

# Notes on *Brachioteuthis riisei* (Steenstrup, 1882) and *Onychoteuthis banksi* (Leach, 1817) (Cephalopoda:Teuthoidea) found in the Aegean Sea

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**ABSTRACT.** The occurrence of *Brachioteuthis riisei* and *Onychoteuthis banksi* in the region of Argosaronikos (Aegean Sea) is reported in this note. Both species were collected by the experimental bottom trawl net used in the framework of the International Bottom Trawl Survey in the Mediterranean (MEDITS).

A single individual of *Brachioteuthis riisei* was caught in June 1997, between 380-418 m of depth. It was a fully mature female with a mantle length of 66 mm, representing the largest individual ever caught in the Mediterranean and the first one recorded in the Aegean Sea. Five specimens of *Onychoteuthis banksi* were found in June 1997 and June 1998 at depths ranging between 685 and 760 m. All specimens were immature their size ranging from 55 to 107 mm DML. This is the first finding of the species in the Aegean Sea and the Eastern Mediterranean (east of 23° E).

**KEY WORDS:** cephalopoda, teuthoidea, Mediterranean.

## INTRODUCTION

*Brachioteuthis riisei* (Steenstrup, 1882) and *Onychoteuthis banksi* (Leach, 1817) are pelagic oegopsid squids distributed in warm and temperate oceanic waters (ROPER et al., 1984; D'ONGHIA et al., 1995). Records of both species in the Mediterranean Sea have been reported mainly for the western and central part (JATTA, 1896; NAEF, 1923; DEGNER, 1926; CIPRIA, 1935; GAMULIN-BRIDA & ILIJANIC, 1965; TORCHIO, 1965; 1966; CLARKE, 1966; LUMARE, 1970; MANGOLD, 1973; ROPER, 1974; BERDAR & CAVALLARO, 1975; MORALES & GUERRA, 1977; SANCHEZ & MOLI, 1985; BELLO, 1985, 1990; SANCHEZ, 1986; VILLANUEVA, 1992; JEREB & RAGONESE, 1994; TURSİ et al., 1994; ORSI-RELINI et al., 1994; D'ONGHIA et al., 1995). The only record of *Brachioteuthis riisei* in the Eastern Mediterranean (East of 23° E) goes back to that reported by Degner (1926), whereas its presence in the Aegean Sea has not yet been documented. *Onychoteuthis banksi* has never been reported in the Eastern Mediterranean. It should be noted however, that Degner (1926) in the report of the Danish expedition, referring to the captures of *Onychoteuthis banksi* paralarvae, found also at west of

Rhodes island, mentioned that some of those specimens might belong to the genus *Ancistroteuthis*.

New findings concerning these species are reported and discussed in this note, and data on their biometry, sex and maturity are given.

## MATERIAL AND METHODS

The present material was collected during two bottom trawl surveys carried out in June 1997 and in June 1998 in the region of Argosaronikos, in the framework of the EU funded project International Bottom Trawl Survey in the Mediterranean (MEDITS). A professional trawler equipped with an experimental net, with a cod end of 10 mm mesh was used. The horizontal and vertical net opening, measured by means of a SCANMAR sonar system, ranged between 13-18,8 m and 1,9-2,8 m respectively. The hauling speed was 2.9-3.1 knots. The sampling design was random stratified (BERTRAND et al., 1997). Hauls lasting from 30 to 60 minutes, were performed in both years, at a total of 22 sampling stations distributed in five depth strata: 10-50, 50-100, 100-200, 200-500 and 500-800 m.

The species were identified following the keys in MANGOLD & BOLETZKY (1987). The weight and the morphometric measurements of the individuals of *Brachio-*

*teuthis riisei* and *Onychoteuthis banksi* were taken after fixation in formalin solution 5%. The maturity stage was determined based on the LIPINSKI'S (1979) maturity scale. The beaks of some of the specimens were removed and measured according to CLARKE (1962).

## RESULTS

One specimen of *Brachyoteuthis riisei* and five specimens of *Onychoteuthis banksi* were caught in the study area (Fig. 1). The weight, the sex, the maturity stage and the measurements of the morphometric characters of the specimens caught are presented in Table I.

*B. riisei* was fished in Epidauros Gulf at a depth between 380 and 418 m, in June 1998 (Fig. 1). The specimen was a fully mature female of 66 mm DML. The oocyte greatest axis varied from 0.95 to 1.15 mm.

*A. lichtensteini* was found in both years in Argolikos Gulf at two different stations (Fig. 1). Four specimens with a dorsal mantle length (DML) ranging between 55 and 92 mm were caught during a haul at depths ranging between 685 and 713 m in June 1997 and one larger specimen with 106 mm DML at a depth of 760 m in June 1998. All five specimens were immature.

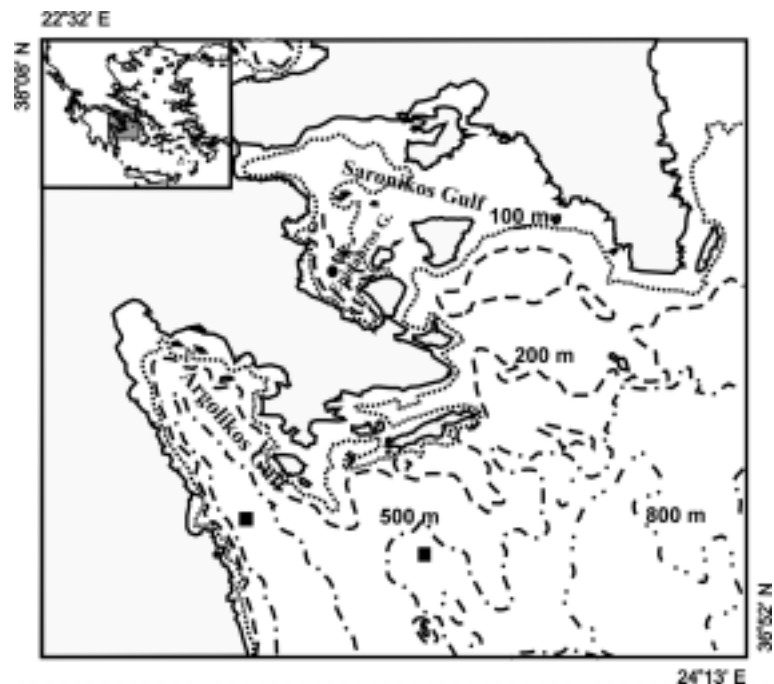


Fig. 1. – Map of the region of Argosaronikos showing place names mentioned in the text and locations of the stations where *Brachyoteuthis riisei* (●) and *Onychoteuthis banksi* (■) were caught during the MEDITS surveys of June 1997 and June 1998.

## DISCUSSION

The region of Argosaronikos (Fig. 1) consists of two main gulfs, Argolikos and Saronikos, quite heterogeneous in respect to their bottom topography and hydrology.

TABLE I

Measurements of morphometric characters in *Brachyoteuthis riisei* (1) and *Onychoteuthis banksi* (2-6) caught in the region of Argosaronikos, after fixation.

No	Sex and maturity stage	DML (mm)	VML (mm)	BW (gr)	MW (mm)	HL (mm)	HW (mm)	FL (mm)	FW (mm)	AL-RI (mm)	AL-RII (mm)	AL-RIII (mm)
1	female V	66	63,5	9	36	11	13	31,5	34	35	54	56
2	male II	106	102	35	55	17	24	63	71	52	63	58
3	female I	90	87	22	50	15	21	55	56	38	50	47
4	male II	65	62	9	39	14	13,5	37	39,5	25	34	34
5	female I	64										
6	unsexed	55										

No	AL-RIV (mm)	AL-LI (mm)	AL-LII (mm)	AL-LIII (mm)	AL-LIV (mm)	TCL (mm)	URL (mm)	UHL (mm)	UCL (mm)	LoRL (mm)	LoHL (mm)	LoCL (mm)
1	43	34	55	58	42	22				2,67	2,45	3,90
2	61	51	61	57	61	36	4,50	9,77	13,67	3,22	2,74	5,08
3	49	39	48	49	50	30	3,36	8,73	10,20	2,66	2,16	4,03
4	32	26	34	32	32	24	1,92	5,53	8,50	2,24	1,78	3,27
6							2,12	6,01	8,79	2,24	1,72	3,31

DML = Dorsal mantle length; VML = Ventral mantle length; BW = Body weight; MW = mantle width; HL = Head length; HW = Head width; FL = Fin length; FW = Fin width; AL = Arm length; R = Right; L = Left; TCL = Tentacular club length; U = Upper beak; Lo = Lower beak; RL = Rostral length; HL = Hood length; CL = Crest length.

Argolikos Gulf is a narrow deep-water basin open to the Aegean Sea. Saronikos Gulf is a semi-enclosed sea which has depths lower than 200m in its greatest part, forming at south-west the deep depression (>400 m) of Epidauros Gulf. The replacement time for the upper waters (<200m) of the western Saronikos Gulf has been estimated 1-2 years, whereas the minimum turnover time for the whole water mass about 8 years. Temperature and salinity values remain remarkably constant below the sill depth (80-100 m) at about 14° C and 38.6‰ respectively, whereas reduced oxygen levels down to 1,5 ml/L are found to occur in the deeper layers (FRILIGOS, 1985).

The presence of the oceanic *B. riisei* in the isolated basin of Epidauros Gulf, is rare and most probably related to the circulation of the upper water originating from the Aegean Sea (FRILIGOS, 1985). Although a wide bathymetrical distribution of *B. riisei* is indicated by the literature (DEGNER, 1926; MANGOLD, 1973; ROPER et al., 1984; ROPER & SWEENEY, 1992), the reduced oxygen levels found to occur in the deeper layers of Epidauros Gulf (Friligos, 1985), lead us to suggest that the single individual presently caught was rather collected in the water column while the trawl net was lifted.

*B. riisei* is a rather small sized species. Individuals with a DML ranging between 2,7 and 65 mm have been recorded from the western Mediterranean (JATTA, 1896; NAEF, 1923; DEGNER, 1926; MANGOLD, 1973; ROPER, 1974), the Ionian Sea (DEGNER, 1926, BERDAR & CAVALLARO, 1975; D'ONGHIA et al., 1995) and the Levantine basin (DEGNER, 1926). The specimen presently found is the largest one reported in the Mediterranean so far and represents the first record of *B. riisei* in the Aegean Sea and the second one in the Eastern Mediterranean (East of 23° E) since 1910 (DEGNER, 1926).

Numerous were the records of *A. lichtensteini* in the Mediterranean sea since the mid of the nineteenth century (CLARKE, 1966) and it was considered an endemic species till its finding by Voss (1956) in the Gulf of Mexico (TORCHIO, 1968). Although *A. lichtensteini* specimens are found stranded in large numbers (Torchio, 1965, 1968; Berdar and Cavallaro, 1975) and are fairly common in the stomach content of swordfish and dolphins (ORSI-RELINI et al., 1994; BELLO, 1996), the catches of the species by sampling devices and fishing gears are rather scarce. Sanchez and Moli (1985) cited one paralarva (DML: 19 mm) caught with Bongo device off the Mediterranean coast of Spain, and Orsi-Relini et al. (1994) listed one juvenile of *A. lichtensteini* between the species caught by an open Isaac Kid midwater trawl in the Ligurian Sea. A small number of immature individuals (DML: 100-150 mm) has been reported in bottom trawl catches from the western Mediterranean (MORALES, 1962; LUMARE, 1970; MORALES & GUERRA, 1977; SANCHEZ, 1986; VILLANUEVA, 1992;) the strait of Sicily (JEREB & RAGONESE, 1994) and the Ionian Sea (BELLO, 1985; Tursi et al., 1994). The relatively smaller size of the individuals presented here could be attributed to the small mesh size

of the MEDITS trawl. The size range of pelagic cephalopods has been shown to differ a lot depending on the sampling unit used (ROPER, 1977; D'ONGHIA et al., 1995).

The vertical distribution of *A. lichtensteini* is quite broad ranging between surface and 1270 m (VILLANUEVA, 1992). In the strait of Messina *A. lichtensteini* has been taken by squid-jigs, harpoons and as bycatch in trammel nets (CAVALLARO & BERDAR, 1969), which indicates that the species is probably more abundant in the upper layers. However daytime distribution of the species can not be determined on the basis of the scant information available. The capture of *A. lichtensteini* in Argolikos gulf in both surveys reinforces the view that it is not rare in this area.

The non-finding of both species presently recorded, in the Aegean Sea till now, is most probably be due to insufficient sampling in deep and middle waters.

Over the last 30 years, information on the distribution of mesopelagic cephalopods in the Eastern Mediterranean and Greek seas was based mainly on the results of bottom trawl surveys aiming to study the demersal resources (SALMAN et al., 1997; STERGIU et al., 1977; LEFKADITOU et al., 1999). Thus information concerning the mesopelagic populations is extremely limited because of inappropriate sampling gear employed and entirely different orientation of the research, taking into account that a) sampling depth rarely exceeded 500 m; b) the mesh size used was 18 mm resulting in a significant loss of relatively smaller individuals and/or species, and c) mesopelagic organisms were caught occasionally, while the net is on its way up, and as a consequence it was not possible to know their vertical distribution.

In Table II the number of mesopelagic cephalopod species by family in the western Mediterranean

TABLE II

Number of mesopelagic species of the cephalopod families in the Western Mediterranean, the Levantine basin and the Aegean Sea.

	Western Mediterranean	Levantine basin	Aegean Sea
Brachioteuthidae	1	1	1
Chiroteuthidae	1	1	1
Cranchiidae	2	1	-
Ctenopterygidae	1	1	1
Enoploteuthidae	5	3	4
Histioteuthidae	3	-	2
Octopoteuthidae	1	1	1
Ommastrephidae	5	3	4
Onychoteuthidae	3	1	1
Thysanoteuthidae	1	-	1
Sepiolidae	3	1	1
Argonautidae	1	1	1
Ocythoidae	1	1	1
Tremoctopidae	1	1	1

(MANGOLD & BOLETZKY, 1988; ORSI-RELINI & MASSI, 1991), the Levantine basin (SALMAN et al., 1997) and the Aegean Sea (LEFKADITOU et al., 1999; unpublished data from MEDITS surveys) is shown. The mesopelagic species found in the Aegean Sea are still considerably fewer than found in the western Mediterranean, but more than the ones in the Levantine basin where research on cephalopods is less systematic. The capture of mesopelagic cephalopod species in the Aegean Sea seems to be favored by trawling in deeper waters and the use of a trawl net with a wide horizontal and vertical opening during the MEDITS surveys, as suggested by MAIORANO et al. (1999).

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