

## NEW RECORDS OF THE EARLY LIFE HISTORY STAGES OF LOUVAR, *LUVARUS IMPERIALIS* RAFINESQUE, 1810, FROM THE EASTERN ADRIATIC

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### ABSTRACT

*Louvar*, *Luvarus imperialis* Rafinesque, 1810, is a very rare species in the Adriatic Sea. Two specimens, "hystricinella" and "astrodermella" stages, were caught in the eastern central Adriatic in June and December 1994. The record of "hystricinella" stage is the first for the eastern Adriatic. The main morphometric and meristic data are given. The June record shows that this species probably spawns in the eastern Adriatic. The spreading of the louvar in the Adriatic is probably related to the "Adriatic ingressions", which are expected to be confirmed later. The status of the louvar needs to be evaluated on a continuous basis because it is becoming increasingly apparent that uncommon species, and particularly those on the edge of their distribution, can be indicators of environmental change.

**Key words:** *Luvarus imperialis*, "hystricinella", "astrodermella", records, eastern Adriatic

### INTRODUCTION

Louvar, *Luvarus imperialis* Rafinesque, 1810, is an epi- and mesopelagic species occurring from Bergen (Norway) to Madeira and near Azores as well as in the Mediterranean (mainly western part). Elsewhere, it is possible to find it in southern parts of the Atlantic, and in northern and southern parts of Indo-Pacific (Japan, Australia). Louvar is a rare species and we know little about its biology (Decamps, 1986). Louvars have been reported from most of the world's oceans and seas, but nowhere are they considered abundant. According to Jardas (1996) it is also very rare in the Adriatic Sea.

Its basic morphological features are: deep and compressed body, tapering to a slender caudal peduncle with a strong fleshy horizontal keel and a pair of smaller keels at the base of caudal fin on each side. Bulky head, its dorsal profile rising steeply from snout; low down mouth, small and toothless (teeth present in juveniles), small and low down eye. Well developed pectoral fins, rudimentary pelvic fins; dorsal fin set far back on body, anal fin similarly far back in adults; lunate caudal fin. Colour is highly distinctive, the back is metallic blue, the flanks are pink-red, the silvery belly with rosy reflections; pectoral, anal and caudal fins are pink or red, dor-

sal fin is pink in front, then blackish. Up to a standard length of 188 cm, usually 60-152 cm (Decamps, 1986). Tortonese (1975) reported that louvar is going through three stages during its life: "hystricinella" (from 0.5 to 2.6 cm), "astrodermella" (from 2.6 to 40 cm), and "luvarella" (from 40 to 100 cm). The same author (1975) reported about the morphological and meristic differences between the early life history stages of louvar and adult specimens.

Very little is known about the life history of the louvar. Length and weight data are incomplete for most specimens that have been examined in the world (Gotshall & Fitch, 1968). There is no published information on biology and ecology in the eastern Adriatic. The aim of this paper is to present new records of the early life history stages of louvar in the eastern Adriatic, together with their biometric and meristic characteristics.

### MATERIAL AND METHODS

One louvar larva ("hystricinella" stage) was caught by Helgoland plankton net at the station "Split Gate" in the eastern central Adriatic (Fig. 1) in June 1994. The specimen was accurately identified on the basis of the description presented by Roule and Angel (1930). One

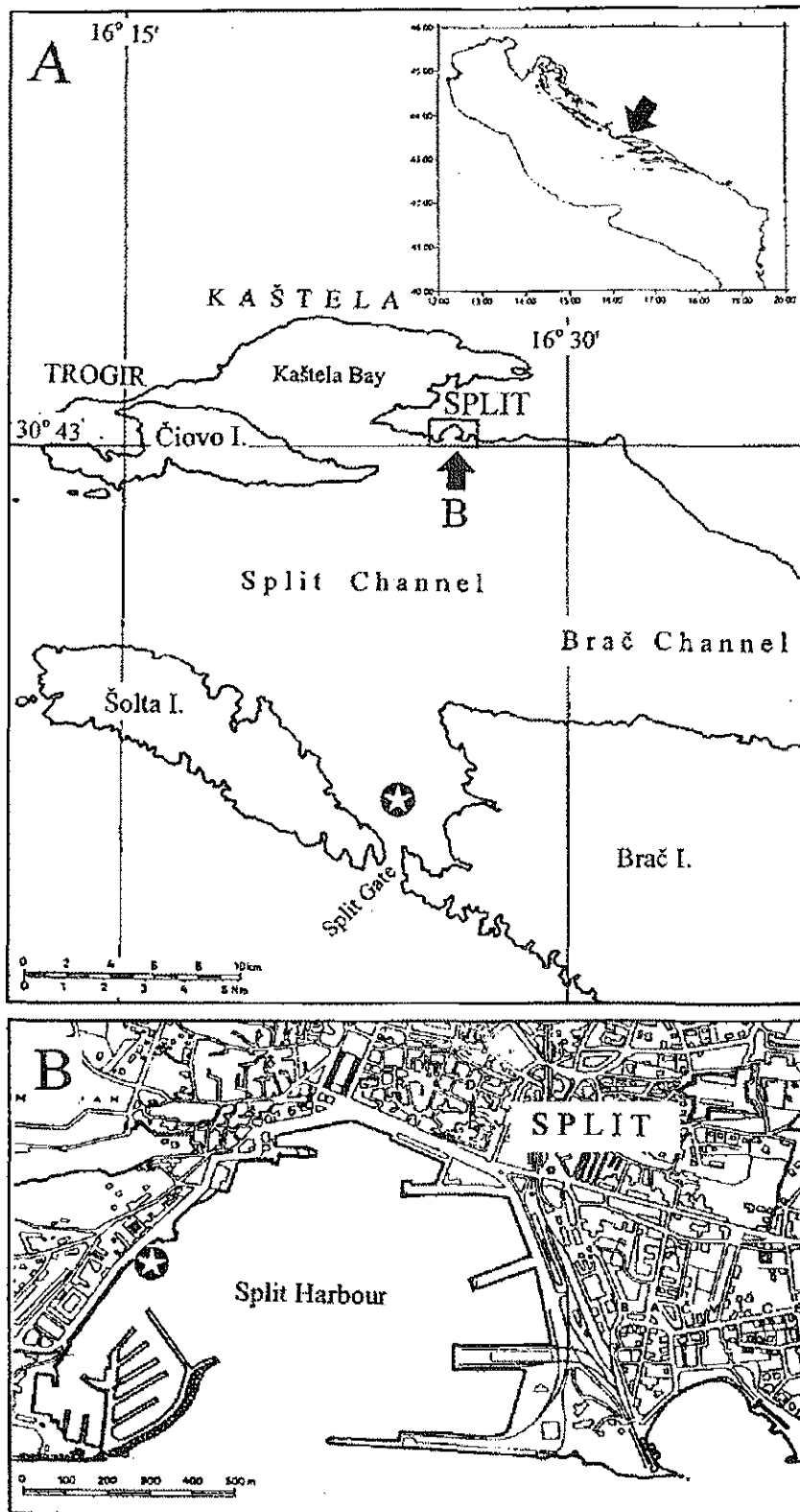


Fig. 1: Geographic locations of *Luvarus imperialis* records in the eastern Adriatic: A - Split Gate; B - Split Harbour (eastern middle Adriatic).

Sl. 1: Lokaciji petelinke (*Luvarus imperialis*) v vzhodnem Jadranu: A - Splitska vrata; B - Splitsko pristanišče (vzhodni srednji Jadran).

louvar juvenile ("astrodermella" stage) was caught by hand in Split Harbour in December 1994 (Fig. 1). The specimen was accurately identified according to the taxonomic keys provided by Šoljan (1975) and Jardas (1996). Both present specimens are deposited in the Ichthyological collection of the Institute of Oceanography and Fisheries in Split. "Hystricinella" stage was preserved in 4% formalin immediately after its capture. Morphometric measurements were taken on fresh specimen to the nearest 0.1 mm. The considered meristic characteristics were dorsal, anal, pectoral, pelvic fin and number of gill rakers. The ventral and pectoral fin in "hystricinella" and ventral fin in "astrodermella" stage were damaged. It was not possible for us to take all morphometric measurements for the "hystricinella" stage, since some parts of the body had been damaged during sampling.

**RESULTS AND DISCUSSION**

Louvar records from the Adriatic are generally very rare and occasional. Kolombatović (1886, 1893) noted down that he saw one big specimen of louvar (without any measurements) on the sandy beach near Split (Dalmatia, Croatia) in 1875, and one specimen of *Astrodermus elegans* Bonaparte, 1832 (total length 30 cm) near Trogir (town 25 km from Split) on October 22<sup>nd</sup> 1888. He affirmed that *A. elegans* was a juvenile stage of louvar. In the Ichthyological collection of the Croatian Natural History Museum (collection no. 2085) there is a specimen caught near the island of Vis (eastern central Adriatic) on December 6<sup>th</sup> 1898 gifted by Kolombatović. Graeffe (1906) reported a record of one adult specimen in the Gulf of Trieste. The last record of louvar was in the *Thunnus thynnus* trap net catches in August 1955 in the Bakar Bay - northern Adriatic (total length 150 cm) (Crmković, 1957). No other data have been given on this species in the eastern Adriatic until now. In 1994 two specimens of louvar were caught in the eastern central Adriatic: "hystricinella" (standard length 6.9 mm) (Fig. 2) and "astrodermella" stage (total length 238 mm) (Fig. 3). According to the previous data we could say that the record of the "hystricinella" stage is the first one for the eastern Adriatic. Diagnostic characteristics: a) morphology - deep-bodied but not as kite-shaped as acanthurids; large square-shaped head with small terminal mouth; extensive head spination; with development, minute spines on soft rays and along body surface; dorsal and pelvic spines elongate, finely serrated; loss of meristic elements with growth; b) pigment - few spots on upper jaw; with development above urostyle; lightly on caudal fin, hypural region with several spots; on gut; with development on pectoral fin rays. In the early life history stages unlike adults, the median fins are longer and further forward, the mouth is toothed and the body and fins are black-spotted.

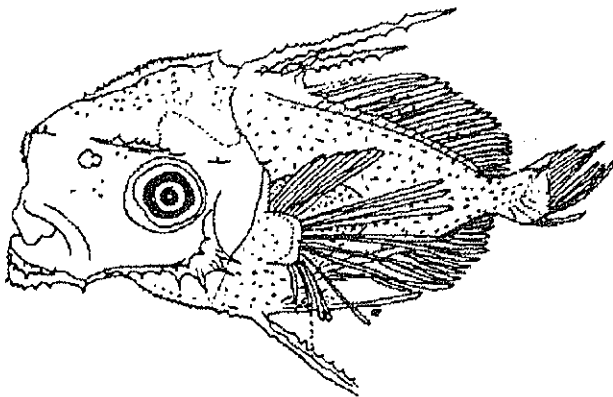
Fresh specimen of "astrodermella" (kept in freezer) and preserved specimen of "hystricinella" (preserved in 4% formalin) were analysed for diagnostic morphometric and meristic characteristics (Table 1). The meristic characteristics of both stages closely correspond with data by Decamps (1986) and Matarese *et al.* (1989), *i.e.* D 22-24, A 15-18 and D 24, A 18, P 4, respectively; but differ from those reported by Gotshall & Fitch (1968). Counts were made on five louvars captured between northern California and San Pablo Point, Baja California. Four of these had 22 vertebrae including the hypural, and one had 23. Dorsal and anal fin ray counts were made on only two of these five fish, and these were identical (13 and 14, respectively), as were the gill raker counts made on the same two specimens (4+1+11=16). The 600 mm SL Humboldt Bay louvar had dorsal, anal, and gill raker counts of 17, 17, and 6+14, respectively.

**Tab. 1: Morphometric (in mm) and meristic data on two specimens of louvar caught in the eastern central Adriatic.**

**Tab. 1: Morfometrični (v mm) in meristični podatki o dveh primerkih petelinke, ujetih v vzhodnem srednjem Jadranu.**

	"Hystricinella" stage	"Astrodermella" stage
Total length	-	238
Fork length	-	210
Standard length	6.9	189
Predorsal length	-	33.3
Preanal length	4.2	72.8
Preventral length	-	58.3
Prepectoral length	-	59.6
Dorsal fin, length	-	126.8
Anal fin, length	-	97.7
Pectoral fin, length	-	52.8
Ventral fin, length	-	36.2
Body depth (max)	-	62.9
Body depth (min)	-	5.2
Head length	-	56.9
Ocular diameter (hor.)	-	11.4
Postorbital length	-	25.5
Preorbital length	-	20.7
Dorsal fin rays	22	23
Anal fin rays	18	19
Pectoral fin rays	DAMAGED	18
Pelvic fin rays	4	4
Ventral fin rays	DAMAGED	DAMAGED
Gill rakers	-	17+11 (28)

As few adult stages were caught and since there were no previous records of "hystricinella" stage, the following question was raised: "Does the louvar spawn in the eastern Adriatic?" Its June record shows that this species probably spawns in the eastern Adriatic, especially when we take into consideration that the louvar spawns in late spring and summer in the Mediterranean



**Fig. 2:** *Luvarus imperialis* - "hystricinella" stage (6.9 mm SL).

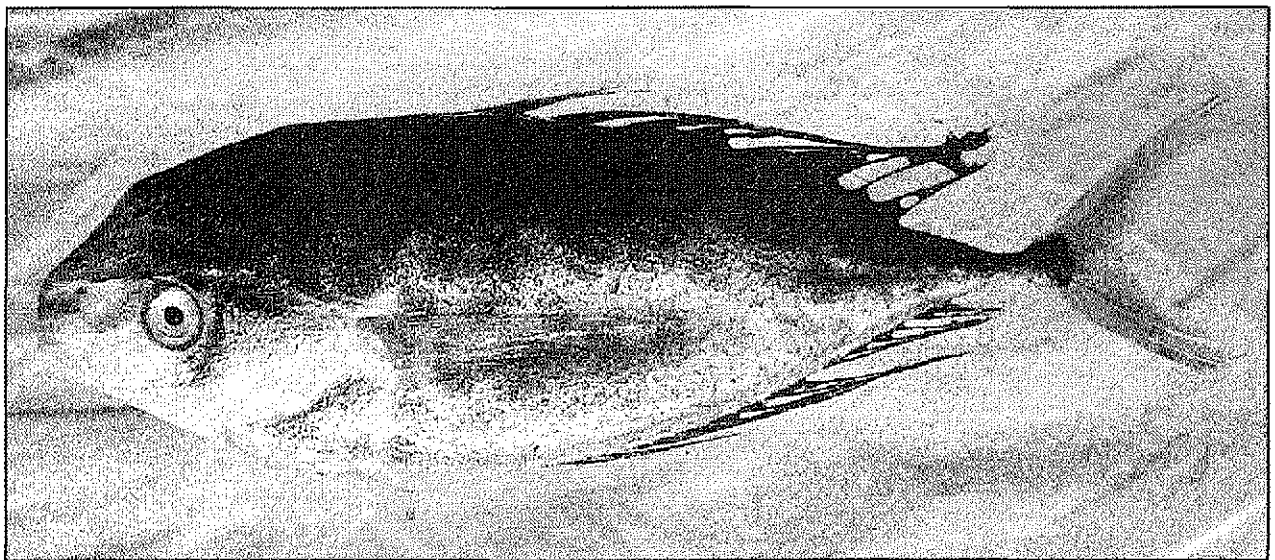
**Sl. 2:** *Luvarus imperialis* - razvojna stopnja "hystricinella" (6,9 mm SL).

(Decamps, 1986). Fitch & Lavenberg (1971) stated that the spawning season of louvar in the Californian waters is in spring-early summer period. Louvar age and size at maturity is unknown. The 167 cm female landed at Morro Bay on 17 May 1953 had very large and presumably ripe ovaries (Fitch, 1953).

It should be emphasized that the eastern Adriatic in

1994 was characterised by frequent first new records of some larvae and juveniles, e.g. larva of a mesopelagic species *Trachipterus trachipterus* (Dulčić, 1996), juvenile of the grey triggerfish *Balistes carolinensis* (Dulčić *et al.*, 1997a), and juvenile of *Trachinotus ovatus* (Dulčić *et al.*, 1997b). This could be connected with some special climatological and oceanographical conditions in 1994 and input of intermedian waters (50-100 m) in the middle Adriatic, which influenced the increase in the salinity and temperature (Marasović *et al.*, 1995). It is also interesting that two specimens of *Tylosurus acus imperialis*, a fish new to the Adriatic Sea, were captured in the south Adriatic Sea on 23 May 1994 (Bello, 1995). Similar sporadic records of some fishes and other marine animals have been reported earlier as well. Their occurrence has been attempted to be accounted for by the "Adriatic ingressions" (Jardas, 1980; Vučetić, 1981; Pallaoro, 1988; Jardas & Pallaoro, 1996) or intensified penetration of warmer and more saline water from the eastern Mediterranean into the Adriatic (Buljan, 1953).

The status of the louvar needs to be evaluated on a continuous basis because it is becoming increasingly evident that uncommon species, and particularly those on the edge of their distribution, can be essential indicators of environmental change.



**Fig. 3:** *Luvarus imperialis* - "astrodermella" stage (238 mm TL).

**Sl. 3:** *Luvarus imperialis* - razvojna stopnja "astrodermella" (238 mm TL).

NOVI ZAPISI O ZGODNJI RAZVOJNI STOPNJI PETELINKE (*LUVARUS IMPERIALIS*)  
RAFINESQUE, 1810, IZ VZHODNEGA JADRANA

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## POVZETEK

*Petelinika* (*Luvarus imperialis*) Rafinesque, 1810 je zelo redka vrsta v Jadranskem morju. V članku so zajeti glavni morfometrični in meristični podatki o zgodnjih razvojnih stopnjah te ribe. Junjski zapisi kažejo, da se petelinika najbrž drsti v vzhodnem Jadranu. Njeno širjenje po Jadranu je bržkone povezano s tako imenovanimi "jadranskimi dotoki", za katere pričakujemo, da jih bomo pozneje lahko tudi potrdili. Status petelinke bi bilo treba oceniti na trajni osnovi, saj postaja vse bolj očitno, da so neobičajne vrste, predvsem tiste na robu svoje razširjenosti, lahko pomemben kazalec sprememb v okolju.

**Ključne besede:** *Luvarus imperialis*, "hystericinella", "astrodermella", zapisi, vzhodni Jadran

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