

On a large specimen of *Histioteuthis bonnellii* (Cephalopoda: Histioteuthidae) caught in the northern Tyrrhenian Sea, western Mediterranean

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Abstract

A large female of the cephalopod *Histioteuthis bonnellii* (Férussac, 1835) was caught by a commercial otter trawler in the northern Tyrrhenian Sea off the Tuscany coasts, on a muddy bottom at 130 m of depth. This specimen (dorsal mantle length = 230 mm, total weight = 3,550 g) was the largest recorded up to now in the Italian waters and probably the largest specimen found in the Mediterranean Sea. About 70,000 immature eggs were estimated to be present in the ovary, ranging from 0.4 to 1.1 mm in diameter (major axis), with an average value of 0.55 mm. Compared with other findings, in particular with those from the Tuscany waters, mostly from 300 to 500 m, the depth from where this specimen was collected (130 m) is unusual.

Riassunto

Una femmina di notevoli dimensioni di *Histioteuthis bonnellii* (Férussac, 1835) è stata catturata il 30 maggio 2005 al largo delle coste toscane nel Mar Tirreno settentrionale, con rete a strascico, su un fondo fangoso tra 120 e 140 metri. L'esemplare dopo la cattura si presentava in buono stato di conservazione, anche se privo delle braccia tentacolari, spezzate nella loro porzione prossimale. L'esemplare (lunghezza dorsale del mantello di 230 mm, peso totale 3.550 g) è risultato quello più grande segnalato in acque italiane e, sulla base delle informazioni esistenti, sembra essere quello di maggiori dimensioni rinvenuto nel Mar Mediterraneo. L'ovario, del peso di 18 g, conteneva circa 70.000 oociti, di diametro massimo compreso tra 0,4 e 1,1 mm, con valore medio di 0,55 mm. La distribuzione dimensionale delle uova è apparentemente polimodale, con una dimensione modale compresa tra 0,5 e 0,7 mm. Le ricerche condotte dal 1985 ad oggi nelle acque toscane, durante campagne di pesca a strascico sperimentale, hanno permesso di catturare 88 esemplari di *H. bonnellii*, di dimensioni inferiori rispetto a quelle dell'esemplare oggetto del presente lavoro, tra 294 e 677 m di profondità, anche se il maggior numero di catture è stato ottenuto tra 400 e 600 m. A questo fa eccezione una segnalazione per le acque a nord dell'Elba di una femmina di 195 mm LDM e del peso di 3,250 g, catturata alla profondità di circa 100 m durante una battuta di pesca professionale. Questi dati potrebbero far ipotizzare la presenza di una relazione taglia/profondità per questa specie. Sono ancora poche le informazioni disponibili sulla biologia riproduttiva di *H. bonnellii*. I dati raccolti sono stati comparati con quelli rilevati su una femmina matura (LDM 300 mm) catturata in Atlantico (25.000 uova stimate, con diametro medio di 2,3 mm) e su una femmina immatura di 195 mm di lunghezza dorsale del mantello (128.000 ± 32.000 uova comprese tra 0,4 e 1,0 mm, con diametro medio di 0,65 mm). Sulla base di queste informazioni, nonché del loro aspetto, gli oociti dell'esemplare indagato sono da considerarsi immaturi. Sembra, inoltre, che in questa specie avvenga una consistente riduzione del numero di uova, passando dagli esemplari in maturazione a quelli maturi. Questo può essere dovuto sia a fenomeni degenerativi o di riassorbimento delle uova, ma anche a decremento numerico dovuto a deposizioni di più lotti in tempi successivi. I dati ad oggi a disposizione non permettono ancora di definirne la strategia riproduttiva.

Key words

Histioteuthis bonnellii, Cephalopoda, Tyrrhenian Sea, Tuscany coast.

Introduction

Histioteuthis bonnellii (Férussac, 1835) was recorded for the first time in Mediterranean in the year 1834 by Verany, in the Gulf of Lions, off Nice. The species was described the following year by Férussac, which dedicated it to the Italian naturalist Franco Bonelli.

The geographical distribution of *H. bonnellii* is very wide, even though rather scattered. According to Voss et al. (1998), the species is present all through the Atlantic Ocean to the north of the Capricorn tropic extending eastwards to the Indian Ocean and the western Pacific, in subtropical waters near the convergence. *Histioteuthis bonnellii* is also present in the waters near the Arctic region and in the Mediterranean Sea.

The species lives in the water column in a wide bathymetric range, from 100 to 2,000 m (Voss et al., 1998). The Family Histioteuthidae is monogeneric and in Mediterranean Sea is represented by two species: *H. bonnellii* (Férussac, 1835) and *H. reversa* (Verrill, 1880). Both species have been collected in the Tuscany waters south to Elba Island, northern Tyrrhenian Sea (Belcari & Sartor, 1993; Sanchez et al., 1998), while only *H. bonnellii* has been recorded in the south-eastern Ligurian Sea, north of the Elba Island (Lazzeretti et al., 1995).

Once considered a rare species, the experimental trawl surveys (Capua, 2004) and the studies of predator stomach contents prove that *H. bonnellii* is rather common (Bello, 2000).

The aim of this note is to report the finding of a large



Fig. 1. Right eye surrounded by 17 photophores.

Fig. 1. Occhio destro circondato da 17 fotofori.

sized specimen of *H. bonnellii* and to provide morphometric and biologic data to increase the knowledge of this still little known species.

Materials and methods

The specimen of *H. bonnellii* was caught during a commercial haul with bottom trawl net by the vessel "Mare

| | |
|----------------------------------|------|
| Weight | 3550 |
| Total length (without tentacles) | 880 |
| Dorsal mantle length | 230 |
| Ventral mantle length | 220 |
| Mantle width | 195 |
| Head length | 130 |
| Head width | 122 |
| Fin length | 130 |
| Fin width | 80 |
| Right eye diameter | 40 |
| Left eye diameter | 60 |
| Lower Rostral Length | 10 |
| Arm I left length | 485 |
| Arm I right length | 485 |
| Arm II left length | 491 |
| Arm II right length | 490 |
| Arm III left length | 510 |
| Arm III right length | 500 |
| Arm IV left length | 470 |
| Arm IV right length | 470 |

Tab. 1. Morphometric measurements (linear measurements in mm, weight in g).

Tab. 1. Misure morfometriche (misure lineari in mm, peso in g).

Blu" based in Castiglione della Pescaia (Grosseto), on the 30 May 2005. The catch was obtained on a muddy bottom ranging from 120 to 140 m depth, on a site located 15 nautical miles westwards to the Formiche di Grosseto Islets (10°50,30' E; 42°31,70' N).

The specimen was in rather good conditions, even though both tentacular arms were broken. *Histiototeuthis bonnellii* has no commercial value and is thus routinely discarded when caught (Sartor et al., 1998). Thanks to the concern of the fishermen it was possible to collect this specimen, that was delivered to the Acquario Comunale of Grosseto.

The following data were gathered: total weight (g), sex, maturity stage and the most important morphometric measurements (mm). The total number of eggs was estimated by counting the oocytes of five 0.2 g ovarian samples, randomly collected inside the oocyte mass; on each sample the size of the oocytes (maximum diameter, to 0.1 mm) was taken as well.

Results

The specimen was identified as *Histiototeuthis bonnellii* according to the description provided by Voss et al. (1998) for the presence of this main macroscopic characters: a deep inner web placed between the arms I-III (more than 50% than the longest arm), typically connected to the web placed between the arms of the fourth pair; the presence of 17 photophores around the right eye (**Fig. 1**); the typical arrangement of the cutaneous photophores; a single, elongate, photophore at the end of each arm I-III (much smaller on arms IV).

The dorsal mantle length (DML) was 230 mm, the total weight 3,350 g. The other morphometric data are shown in **Tab. 1**.

The internal morphological analysis revealed that this specimen was a female. The ovary was 40 mm long and 45 mm wide and weighted 18 g. The oocyte count, on a sample basis, allowed to estimate the presence of about 70,000 immature oocytes (**Fig. 2**). The eggs were connected to each other by a thin structure that clustered them in many bunches.

The egg size (maximum diameter) ranged from 0.4 to 1.1 mm, with an average value of 0.55 mm. The size frequency distribution of the 256 measured eggs is shown in **Fig. 3**. The histogram seems polymodal, though the size class 0.5-0.7 mm forms a well defined peak.

Discussion

In Tuscany waters *Histiototeuthis bonnellii* is frequently caught, though with a scarce number of specimens, during commercial trawling on epibathyal bottoms, mainly when targeting the Norway lobster, *Nephrops norvegicus* (Crustacea: Decapoda), the deep sea pink shrimp, *Parapanaeus longirostris* (Crustacea: Decapoda) and the red shrimps, *Aristaeomorpha foliacea* and *Aristeus antennatus* (Crustacea: Decapoda) (Sartor et al., 2003; Capua, 2004).

Experimental trawl surveys were carried out in Tuscany waters (south-eastern Ligurian Sea and northern Tyrrhenian Sea) from 1985 to date on soft bottoms from 10 to 750 m depth (Bertrand et al., 2000; Relini, 2000). In these years, 88 specimens of *H. bonnellii* were caught (on the average, two specimens per survey), in a wide depth range, from 294 to 677 m; the most abundant catches were obtained from 400 to 600 m. The specimens caught were highly variable in size, with a weight from 2 to 1950 g and an average total weight of about 150 g.

The specimen object of this study appeared the largest among those collected in the area during the experimental trawl surveys. Moreover, this specimen is also the largest among those collected up to now in the Italian seas (Jatta, 1896; Naef, 1923; Arbocco, 1958; Torchio, 1965; Voss, 1969; Würtz, 1979; Belcari & Sartor, 1993; Lazzeretti et al., 1995). On the basis of the available literature, this specimen is probably the largest one recorded for the Mediterranean Sea (Morales, 1962; Kaspiris & Tsiambaos, 1984; Koutsoubas & Boyle, 1999).

As concerns the bathymetric distribution in the Mediterranean Sea, the available literature reports that the species has been caught on a wide depth range, from a few hundreds meters to about 800 m (Arbocco, 1958; Torchio 1965; Bello, 1994; Tursi et al., 1994; Sanchez et al., 1998; Koutsoubas & Boyle, 1999; Maiorano et al., 1999; Giordano & Carbonara, 1999; Gonzalez & Sanchez 2002). In Tuscany waters *H. bonnellii* has been caught from 294 to 677 m depth.

Such data show that the depth where the specimen was collected (130 m) is unusual with respect to the bathymetric range typical for this species in the Mediterranean; also the large female (195 mm DML, 3250 g) recorded by Lazzeretti et al. (1995) was collected in Ligurian Sea at a similar depth, i.e. about 100 m. These observations may suggest that the largest specimens of *H. bonnellii* are more abundant near the upper limit of its bathymetric range, but additional data are needed to validate this hypothesis.

The available information on the reproduction of *H. bonnellii* is still scarce. The data collected in the present work were compared with those reported by Kristensen (1980)

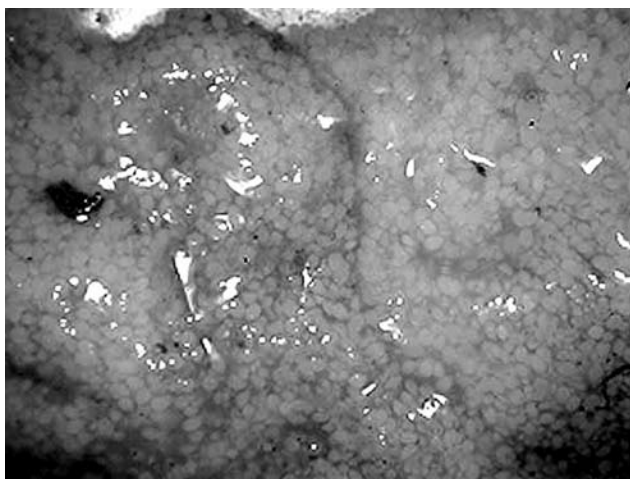


Fig. 2. Close up of the oocyte mass.

Fig. 2. Dettaglio della massa oocitaria.

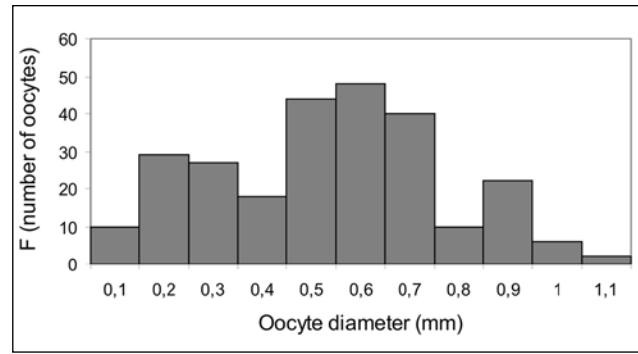


Fig. 3. Size frequency distribution of the oocytes.

Fig. 3. Distribuzione di frequenza di taglia degli oociti.

for a mature female (DML 300 mm) caught in the Atlantic (25,000 estimated eggs of 2.3 mm mean size) and those reported by Lazzeretti et al. (1995) for an immature female of 195 mm DML, with an estimated number of eggs of $128,000 \pm 32,000$ (range 0.4-1.0 mm; average size 0.65 mm). On the basis of these data, the oocytes of the present specimen (average diameter = 0.55 mm) have to be considered immature, which is corroborated by their general appearance and by the absence of external reticulations, a character of cephalopod oocytes close to maturity.

Notwithstanding the few specimens studied, the available data suggest that a steady decrease in the total number of oocytes occurs during the maturity. This may be due to either degenerative or reabsorption processes or the spawning of several batches of eggs. Anyway, the wide size range of the oocytes and the characters of the ovary reported by Kristensen (1980) (with all mature eggs, also found in the oviduct, in a specimen of a very large size) stimulate further investigations on the reproductive biology of this species. The available data do not allow the spawning pattern of *H. bonnellii* to be defined, whether semelparous (synchronous ovulation, monocyclic spawning) or iteroparous (group-synchronous ovulation, monocyclic spawning) (Rocha et al., 2001).

However, the polymodal size frequency distribution of oocytes suggests a multiple spawning strategy, as observed in many cephalopod species (Boletzky, 1987; Laptikhovskiy & Nigmatullin, 1993; Bello & Deickert, 2003).

The reproductive biology, together with studies on the main ecological aspects, are important targets for future investigations on this still poorly known species.

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