحجار وهو لم يلق حقـــه من الد راسة من الباحثين السابقين رغم أنه يعمل كعائل متوسط لانواع معينة من الطفيليات الغير شائعة ولم تد ل صفات الصد فه وغطائها د لالة واضحة على أن هذا القوقع ينتمى الى جنس" فيفيبارس " أو جنس " بيللا ميا " ولكن د لت صفات الخصية فى الذكـر والقابلةالمنوية فى الانثى على انتماء هذا القوقع الى جنس " بيللا ميا " .

ولقد اختص هذا البحث بد راسة أهم مميزات الأجزاء الرخوة لهذا القوقع واتضح أنه معد للاغتذاء الهد بى لوجود مـــيزات الغذاء المهد ب والمزود بالغد د المخاطية فى قاع التجويف البرنسى ولوجود الزوائد الخيشوميه المنفصلة عنه نهاياتها وكـذلك لوجود المزراقين الشهيقى والزفيرى اللذين يسمحان بمرور تيار من الماء المحمل بجزئيات الغذاء الى د اخل التجويف البرنسى وخروجـــه منه .

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NOTES ON THE EGYPTIAN SNAIL VIVIPARUS UNICOLOR, WITH REFERENCE TO ITS TAXONOMIC STATUS

(With 9 Figures)

By

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SUMMARY

1- The present investigation deals with the description of the shell, operculum and soft parts of one of our local freshwater operculate snails, known as Bellamya unicolor (OLIVIER, 1801). Such study has not been carried out before.

2- The characters of the shell and operculum do not show clearly that the snail belongs to genus Bellamya as reported by MALEK and CHENG (1974, p. 69). But according to ROHRBACH (1937) and MANDAHL-BARTH (1954) the position and shape of the testis in the male and the shape of the receptaculum seminis in the female of the present species show that it can be put under the genus Bellamya.

3- The present species has the characteristic viviparid ciliated groove on the floor of the mantle cavity and leading to the mouth opening via the cephalic groove below the right tentacle. It has also the terminally free filamentous gills which together with mucous, aid in the collection of food particles. During life, there is an inhalent left siphon and an exhalent right one at the mantle edge, causing a continuous current of water within the mantle cavity. Therefore, the snail is adapted for ciliary feeding.

INTRODUCTION

A review of the literature on the freshwater snails reveals that most of the earlier authors have confined their study to the conchological characters with little attention to the soft parts. Such studies, however, have left malacologists, in some cases, in a lamentable disagreement about the classification and nomenclature of some forms. For instance, MALEK and CHENG (1974) have stated, "species belonging to the genus Viviparus, but occurring in Africa and Eastern Asia have been placed in another genus, Bellamya Jousseaume, for example Bellamya unicolor (oliver), which occurs in the Nile Valley". They have not referred to the basis upon which this displacement depends.

The list of the fresh water snail fauna in Egypt shows that the family Paludinidae or Viviparidae is credited with the genus Viviparus (MONTOFORT, 1810). According to PALLARY (1909), this genus was previously described as Paludina and Vivipara by LAMARK . In Egypt, there is only one species belonging to genus Bellamya which was previously treated by Oliver under the name Cyclostoma unicolor and Vivipara unicolor. LEIPER (1915) has briefly described, with illustrations, the external features of the shell of this species and referred to its occurrence in the River Nile and its branches. Since this publication, no other studies on the structure of the Egyptian mesogastropod Bellamya unicolor has been found.

A perusal of the literature on the two viviparid genera Viviparus and Bellamya,has shown that all the available distinguishing characters of each genus are confined to those of the shell and operculum. This is in spite of the fact that there are few publications on the internal anatomy of certain viviparid species. Among those, one can mention a paper on ciliary feeding mechanism in Viviparus viviparus (COOK, 1949) and another on the reproductive condition in two malayan freshwater viviparid gastropods (BERRY, 1974). None of these publications has dealt with a species of the genus Bellamya.

Accordingly, the present paper deals with the study of the shell, operculum and the taxonomically important characters of the soft parts of the Egyptian viviparid snail. Such study, besides adding to our knowledge about our local freshwater snail fauna, is the first trial to reveal the genus to which the species concerned belongs and to participate in the establishment of the main distinguishing characters of this genus.

MATERIALS AND METHODS

The specimens of Bellamya unicolor used in the present investigation were collected either regularly from a single site in Assiut Governorate or sporadically from different localities in Giza Gavernorate. They are most

commonly found in the region of connection between the River Nile and Ibrahimia canal at Assiut City. This area is characterized by the presence of sand, soil and small rocks and by the absence of water plants. The present species was also found in slow running roadside irrigation canals in different provinces. The snails were usually seen crawling on the bottom or embedded partially or completely in mud along the bank of the water canals, in association with one or more of the other genera common to our freshwater molluscan fauna as Physa, Cleopatra, Melania, lanistes and Unio. The snails of B. unicolor were collected, sorted out, cleaned and maintained in the laboratory by methods as those advocated by ABOU-ELA and BEDDINY (1969).

Full grown specimens were carefully observed during activity in the aquarium. The empty shell and operculum were separated and studied. The soft parts were carefully removed from the shell during life or after relaxation with different narcotising agents as menthol in absolute alcohol (HUBENDICK, 1954) and magnesium sulphate. The entire soft parts and the mantle cavity of both sexes were examined under a binocular dissecting microscope. All drawings were done with the help of the camera lucida.

RESULTS AND DISCUSSSION

The Shell And Its Operculum: (PL. I, Figs.: 1-6).

The species under investigation, has a true dextral, cone-shaped shell, measuring about 1.8 and 2.6 mm. in height and 1.4 & 1.7 mm. in width, in the average adult male and female respectively. It is rather thick, brown in colour and umbilicate. It consists of up to six whorls which are inflated with somewhat deep sutures running between them. Starting from the apex, the whorls increase gradually in size; the last or the body whorl being the largest one, about three quarters of the shell height. The sculpture of the shell is in the form of delicate uniform oblique striae or lines of growth. In some snails, few lines of growth of the shell become thickened forming ridges or varices indicating periods of dormancy during the growth of the visceral mass.

The shell aperture is ovate and bounded by a sharp entire peristome. It is about 1.1 & 0.9 mm. in its long and shrot axes respectively. The columellar margin is neither reflexed nor folded or twisted. The columella is relatively long and hollow.

The shell operculum is somewhat oval yellowish plate, attached to the dorsal surface of the posterior part of the foot. It has nearly the same outline of the shell aperture, with an outer clearly convex margin and an inner slightly convex one, with a central small knob. It has an anterior somewhat tapering narrow part, and a posterior broad one. It measures about 10 and 8 mm. in the long and short axes respectively. In surface view, the shell operculum appears to be consisting of an oval excenteric small nucleus which is surrounded by 5 or 6 outer rings. Such type of operculum with relatively few number of rings, as in most monotocardians (GRAHAM, 1971), is described to be oligogyrous. The lower surface of the operculum, shows a creamy protuberance or boss which is attached to the dorsal surface of the foot by muscle fibres.

On comparing the characters of the shell and operculum of the present species with those of other viviparid snails belonging to genus Viviparus (LEIPER, 1915) or to genus Bellamya (JOUSSEAUME,1886 and MANDAHL-BARTH,1954), it becomes clear that it is difficult to assigne the Egyptian viviparid snail to one of the two. In this respect, one can state that it is necessary to establish, on anatomic basis, the definitive characters of each of the two genera Viviparus and Bellamya, in order to justify the recognition of their members.

The Soft Parts: (Pl. II, Figs.: 7 & 8).

The integument of the present snail is characterised by the abundance of black pigmentation with few scattered deep yellow blotches. The latter are more conspicuous and frequent on the head and tentacles than on the foot. The body of Bellamya unicolor, as that of any other gastropod, can be differentiated into the head,foot and visceral mass.

The head is a comparatively small snout like anterior structure connected ventrally with the foot and dorsally with the visceral hump. Two folds project from the two lateral sides of the head at a ventral level with respect to its dorsal wall. The right fold extends ventrally below the right eye stalk and tentacle to become near the mouth opening. It is broader and longer than the left one, the first being about 1.5 mm. in breadth & 1.6 mm. in length while the second being about 0.7 & 1.2 mm. in the same dimensions. The right fold has a rectangular shape and the left is cone-shaped with somewhat pointed anterior end. Examination of the adult snail during life,

has shown that the right fold forms the anteroventral border of the exhalent siphon when the animals is normally extended. In such case, the fold becomes curved to acquire a somewhat vertical position with respect to the long axis of the snail and its curvature is directed posterodorsally. When the head region becomes fully extended anteriorly, the right fold acquires a position somewhat far from the mantle edge and the exhalent siphon becomes incomplete. During life, the water current enters the mantle cavity on the left side of the head via the left fold which forms an inhalent siphon and leaves it on the right side through the exhalent siphon.

A review of the literature has shown that the two head folds of the present species may correspond to those of Viviparus viviparus (COOK, 1949) and to " the neck veil " of FORBES and HANLEY (1853) and epipodial Lobe of ELLIS (1926), working on some British snails.

The head carries a pair of conspicuous lateral tentacles and a pair of short eye stalks lying just posterior and to the exterior of the tentacles. In the well extended female, the two tentacles are long, slender and similar (1.2 mm. in Length), whereas in the well extended male, the right tentacle is often tightly curved and longer than the left one; (2.7 & 1.2 mm. long respectively).

The foot forms the greater part of the fully extended animal, being a tringular, flat, muscular, mostly black pigmented structure. It is characterised by few scattered deep yelow patches.

The visceral mass, including the vital organs, is spirally coiled and invested by the thin mantle which is heavily pigmented with black granules. Through the thin pigmented mantle, certain organs as the digestive gland, intestine and rectum can be distinguished.

The mantle edge or collar is bordered by small tubercles ornamented with scattered orange spots. Examination of the incubated young snails within the brood pouch, during life, has shown the existence of three relatively large papillae on the right half of the mantle edge, with some small tubercles dispersed between them. It is noticeable that these papillae decrease gradually in size as the snail grows, till they become irremarkable in the emerged individuals.

When the mantle cavity is opened mid-dorsally (Pl. II, Fig. 9), its floor is exposed and appears distinguished by a groove extending diagonally from the posterior end of the left side of the mantle cavity, forwards to reach the cephalic region. Along the floor of the mantle cavity, this groove is bordered laterally by a low ridge and relatively high left one. Anterior to the mantle collar, it proceeds along the neck and head, close to the right head fold and below the right tentacle, till it reaches the mouth opening. This groove corresponds to the characteristic food grooove of other viviparids as that described and drawn in Viviparus viviparus, by COOK(1949) and in Siamopaludina martensi by BERRY (1974). The food groove of the present species is about 70 U., in depth and 13.4 mm. long and lined by a simple ciliated columnar epithelium with interspersed mucous secreting cell.

It is remarkable that in the male, the testis (Pl. 11, Fig. 7) is a compact curved elongated mass, lying on the right side of the mantle cavity, parallel to the rectum and sparate from the digestive gland. Also, in the female the recepataculum seminis is a Λ-shaped elongated glandular structure.

The previously mentioned characters of the soft parts of the species under investigation, especially those of the food groove, the right tentacle of the male and the two head folds show great resemblance to those of Viviparus viviparus (COOK, 1949) and the two viviparid species; Siamopaludina martenst and Filopaludina sumatrensis (BERRY, 1974).

On comparing the characters of the testis and receptaculum seminis of the present species with those of Bellamya species from other regions (ROHRBACH, 1937 & MANDAHL-BARTH, 1954), one can easily put the Egyptain viviparid snail under the genus Bellamya.

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EXPLANATION OF PLATES

PLATE 1

Fig. 1: A camera lucida drawing of the dorsal aspect of the snail with partially extended head-foot region.

Fig. 2 & 3: Camera lucida drawings of the dorsal and ventral aspects of the shell.

Fig. 4: A camera lucida drawing of V.S. of the shell showing the columella.

Fig. 5: A camera lucida drawing of the upper surface of the shell operculum.

Fig. 6: A camera lucida drawing of the lower surface of the shell operculum.

PLATE II

Fig. 7: A camera lucida drawing of the dorsal aspect of the soft parts of an adult male specimen after the removal of the shell.

Fig. 8: A camera lucida drawing of the dorsal aspect of the soft parts of an adult female specimen, after the removal of the shell.

Fig. 9: Illustration, shwoing the roof of the pallial cavity of a female specimen cut open, to expose the food groove and the pallial organs.

KEY TO LETTERING OF FIGURES

ap.	= apex	b.m.	= buccal mass
b.p.	=	bl.p.	= black pigment
bo. wh.	= body whorl	bos.	= boss
col.	= columella	ct.	= ctenidium
di.g.	= digestive gland	e.	= eye.
epi.	= epitaenia	e.s.	= exhalent siphon
f.g.	= food groove	ft.	= foot
h.	= head	ha.	= heart
int.	= intestine	l.f.	= left fold
l.t.	= left tentacle	m.	= mantle
m.c.	= mantle collar	nu.	= nouleus
op.	= operculum	pa.	= papilla
rec.	= rectum	r.f.	= right fold
r.t.	= right tentacle	rin.	= ring
sh.	= shell	sh.ap.	= shell aperture
sut.	= sutrue	t.	= tentacle
ts.	= testis	umb.	= ubilicus
vi.m.	= visceral mass	ye.b.	= yellow blotches

PL. I

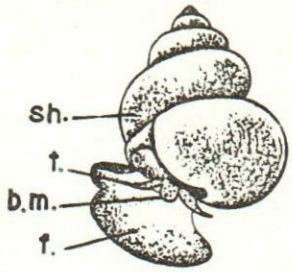


Fig. (1)

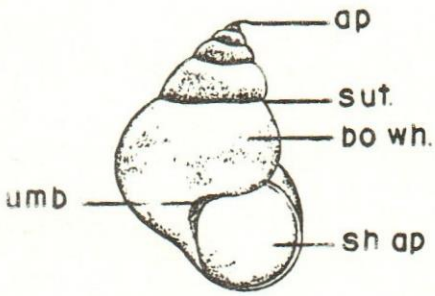
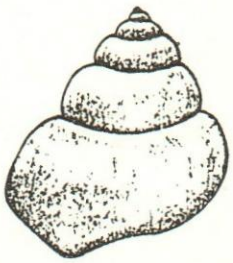


Fig. (2)



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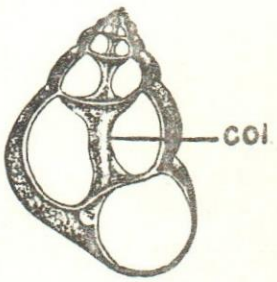

Fig. (4)

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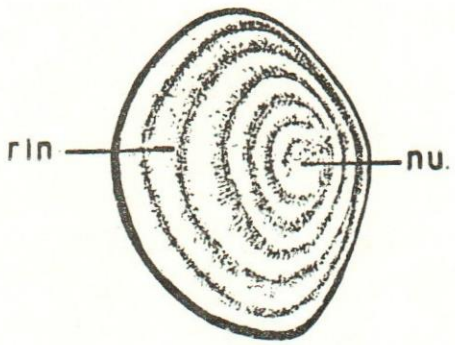

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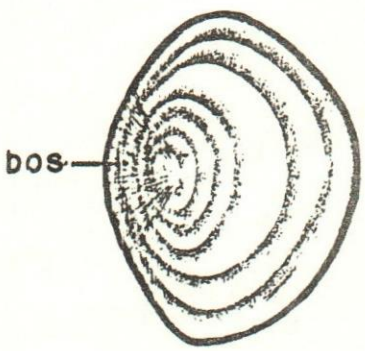

Fig. (6)

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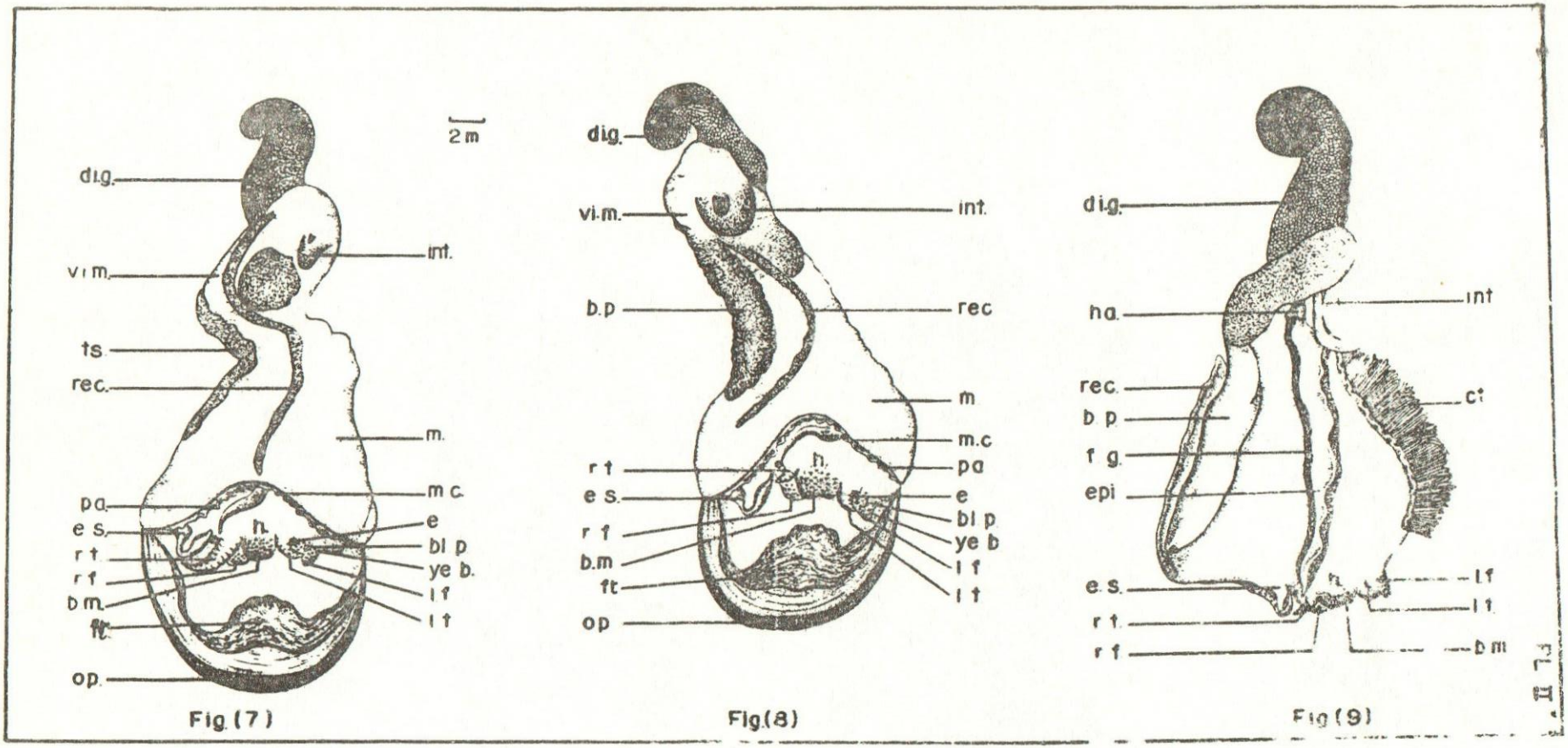
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Fig.(8)
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Fig.(9)