

## NOTE

**First record of larval stages of *Coryphaena hippurus* (Pisces: Coryphaenidae) in the Mediterranean Sea\***

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SUMMARY: The occurrence of early larval stages of *Coryphaena hippurus* is reported for the first time in Mediterranean waters. Four larvae between 3.25 and 4.80 mm standard length were found in ichthyoplanktonic collections taken off the Balearic Islands between 1985 and 1995. Their capture is discussed in relation to the life cycle proposed for this species in the area.

*Key words:* *Coryphaena hippurus*, larvae, life cycle, Mediterranean Sea.

RESUMEN: PRIMERA CITA DE ESTADIOS LARVARIOS DE *CORYPHAENA HIPPURUS* (PISCES: CORYPHAENIDAE) EN EL MAR MEDITERRÁNEO. – Se cita la primera captura de estadios larvarios de *Coryphaena hippurus* en el Mediterráneo. Se han encontrado cuatro larvas de longitud estándar comprendida entre 3.25 y 4.80 mm, en muestras de ictioplancton recolectadas entre 1985 y 1995 en las Islas Baleares. Se discute su distribución espacio-temporal en relación con el ciclo vital propuesto para la especie en el área.

*Palabras clave:* *Coryphaena hippurus*, larvas, ciclo vital, mar Mediterráneo.

## INTRODUCTION

The dolphin-fish *Coryphaena hippurus* Linnaeus, 1758 (Pisces: Coryphaenidae) is an epipelagic and cosmopolitan species, distributed in tropical and subtropical waters. It is a fast swimming top level predator, which migrates on a large scale. It is short lived, living to a maximum of three years, grows rapidly and attains lengths of over 1 m (Palko *et al.*, 1982).

As in other subtropical areas in which *Coryphaena hippurus* is found during warmer months (Shcherbachev, 1973), its occurrence in the Western Mediterranean takes place seasonally

from May-June to December, when the water surface temperature reaches >16-18°C (Massutí, 1997). Adult specimens are occasionally captured with drifting surface longlines, and juveniles are the target species of a traditional small-scale fishery with surrounding nets and fish aggregation devices (Massutí, 1997).

Although the spawning season and early juvenile distribution of *Coryphaena hippurus* has been widely reported (Gibbs and Collette, 1959; Palko *et al.*, 1982), little is known about its spawning grounds, its spatial and temporal distribution and the abundance of its early life stages (Ditty *et al.*, 1994). To date, eggs and larvae of this species have never been reported in the Mediterranean. In this area, Sanzo described mature ovarian eggs (in Padoa, 1956), Lo Bianco (1909) mentioned the presence of juveniles

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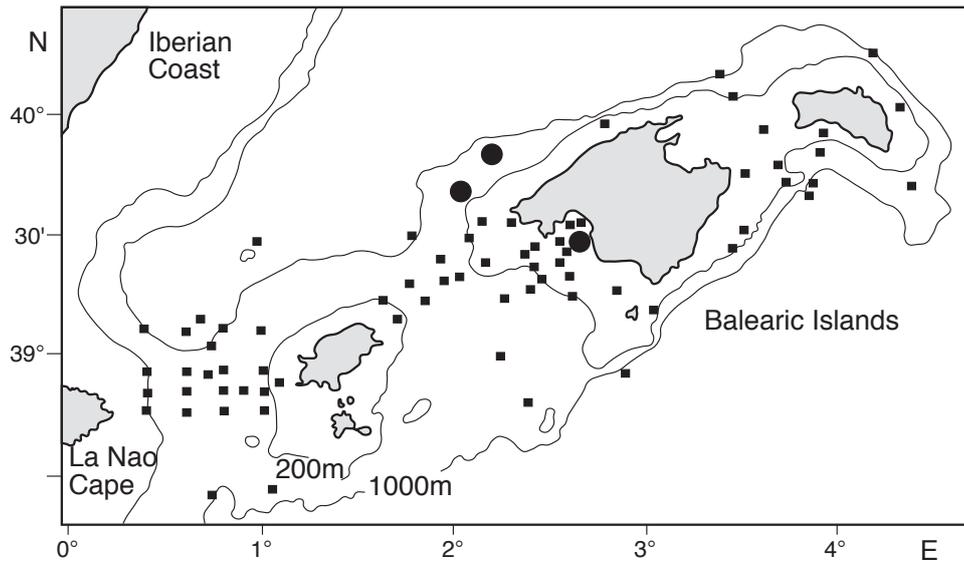


FIG. 1. – Location of zooplankton sampling collections analysed by Alemany (1997) (■), and the three stations where *Coryphaena hippurus* larvae were captured (●).

between 1 and 5 cm from August to November off the Gulf of Naples, and Fage (1910) reported the capture of a single juvenile specimen measuring 5 cm from the Port of Monaco in September. In this note we report, for the first time, the capture of early larval stages of *Coryphaena hippurus* in the Mediterranean Sea.

## MATERIAL AND METHODS

A total of 1177 zooplankton samples were analysed. These plankton collections were taken all year round between 1985 and 1995, using different net types (Bongo, WP-2 and Juday-Bogoroff) and sampling methodologies (oblique, vertical and horizontal hauls), within the framework of several oceanographic research surveys and monitoring programs carried out around the Balearic Islands

(Alemany, 1997). The sampling stations were situated in neritic and oceanic waters, over the continental shelf and slope (Fig. 1). Fish larvae were sorted and identified to specific level (Alemany, 1997). From the specimens identified as *Coryphaena hippurus* larvae, the following measures were taken:

- Standard length: the distance along the midline of the body from the tip of the snout to the end of the urostyle.
- Preanal length: the distance along the midline of the body from the tip of the snout to the anus.
- Head length: the distance along the midline of the body from the tip of the snout to the posterior margin of the cleithrum.
- Eye diameter: horizontal eye diameter
- Preocular length: the distance along the midline of the body from the tip of the snout to the anterior margin of the eye.

TABLE 1. – Morphometric characteristics of the four *Coryphaena hippurus* larvae caught in the Mediterranean Sea (all measurements are in millimetres; conserved material in formaldehyde 4% in sea water).

Specimen	Standard length	Preanal length	Head length	Eye diameter	Preocular length	Body depth at cleithrum	Body depth at anus
1	4.80	3.00	1.00	0.32	0.25	0.57	0.27
2	3.55	2.37	0.85	0.27	0.15	0.52	0.27
3	3.25	2.00	0.80	0.30	0.25	0.60	0.25
4	3.25	1.97	0.75	0.27	0.17	0.50	0.25

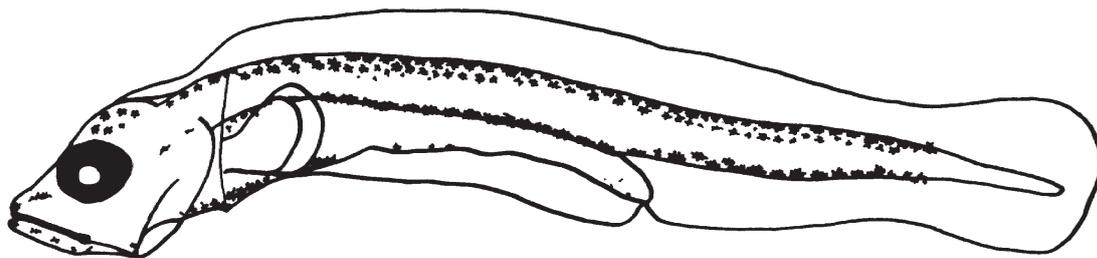


FIG. 2. – Early larval stage of *Coryphaena hippurus* caught in the Mediterranean Sea (4.8 mm standard length; 40 magnifications).

- Body depth at the inferior part of the cleithrum.
- Body depth at the anus.

## RESULTS AND DISCUSSION

Four specimens, between 3.25 and 4.80 mm standard length (Table 1), were identified as *Coryphaena hippurus* larvae by their morphology and pigmentation pattern, following the descriptions of Mito (1960) and Ditty *et al.* (1994). These larvae were also compared with a complete series of *Coryphaena hippurus* larvae from 0 to 38 days old reared in captivity, at a constant temperature of 26–27°C, by the aquaculture company Pisciculture Marine de Monaco S.A.M. (Massutí, 1997).

The four captured larvae were at the same stage of development. They were very similar to the 3.5 mm larvae described by Ditty *et al.* (1994). The eyes were fully pigmented, but the preopercular spines were not developed yet and there were no melanophores on the primordial fin. These larvae were shorter and less pigmented than the examined 3-day old reared larvae, which presented the same development stage, due probably to the shrinkage of the captured larvae during preservation in 4% formalin. One of these four larvae (deposited in the C.O.B. Ichthyoplanktonic Collection) is well conserved and is represented in Fig. 2, while the others seemed to be more affected by shrinkage.

Three larvae were caught in June 1988 at offshore stations, and one in June 1990 at a neritic station (Fig. 1). In 1988, the three larvae were sampled with a Juday-Bogoroff net, in horizontal hauls towed at 0 m, at two stations placed over the slope, at approximately 500 and 700 m in depth and 12 and 15 nautical miles from the northwestern coast of Majorca. The fourth larvae appeared in a sample taken with a 20 cm mouth diameter Bongo net, also

towed horizontally through the surface layer. This station was sited in neritic waters of Palma Bay, at a depth of approximately 50 m and 2 nautical miles from the coast.

Due to the low number of larvae caught, it was not possible to reach any conclusion about the location of the spawning grounds of *Coryphaena hippurus* and its larval abundance in the Mediterranean. Nevertheless, the capture of three larvae in oceanic waters seems to be in accordance with the results obtained by Ditty *et al.* (1994) in the Gulf of Mexico, where the collection of preflexion larvae (<7 mm standard length) of this species at stations primarily beyond the continental shelf seems to indicate that spawning occurs in oceanic waters. The presence of a single larva in a neritic station located in Palma Bay does not invalidate this hypothesis, since the presence in this area of oceanic zooplanktonic species, due to the offshore-inshore currents, has been previously reported (Jansá and Carbonell, 1988). Also larvae of typically oceanic or deep water fishes are relatively frequent at this station (Alemany, 1997).

The capture of *Coryphaena hippurus* larvae in June is in agreement with the proposed seasonal life cycle of this species in the Western Mediterranean, with a spawning peak in June–July, confirmed by monthly progression of the maturity stage and gonadosomatic index in adult fish, and with back-calculated birthdates determined from daily growth rings in the otoliths of juvenile specimens (Massutí, 1997).

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