Assiut Univ. J. of Zoology *Printed ISSN 1687-4935*
47(2), pp. 119-137(2018)

MORPHOLOGICAL STUDIES ON SOME SPECIES OF CEPHALOPODS (CUTTLEFISHES AND SQUIDS) FROM HURGHADA (RED SEA), EGYPT.

Safaa M. Ali[1], Torkia A. Mohammed[1], Ahmed M. Mandour[2] and Asmaa R. Abd EL-Malek[1]
[1] Departmentof Zoology, Faculty of Science, Assiut University, Egypt and
[2] Department of Parasitology, Faculty of Medicine, Assiut University, Egypt.
E-mail:safaa.mohamed1@science.au.edu.eg

Received: 7/11/2018 **Accepted:**13/12/2018 **Available Online:**1/1/2019

The present study was carried out to determine and describe the different morphological characteristics of some cephalopod species (squids or cuttlefishs). A total of 27 specimens (belonging to order Teuthoidea and Sepioidea) were collected from the Red sea around the aqua area near the National Institute of Oceanography and Fisheries – NIOF- Red sea branch during the period from February 2016 to June 2018. The morphological characters which have been studied were suckers of the tentacular club, suckers of the arms, teeth of the suckers of both arms or tentacles, shell (shape and type), funnel (siphon), type of the eye, fins, presence or absence of the hectocotylized arm (modified arm that characterize male) and presence or absence of the two nidamental and accessory nidamental glands (which characterize the females).

INTRODUCTION

Molluscs are one of the most diverse group of animals. They are worldwide spread. There are terrestrial, freshwater, marine and brackish water molluscs. They have a vital role in the ecosystems and can be used as bioindicators (Benkendorff, 2010).

The marine molluscs, especially, cephalopods are economically important as they are a good food source and for the biomedical applications (Flores – Garza *et al.*, 2012 and Riad *et al.*, 2016)

Cephalopoda are one of the largest classes of molluscs. They are very important in the marine ecosystem as they act as consumers or preys (Lindgren *et al.*, 2004, Jereb *et al.*, 2005 and Hastie *et al.*, 2009).

Cephalopods contribute about 14% of the world fisheries (FAO 2004 and Riad *et al.*, 2016). It embraces about 1000 known valid species and constitutes about 2.07% of phylum Mollusca (Hassan, 1974).

Cephalopods represent a significant worldwide fishery resource (Raid *et al.*, 2016).

Cephalopods characterized by their intelligent, activity, well developed eye and nervous system (Boyle and Rodhouse, 2005).

They are bilaterally symmetrical, soft-bodied animals. Their bodies consist of a head [that bears 10 circumoral mobile appendages (8 arms and 2 tentacles)] and muscular mantle that enclosed the mantle cavity at which the internal organs present. Cephalopods are characterized by the presence of the funnel apparatus that make them active swimmer (Lindgren *et al.*, 2004).

The shell in cuttlefishes and squids are internal structures (no external shell). In the cuttlefishes, shell represented as a structure of calcium carbonate, while it is reduced to a rigid chitinous structure in squids. The absence of external shell in cuttlefishes and squids make the muscular mantle developed to be the main locomotory organ to obtain faster swimming by jetting water from the funnel (Jereb *et al.*, 2005).

Living cephalopods belong to two subclasses': Nautiloidea and Coleoidea (Lindgren *et al.*, 2004 and Jereb *et al.*, 2005).

Nautilidae, is the only taxon in Nautiloidea. They have a coiled, calcified chambered external shell (Young *et al.*, 1998).

Coleoidea can be classified into: Decabrachia (cuttlefish and squids) and Vampyropoda (Boletzky, 2003).

Decabrachia are classified into two orders: Teuthoidea and Sepioidea. All members of Order Teuthoidea are squids, whereas order Sepioidea include: Idiosepiida, Sepioidea, Sepiida and Spirulida. (Young and Vecchione, 1996; Beesley *et al.*, 1998).

Order Teuthoidea can be divided into two suborders, Myopsida and Oegopsida. Myopsida is characterized by the presence of a cornea covering the eye, while the eye of Oegopsida has no cover and is directly contact with the water (Jereb and Roper, 2010).

Squids are characterized by their cylindrical elongated body with posterolateral fins that occupy less than 70% of the mantle length (in rare cases it equals the mantle length). They have 8 arms and 2 tentacles, the arms pear 2 rows of stalked suckers (sometimes 4 or more rows) with chitinous rings (some times and / or chitinous hooks). Suckers are present on the entire arm length. Tentacles have from 2 to more series of stalked suckers on its tentacular club (the distal portion of the tentacle), hooks may be present or absent. The tentacular stalks (the proximal part of the

tentacle) lack suckers or hooks, the internal shell is straight and feather like (Jereb and Roper, 2010).

Genus *Sepioteuthis* is a squid that may be confused with *Sepia* (cuttlefish) due to the presence of large fins that wrap around the mantle. The body of members of this Genus is broader than other squids and so they looks like *Sepia*, while their internal shell is feather- shaped and so they are squids (Emam and Gareb, 2010).

The term 'cuttlefishes' refers to: Cuttlefishes, Bottletail squids, Bobtail squids, Ram's horn squid and Pygmy squids (Jereb *et al.*, 2005).

Cuttlefishes are also characterized by their 8 arms and 2 ventrolateral tentacles. These appendages pear stalked suckers and tentacles are able to retractile into pockets between the III and IV arms. The fins extend from the anterior edge of the mantle to its posterior end, but they are not joined. The shell is internal, straight and chalky calcified (Jereb *et al.*, 2005).

Different species of cephalopods have great similar morphological characters (Espineira *et al.*, 2010). Morphological similarity between species and variation within species often disrupt the accurate identification (Warnke *et al.*, 2004). Some of these differences (variability) may be due to the increase in some body structure to maintain their structure because of the geometric and environmental changes, so relative growth of individuals from the same species obtained from different localities were studied by many authors (Sallam, 2000).

Documenting the changes in the intra and inter specific variations are helpfull in the separation of species and /or sexes, also morphological studies are helpful in understanding phylogeny and classification of taxonomic groups (Roper and Voss, 1983).

The morphometric and meristic characterestic are very important in classification of different cephalopod species and sub-species (Witaker, 1978 and Sanchez *et al.*, 1996) and also important in the differentiation between different populations of the same species (Vega *et al*., 2001).

Hence, the present study aimed to describe the different morphological characterestics of some species of cephalopods from the Red Sea.

MATERIALS AND METHODS

Collection of Samples:

A total of 27 female specimens (3 *Sepioteuthis sepioidea*, 3 *Sepia officinalis*, 21 *Sepia orbignyana*) were collected during the a period of (February 2016 to June 2018) from the Red sea around the aqua area near the National Institute of Oceanography and Fisheries – NIOF- Red sea

branch. Then transferred in tanks supplied with air pumps to the laboratory of zoology department at Assuit University. Sex determination were carried out by checking the presence or absence of the left IV hectocotylized arm (the modified arm of males) or by dissecting specimens for checking of the presence or absence of the nidamental glands which present in females (Richard, 1967; Riad *et al.*, 2015 and Riad *et al.*, 2016).

MORPHOLOGICAL IDENTIFICATION OF SAMPLES:

1.1. Identification of squids:

Squids (3 female specimens from ***Sepioteuthis sepioidea***) were identified according to FAO species catalogue Vol. 2 (Jereb and Roper, 2010).

1.2. Identification of Cuttlefishes:

Cuttlefishes (24 female specimens from two different species: *Sepia officinalis* and *Sepia orbignyana*) were identified according to FAO species catalogue Vol. 1 (Jereb and Roper, 2005) and Identification guide for cephalopod (Zaragoza *et al.*, 2015).

Examination of the specimens included the external morphological characters: Suckers of the tentacular club, suckers of the arms, teeth of suckers ring of both arms or tentacles, shell and funnel (siphon), normal arm or hectocotylized arm (if present) for the determination of sex. In the small specimens, sexes cannot be determined externally and so the ventral mantle was opened for the checking of the presence of two nidamental glands with a pear shape which characterize the females.

RESULTS

11% of the samples are squids and they were identified as ***Sepioteuthis sepioidea***, whereas, the remain were cuttlefishes (89%). Cuttlefishes were identified as *Sepia officinalis* (11%) and *Sepia orbignyana* (78%) of the total sample.

1. ***Sepioteuthis sepioidea*** **(Blainville, 1823)**

   Synonymised names :

   Loligo spiacea (Blainville, 1824)

   Loligo sepioidea (Blainville, 1823) (original combination)

   Sepia affinis (d Orbigny, 1826)

   Sepia officinalis jurujubai (Oliveira, 1940)

Sepioteuthis biangulata (Rang 1837)
Sepioteuthis ehrhardti (Pfeffer, 1884)
Sepioteuthis occidentalis (Robson 1926)
Sepioteuthis ovata (Gabb, 1868)
Sepioteuthis sepiacea (Blainville, 1823)
Sepioteuthis sloanii (Gray 1849)

According to FAO species catalogue Vol. 2, the Caribean reef Squid *Sepioteuthis sepioidea* Blainville, 1823) belongs to:
Phylum: Mollusca
Class: Cephalopoda
Subclass: Coleoidea
Superorder : Decapodiformes
Order: Teuthoidea, Clarke, 1988.
Suborder: Myopsida, Clarke, 1988.
Family: Loliginida, Haas, 2002.
Genus: ***Sepioteuthis***
Species: *sepioidea*

Morphological description of *Sepioteuthis sepioidea*:

- The body divided into anterior head and posterior mantle, head is narrower than the mantle. On each side of the head there is a well-developed eye. Their body doesn't exhibit the external shell (Fig.1).
- Mantle appeared broad, pointed posteriorly to a blunt end (Fig. 1).
- Presence of a crown of 10 anterior circumoral appendages surrounds the mouth. These appendages differentiated into 8 arms and 2 long tentacles between the III and IV arm on each side. (Fig. 1A and 2A).
- Suckers of both arms and tentacular club are stalked (rest on pedicle) (Fig. 3), with chitinous, serrated rings which characterized by the presence of well developed and pointed teeth (Fig. 3C and G). Ring of arms bear about 19 sharp teeth, while ring of the tentacular club bear about 21 sharp teeth.
- Tentacles contractile, not retractile, into tentacular pockets (Fig. 1Aand 2A). They are mainly differentiated into two parts: a distal or terminal tentacular club which bears suckers and a proximal tentacular stalk which devoid of suckers. The tentacular club differentiated into 3 regions: a basal carpus, middle manus and distal dactaylus (Fig. 3D).
- Fins broadly elliptical, united at posterior end of mantle (Fig. 1B).
- Feather-shaped internal shell (Gladius or pen) (Fig. 4 a and b).

- The mouth characterized by the presence of upper and lower beak which highly chitinized (Fig. 4c and d). The lower jaws of the squids in the present study showed a clear appearance. Radula enclosed between these two beaks and composed of a centrally located tooth which supported by lateral and marginal teeth (Fig. 4 e ,f and g).
- Squids in the present study characterized by the presence of transparent membrane (cornea) covering their eyes and so they belong to the suborder **Myopsida** (Fig. 1).

The fallowing diagnostic features characterize the genera of **family Lologinidae**:

- Funnel-locking apparatus: from the simple type (as a two elongated sockets on the funnel), that fits into two oval cartilaginous straight ridge which elaborated from the mantle (Fig. 2D).
- Suckers of the arms arranged in 2 series, while suckers on manus of tentacular clubs are tetraserial (four longitudinal rows) from the basal to proximal part. (Fig. 3A and 3D respectively).
- The fins length occupy >85% of mantle length. Fin length (FL) = 15.3cm, Mantle length (ML) = 17cm, and so FL occupy 91%. (Fig. 1B).

2. ***Sepia officinalis***
   Frequent Synonyms:
   Sepia filliouxi Lafont, 1869
   Sepia mediterranea Ninni, 1884.
3. ***Sepia orbignyana***
   Frequent Synonyms: None.

According to FAO species catalogue Vol. 1and Identification guide for cephalopod ***Sepia officinalis*** and ***Sepia orbignyana*** belongs to:
Phylum: Mollusca
Class: Cephalopoda
Subclass: Coleoidea
Superorder : Decapodiformes.
Order : Sepioidea, Clarke, 1988. (, Naef, 1916)
Family: Sepiidae, Haas, 1866. (, Keferstein, 1866)
Genus: *Sepia* Linnaeus, 1758
Sepia officinalis Linnaeus, 1758.
Sepia orbignyana Férussac *in* d'Orbigny, 1826**.**

Morphological description of *Sepia officinalis* and ***Sepia orbignyana* :**

- **Appendages:** there are the same 10 circumoral mobile appendages (8 arms and 2 ventrolateral tentacles) which surround the mouth (Fig. 5 and Fig. 10).

- **Retractil tentacles:** tentacles are retractile into two lateral pockets (one on each side) between the 3rd and 4th arm (Fig. 5 B,C and Fig. 6A and Fig. 10C).
- **Pedicels:** suckers of arms and tentacular club are also stalked (Fig. 7B and Fig. 11a). Ring of the sucker of both arms and tentacular club are a clear circle as they are appeared with no projections or teeth (Fig. 7f).
- **Shell:** All Cuttlefishes have calcified, chalky and straight internal shell (Fig. 9 and Fig. 12).

▪ **Generic characters:**

- Anterior dorsal edge of the mantle with tongue-like projection (Fig. 5A and 10B).
- Absence of gland and gland pore (Fig. 8A and Fig. 13A).
- Semicircular mantle-locking apparatus (Fig. 8c and Fig. 13b).
- The outline of the cuttlebone elliptical (Fig. 9 and Fig. 12).
- Length of the cuttlebone (24.5 cm) (Fig. 9) approximately equal to mantle length (25cm).

▪ **Characters of the species:**

- Suckers of the tentacular club have 5-6 rows of suckers (Fig. 7AD and Fig. 11b). There are 6 median enlarged suckers (larger than the other suckers) on the club (Fig. 7c and Fig. 11a).
- Arms with 4 rows of suckers in each transverse row from its proximal to distal part (Fig. 7E,F and Fig. 11C).
- Fins with not joined posterior ends (Fig. 8A)**.**Fins start at the anterior border of the mantle directly and extend posterioly along the mantle edge (Fig. 8b).
- The shell has posterior spine in both *Sepia officinalis* (Fig. 9) and *Sepia orbignyana* (Fig. 12). The spine of *Sepia orbignyana*, dorsally directed and protrudes out of the body (Fig. 12).
- The ventral side of the shell showed an anterior smooth zone and posterior striated zone (with inverted u shaped striation in *Sepia officinalis* (Fig. 9) or inverted v shape in *Sepia orbignyana* (Fig. 12). At the posterior end of the cuttle bone there are inner and outer cones (Fig. 9 and Fig. 12).
- Sulucs of the cuttlebone, in both species, are deep, and speared to be extend in the striated zone only (Fig. 9 and 12).

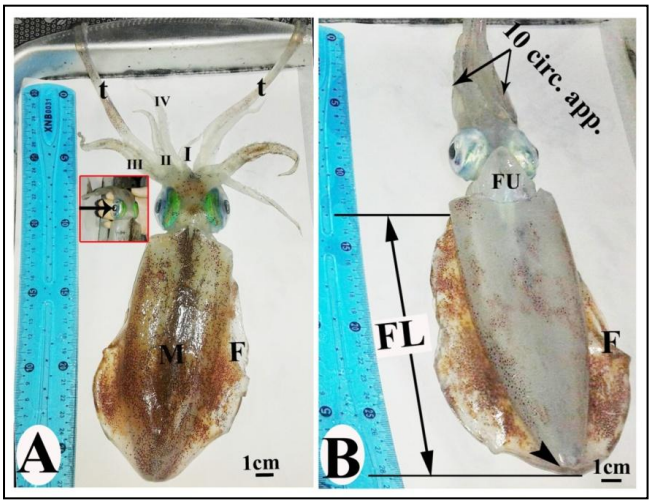

Fig. 1: Photographs of the squid ***"Sepioteuthis sepioidae"***: **A)** Dorsal view showing the arrangement of 10 circumoral appendages (circ. app.): tentacles (t) and arms also, showing the transeparent membrane which cover the eye (arrow) . **B)** Ventral view showing fin length (F.L. = 15.3cm.), that occupy > 85% (91%) of the mantle length (M.L. = 17cm), fins not joined posteriorly (arrow head). Note: F=Fins, M=Mantle, FU= Funnel.

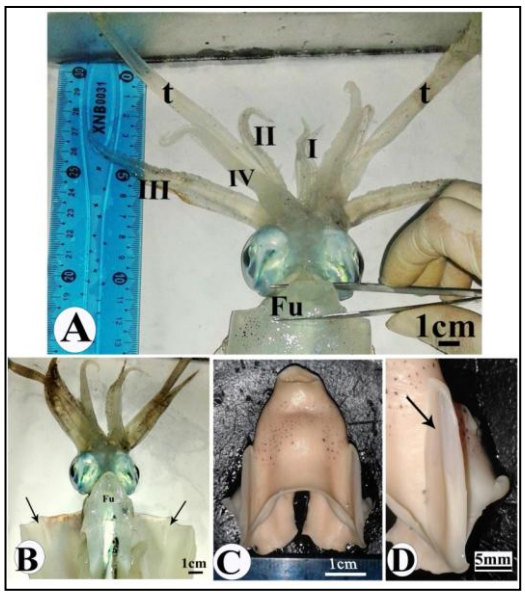

Fig. 2: Photographs of the squid ***"Sepioteuthis sepioidae"***: **A)** Ventral view showing the arrangement of the arms and tentacles. **B)** Ventral view of dissected specimens showing the funnel (FU) and projection of the mantle cartilage (arrow). **C)** and **D)** Isolated funnel showing the socket of the funnel-locking apparatus from the simple type.

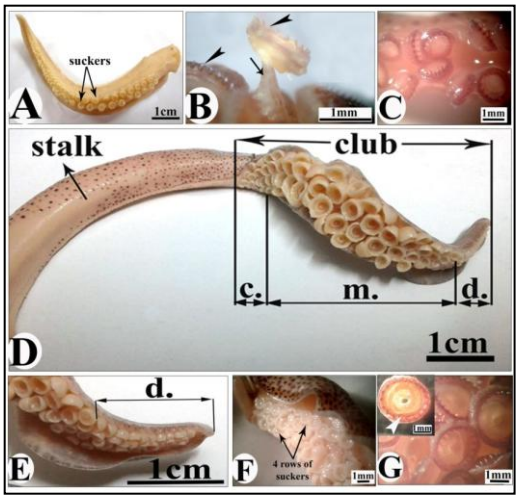

Fig. 3: Photographs of the arms and tentacles of the squid ***"Sepioteuthis sepioidae"*** showing: **a)** pedicels (arrow) and the teeth of the sucker ring (arrow head), **b)** arms with 2 rows of suckers, **c)** the serrated or toothed sucker ring of the arm, **d)** tentacle which consists of stalk and tentacular club. Tentacular club consists of proximal carpus (c.), median manus (m.) and distal dactylus (d.). **e)** and **f)** dactylus region of the tentacle which terminate with 4 rows of suckers (tetraserial). **g)** the serrated or toothed sucker ring of the tentacular club.

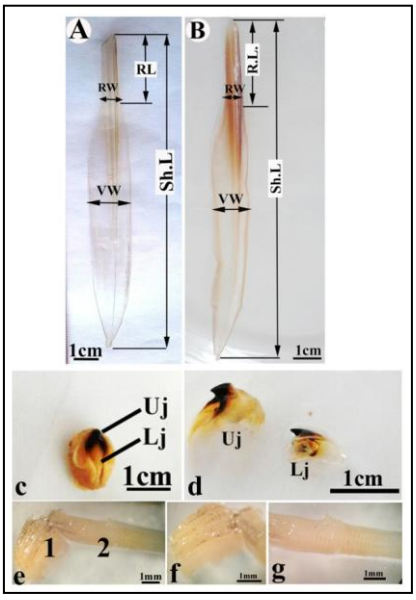

Fig. 4: A) and B) Photographs of the gladii of two specimens from the squid ***"Sepioteuthis sepioidae"*** showing that it is consists of central axis (the rachis, **r**), thin lateral expantion (the vane, **v**). **C)** and **d)** the upper and lower jaws. **e)** Radula. **f)** and **g)** enlarged portions of it.

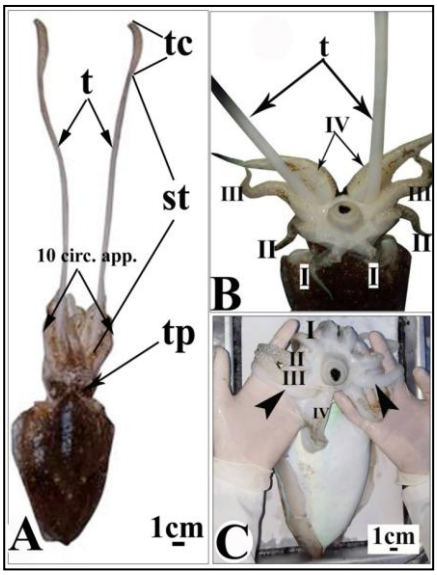

Fig. 5: Photographs of the specimen *Sepia officinalis* (dorsal view) showing: **a)** 10 circumoral appendages, 8 arms and 2 ventrolateral tentacles also showing the tongue-like projection of the mantle. **b)** Dorsal view showing the arrangement of the arms and tentacles. **c)** Ventral view showing the arrangement of arms (I - IV) and tentacles (arrow head).

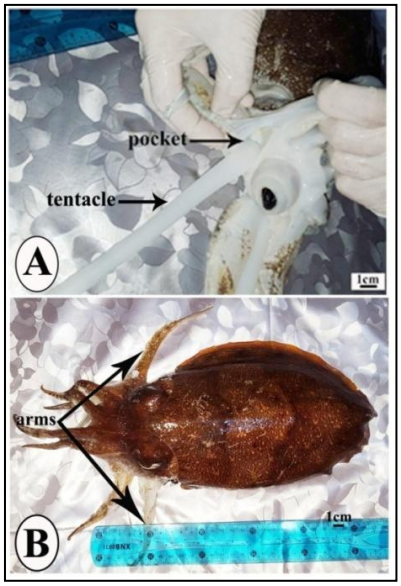

Fig. 6: Photographs of the specimen *Sepia officinalis* showing: **A)** the tentacle which retractile into its pocket. **B)** Other specimens of *Sepia officinalis* which retract their tentacles.

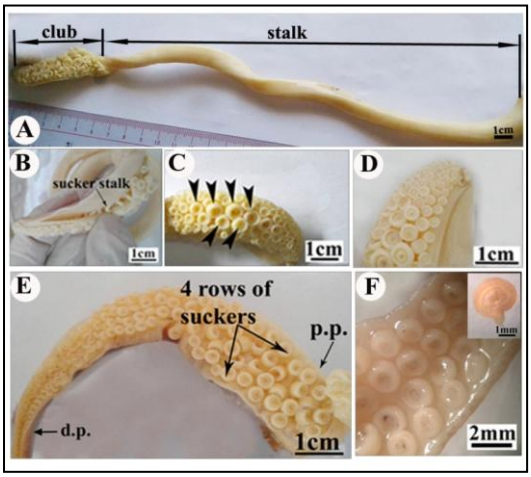

Fig. 7: Photographs of the tentacular club and arms of the specimen *Sepia officinalis* showing: **a)** Pedicel (stalk) of the sucker. **b)** suckers of the club with 6 median enlarged suckers (arrow head). **c)** tentacular club with 6 rows of suckers. **d)** arm with its proximal part (p.p.), distal part (d.p.) and tetraserial suckers on its proximal part. **e)** enlarged portion from the distal part of the arm which also appeared with tetraserial suckers

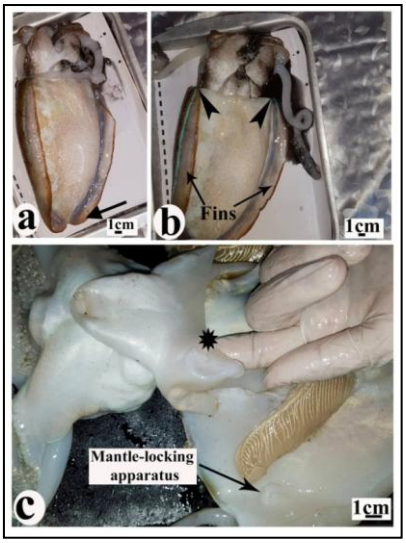

Fig. 8: Photographs of the specimen *Sepia officinalis*: **a)** ventral view, showing the absence of gland pore from the posterior end also showing that fins not joined posteriorly (arrow). **b)** ventral view showing that fins starting directly at anterior edge of mantle (arrow head). **c)** dissected specimen showing the semicircular projection of mantle-locking apparatus and its socket (strike) on the funnel.

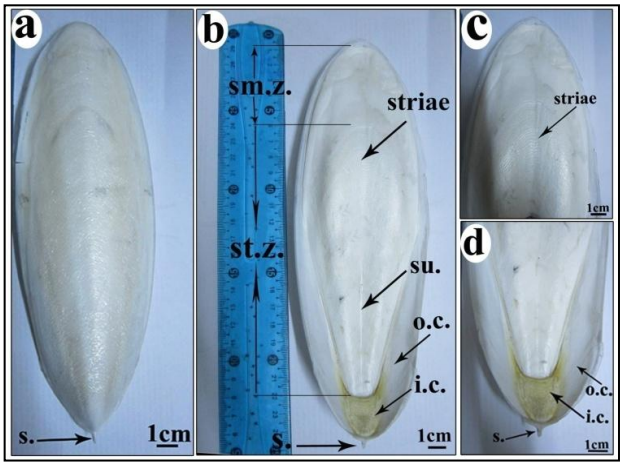

Fig. 9: Photographs of the cuttlebone of the specimen *Sepia officinalis* showing: **a)** dorsal view of the cuttlebone with posterior spine (s.). **b)** ventral view showing smooth zone (s.z.), striated zone (st.z.), sulcus (su.), inner cone (i.c.) and outer cone (o.c.) of the cuttlebone. **c)** enlarged anterior portion of the cuttlebone showing inverted u shape of the striae. **d)** enlarged posterior portion of the cuttlebone. **Note** cuttlebone length (24.5 cm) approximately equal to mantle length of the specimen (25cm).

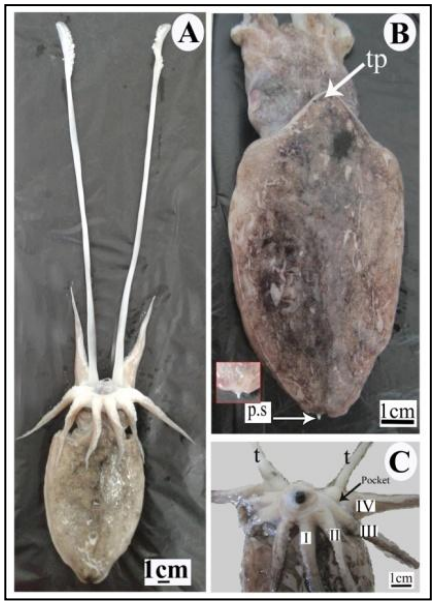

Fig. 10: Photographs of the specimen *Sepia orbignyana*: **a)** dorsal view showing 10 circumoral appendages, 8 arms and 2 ventrolateral tentacles. **b)** dorsal view of the specimens showing an anterior toung-like projection and posterior spine (p.s.) which protrude out of the mantle. **c)** the arrangement of the arms and tentacles, tentacles retractile into pocket between arm III and IV.

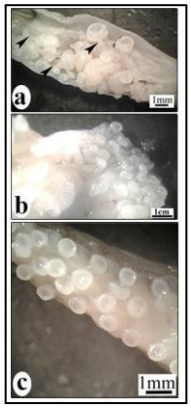

Fig. 11: Photographs of the tentacular club (a, b) and arm (c) of the specimen *Sepia orbignyana* showing: **a)** Pedicels or sucker stalk (arrow head). **b)** transverse rows of suckers (5-6) on the tentacular club. **C)** arm of the specimen with 4 rows of suckers.

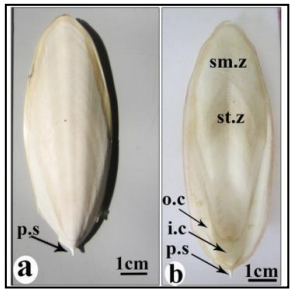

Fig. 12: Photographs of the cuttlebone of the specimen *Sepia orbignyana* :showing: **a)** dorsal view with posterior spine (s.). **b)** ventral view showing smooth zone (sm.z.), striated zone (st.z.), inner cone (i.c.) and outer cone (o.c.) of the cuttlebone. **Note** cuttlebone length (9cm) approximately equal to mantle length of the specimen (9.1cm).

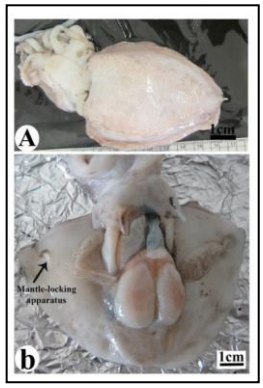

Fig. 13: Photographs of the specimen *Sepia orbignyana*: **a)** ventral view showing the absence of gland pore (arrow head) from the posterior end also showing that fins not joined posteriorly, also showing the posterior spine (p.s.) which protrude out of the mantle. **b)** dissected specimen showing the semicircular mantle-locking apparatus (arrow).

DISCUSSION

Systematic knowledge of species population is essential when investigating the biology, ecology, behavior and fisheries of different species forms (Roper and Voss, 1983).

The present study revealed that the bodies of the investigated species are divided into two main parts (anterior head and posterior mantle) and all of them are belong to the subclass: coleoidea which characterized by the presence of 10 circumoral appendages (eight arms and two lateral tentaces), these general characters are also mentioned by Roper *et al.* (1984), Nesis (1987), FAO (2005), Riad (2008) and Riad *et al.* (2016).

Squids in the present study were taxonomically identified as *Sepioteuthis sepioidea*.They are characterized by: a broad mantle which pointed posteriorly to a blunt end, fins are broadly elliptical, united at posterior end of mantle (fins length occupy >85% of mantle length as the fin length (FL) = 15.3cm, Mantle length (ML) = 17cm, and so FL occupy 91%. These characters agreed with the results of Jereb and Roper (2010) and Emam and Gareb (2010) as they mentioned that the fins of *the genus Sepioteuthis* are very long (>90% of the mantle length) and so may be confused with the cuttlefish. Emam and Gareb (2010) discussed the meaning of generic name of these squids as *" Sepio"* as their fins look-like that's of cuttlefish, and *"teuthis"* as they are areal squids due to their gladius (internal shell or feather shaped shell).

Tentacles of squids are contractile, not retractile, into tentacular pockets and consist of two parts: a distal tentacular club and a proximal tentacular stalk. Suckers are present on the tentacular club while the stalk devoid of suckers. Tentacular club differentiated into 3 regions: a basal carpus, middle manus and distal dactaylus. These general descriptions of squids in the present study are completely agreed with that of Jereb and Roper (2010).

Suckers of the arms of these squids are arranged in 2 rows of suckers while that of tentacular clubs are tetraserail. These results didn't completely agreed with the study of Emam and Gareb (2010) that mentioned; both arms and tentacular club of *Sepioteuthis lessoniana* are tetraserail. They also mentioned that suckers of either arms or tentacular clubs are stalked with chitinous serrated rings (with well developed and pointed teeth) which agreed with the present study.

In the present study, ring of arms bear 17-26 sharp teeth, while ring of the tentacular club bear 17-21 sharp teeth. Emam and Gareb (2010) reported that the number of these teeth were 20-25 on the arms and 17-22 on the tentacular club. These results also slightly differed from those of

Roper *et al*. (1984) and Carpenter & Niem (1998), whose reported that the sucker ring of the tentacular club with 14 - 23 teeth and that of the with 18 - 29 teeth.

Buccal mass of the represented squids characterized by the presence of upper and lower beak which highly chitinized. The lower beak overlapping the upper one and has a lateral large wings and a short curved rostrum. The lower one also has a short rostrum and their lateral wings showed a clear appearance. These results agreed with Emam and Gareb (2010). Radula enclosed between these two beaks and composed of a centrally located tooth which supported by lateral and marginal teeth also as reported by Emam and Gareb (2010) and Riad *et al*. (2016).

Squids in the present study belong to the Myopsida as they characterized by the presence of transparent membrane (cornea) covering their eyes and funnel-locking apparatus from the simple type. These results agreed with Jereb and Roper (2010).

The cuttlefishes in the present study were characterized by its long fins (start at the anterior border of the mantle directly and extend posterioly along the mantle edge with not joined posterior) and their internal calcified shell (its length approximately equal to mantle length). These results agreed with Jereb and Roper (2005).

They are belonging to the genus *Sepia* as their anterior mantle edge with a tongue-like projection. This character used to differentiate the genus *Sepia* from *Metasepia* and the absence of the gland pore characterizes the genus *Sepia* from *Sepiella* also the semicircular shape of the mantle-locking apparatus. These generic characters are agreed with Jereb and Roper (2005).

Tentacles of cuttlefishes are retractile into two lateral pockets (one on each side) between the 3rd and 4th arm. Arms with 4 rows of suckers in each transverse row. Suckers of the tentacular club have 5-6 rows of suckers with 6 median enlarged suckers. These results as such reported by Jereb and Roper (2005), Riad *et al.* (2016) and Tehranifard and Dastan (2011).

Suckers of both arms and tentacular club are also stalked. Ring of the sucker of both arms and tentacular club are a clear circle as they are appeared with no projections or teeth. These results didn't completely agreed with those of Riad *et al.* (2016) as they reported that arm suckers of *Sepia pharaonis* posses about 20 blunt teeth while that of tentacular club don’t posses neither teeth nor projection.

The present work deals with two species of cuttlefishes, *Sepia officinalis* and *Sepia orbignyana*.

The shell of both species has a posterior spine, however in *Sepia orbignyana*, the spine dorsally directed and protrudes out of the body. These results agreed with Zaragoza *et al.* (2015).

The ventral side of the shell showed an anterior smooth zone and posterior striated zone (with inverted u shaped striation in *Sepia officinalis* or inverted v shape in *Sepia orbignyana*). These results in good agreement with the description of Jereb and Roper (2005).

Sulucs of the cuttlebone, in both species, in the present work are deep and speared to be extending in the striated zone only. These results didn't agreed with that mentioned by Jereb and Roper (2005) as they describe the sulucs of the shell of *Sepia officinalis* persist only on the last loculus but absent from the striated zone. However their description of the sulucs of *Sepia orbignyana* completely agreed with that described in the present study.

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دراسات مورفولوجية على بعض أنواع من الراسقدميات (الكالمارى والسبيط) من الغردقة (البحر الأحمر) ، مصر.

صفاء مجلى على[١]، تركية ابو المجد محمد [١]، أحمد محمد مندور[٢] ،اسماء رمضان عبد المالك[١]

[١] قسم علم الحيوان ، كلية العلوم ، جامعة اسيوط، مصر

[٢] قسم الطفيليات ، كلية الطب ، جامعة اسيوط، مصر

أجريت الدراسة الحالية لتحديد الصفات المورفولوجية المميزه لبعض أنواع من الرأسقدميات سواء الكالمارى او السبيط. تم تجميع ٢٧ عينة من الرأسقدميات من البحر الأحمر حول منطقة الأحياء المائية بالقرب من المعهد القومى لعلوم البحار والمصايد(NIOF) فرع البحر الاحمر خلال الفترة من فبراير ٢٠١٦ حتى يونيو ٢٠١٨. وتنتمى هذه العينات الى (Family: Loliginida) ***Sepioteuthis*** ***sepioidea***(و ***Sepia orbignyana* &*Sepia officinalis*** (Family: Sepiidae). وقد تم دراسة بعض الصفات المورفولوجية لها مثل: الممصات الموجودة على اللوامس وتلك الموجودة على الأذرع ،حلقة الأسنان الموجودة على حافة الممصات سواء الموجودة على الأذرع أو اللوامس، الصدفة (شكلها ونوعها)، القمع، العين، الزعنفة وأيضا تم تحديد وجود أو عدم وجود الذراع المتحور المميز للذكور (hectocotylized arm) وأيضا وجود أو عدم وجود الغدد العشية والغدد العشية الإضافية (التى تميز الإناث).