

MEDUSIVOROUS FISHES OF THE LIGURIAN SEA 1. CHUB MACKERELS AND OTHER PELAGIC FISH SPECIES SOMETIMES “HAVE THE MEDUSA” *PELAGIA NOCTILUCA*

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Abstract

During blooms of *Pelagia noctiluca* periodically occurring in the Ligurian Sea (North Western Mediterranean), a natural mark, formed by the jellyfish pigments, characterizes fish eating this species.

Keywords: *Western Mediterranean, Medusae, Pigments, Fishes*

CIESM is promoting observations about gelatinous zooplankton blooms, in particular those of jellyfish, which may be related to basic transformations of ecosystems, both of climatic and anthropogenic nature (1, 2). Such renewed attention to medusozoans has the consequence that parallel studies should be carried out about the consume of jellyfish by many marine organisms (3), particularly the most abundant fishes (4, 5); in fact if fishing or other anthropic activities are mentioned among possible causes of jellyfish blooms (2), it is necessary to know the trophic relationship among the concerned organisms.

Worldwide studies about medusivorous fish (3, 4, 5) allow us to list the following species which are also part of Mediterranean ichthyofauna, with indication in parenthesis, of the area in which the jellyfish consume was observed: *Squalus acanthias* (North Sea), *Etmopterus spinax* (North Atlantic), *Centroscymnus coelolepis* (North Atlantic), *Alepocephalus rostratus* (South Atlantic, Mediterranean sea), *Scorpaenopsis diabolus* (North Atlantic), *Boops boops* (Gulf of Tunis), *Trachurus trachurus* (North Sea), *Coryphaena hippurus* (Mediterranean Sea),

Sparus aurata (New Zealand waters), *Scorpaenopsis diabolus* (Japanese waters), *Scorpaenopsis diabolus* (Baltic Sea, North Sea, Western North Atlantic), *Luvarus imperialis* (Eastern North Atlantic), *Centrolophus niger* (Mediterranean Sea), *Hyperglyphe perciformis* (Gulf of Maine), *Schedophilus medusophagus* (Mediterranean Sea, North Atlantic), *Stromateus fiatola* (Mediterranean Sea), *Mola mola* (North Atlantic, Japanese waters, Gulf of Maine, North Pacific), *Ranzania laevis* (North Atlantic). Only in few cases the consume of jellyfish have been observed in the Mediterranean; in particular the observations regarding Mediterranean stromateoid fishes occurred in Italian waters more than one century ago, thanks to Anastasio Cocco and Salvatore Lo Bianco.

All the listed fish species are present in the Ligurian Sea, an area of recognized richness of pelagic life (6), including offshore and coastal protected areas, such as the Cetacean Sanctuary and Portofino MPA, both SPAMI under the Barcelona convention. During recent blooms of *Pelagia noctiluca* we have ascertained its consume by four species of fish, three of them already known as medusivorous, i.e. *S. colias*, *T. trachurus* and *S. medusophagus* (7) and one, *Oblada melanura*, representing a new entry in the group. With regard to prey, *P. noctiluca* is well known in our study area. On the basis of impact on anthropic activities, organized research (frequently on international basis), assembled knowledge (but not all life cycle is exhaustively known), *P. noctiluca* can be placed in the top six jellyfish species of the world (8). Fluctuations of abundance of *P. noctiluca* in the Ligurian Sea have been studied assembling 200 years of Mediterranean records (9). A twelve years periodicity was found, each period being formed by groups of years with and without blooms of this species. Using a forecasting model, climatic variables, notably temperature, rainfall and atmospheric pressure appeared to predict years with *Pelagia*.

P. noctiluca has an olopelagic life history: a large egg (0.3 mm) gives rise to larval forms (*ephyrae*) which in three months become young *medusae* (8). The nice pink-lilac colour of *P. noctiluca* is due to four different pigments, a brown, a magenta and two blue substances, distributed with sexual dichromism in mature individuals (8). When fish eat large quantities of *P. noctiluca*, pigments and/or their indigested residues reach a great concentration in the gut colouring the entire intestinal tract, to the anus (7).

During the most recent blooms (from 2006 onward), *Scorpaenopsis diabolus*, *Trachurus trachurus*, *Oblada melanura* arrived to the market with the mark of *P. noctiluca*, that is presenting the anal rim surrounded by a violet blot (fig. 1). This fact brought to a popular level the knowledge of jellyfish consume: asked for the reason of such colour, fishermen and retailers simply answer that the fish “has the medusa”.

In conclusion: 1) consume of jellyfish is not easily studied, given the fragility of tissues and the necessity to look for specific structures such as nematocysts at the microscope. In the case of *Pelagia* probably a relevant part of predation occurs on larvae and goes unnoticed. But when the stage of medusa is reached and aggregations are forming, studies on consumers are made easier by the natural mark; 2) chub and horse mackerels are able to use large quantities of *P.*

noctiluca, because of their massive presence. In fact these species are in a growing phase since at least ten years (10); 3) in healthy pelagic ecosystems (the Ligurian Sea has a very important presence of top predators and a reduced fishery pressure), global warming is probably enhancing the presence of some jellyfish species and of their consumers as well, maybe building new balances.



Fig. 1. Gut content coloured by *Pelagia noctiluca* pigments in the chub mackerel *Scorpaenopsis diabolus* (photo by Giulio Relini)

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