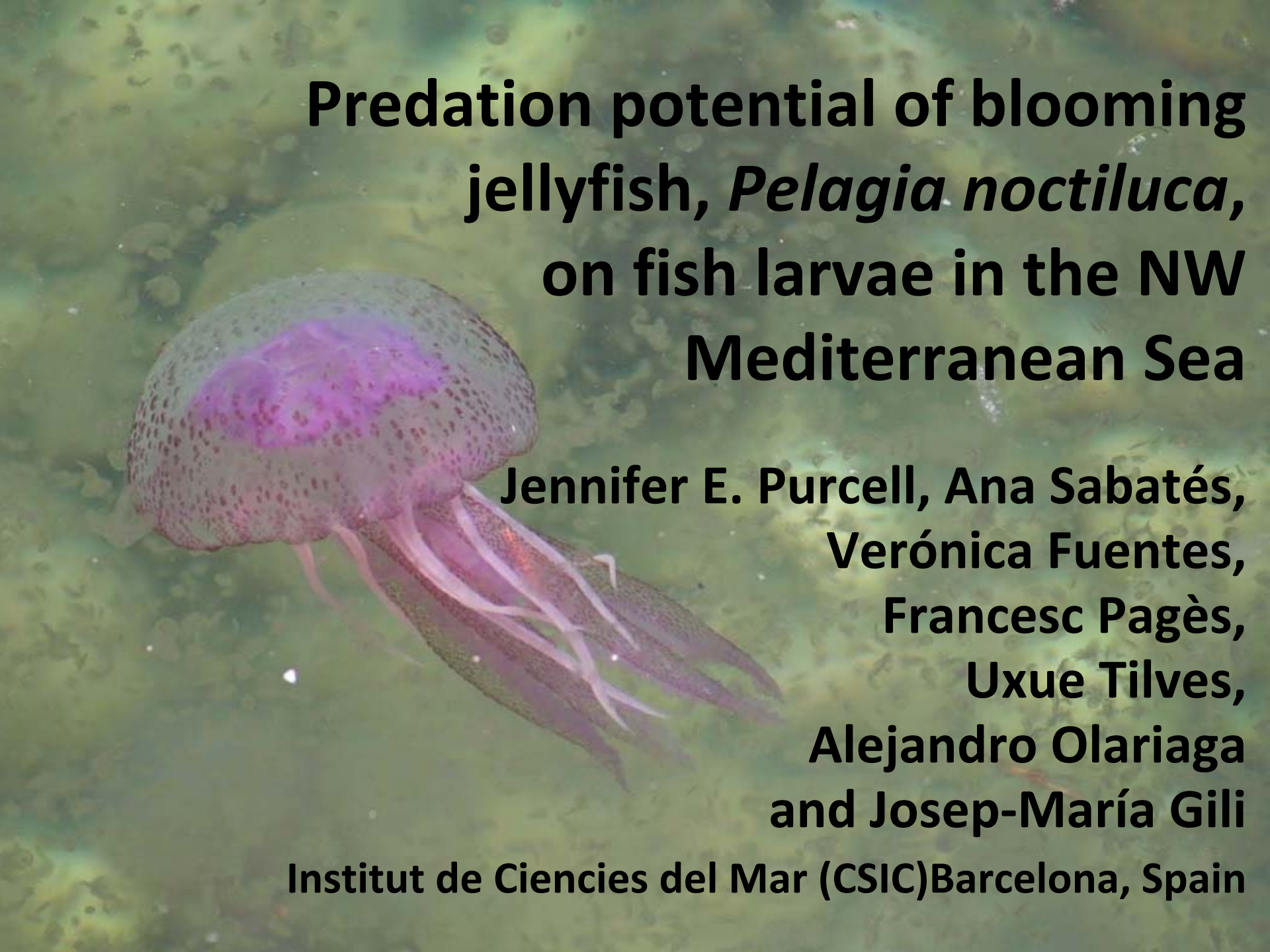

Predation potential of blooming jellyfish, *Pelagia noctiluca*, on fish larvae in the NW Mediterranean Sea

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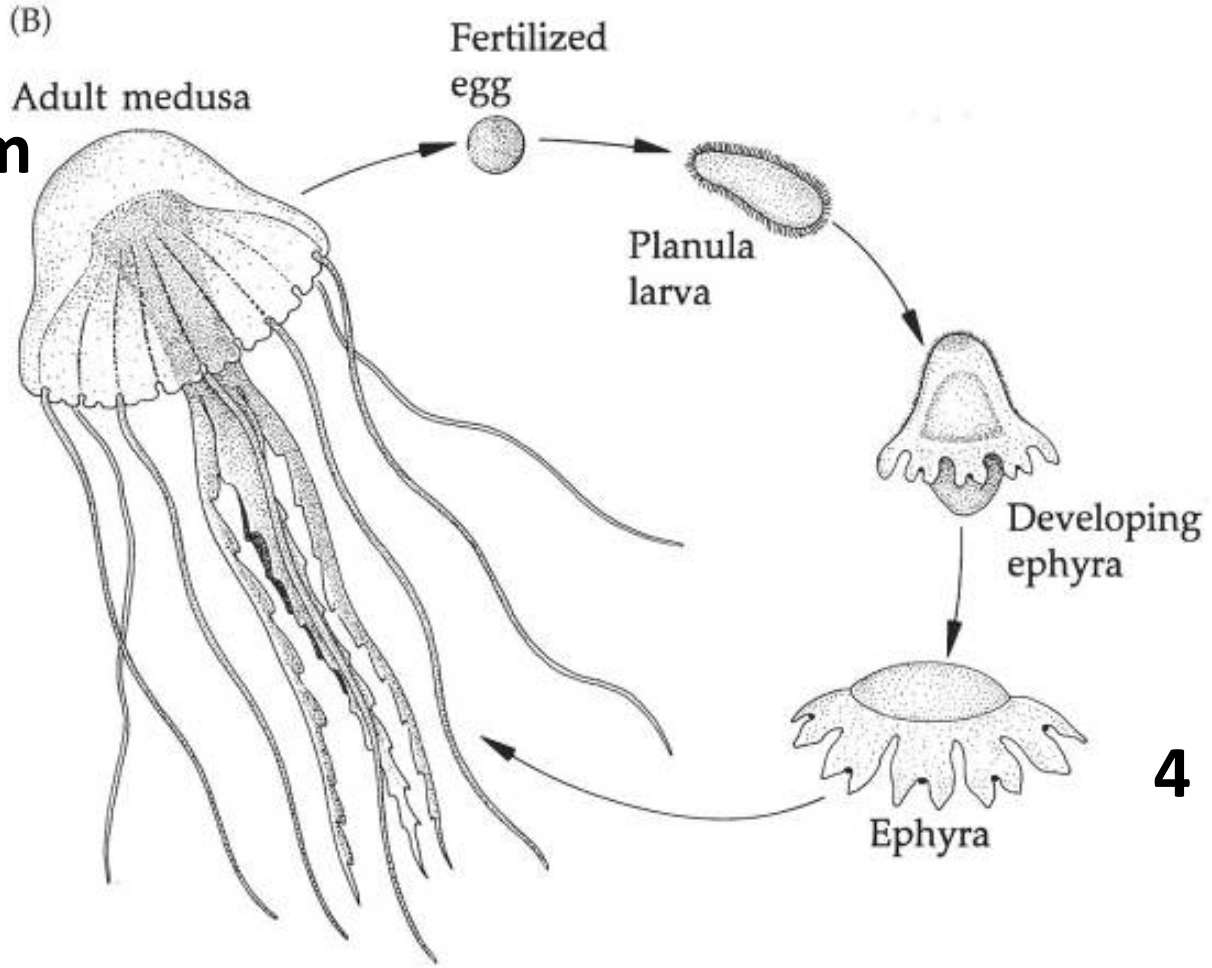
Life cycle of *Pelagia*

No polyp stage: planula → ephyra→ medusa



30-150 mm

4 mm

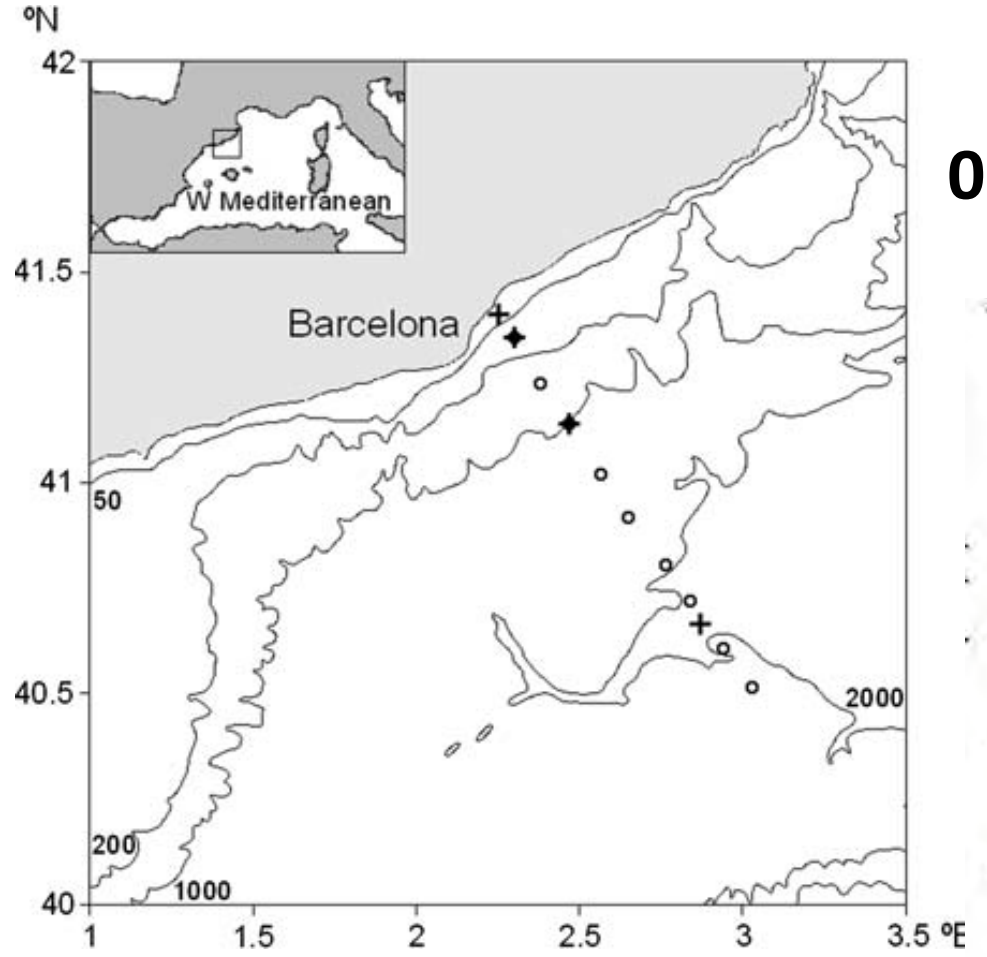
Pelagia is distributed worldwide

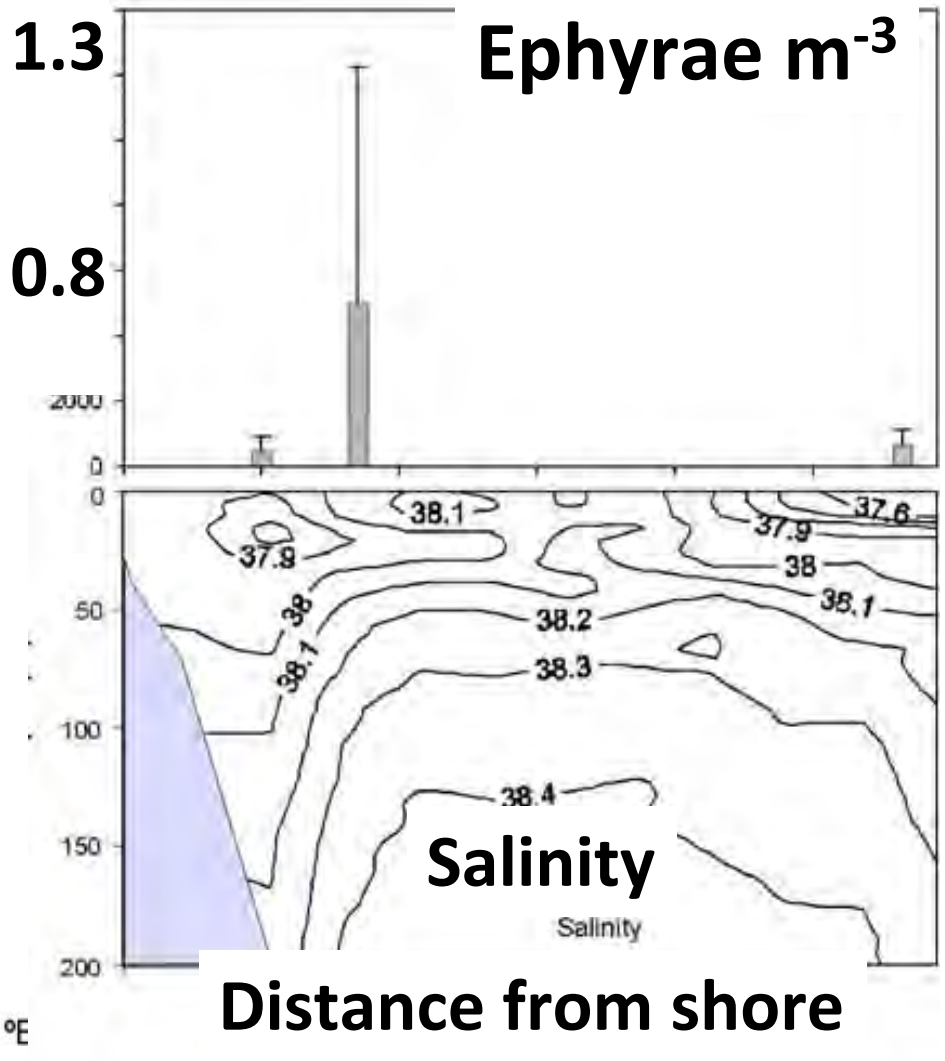
Is *Pelagia* also an important predator and competitor of fish?

Study of *Pelagia* distribution and feeding in the NW Mediterranean Sea

(Sabatés et al. 2010. Hydrobiologia 645: 153-165.)

18-23 June 1995





Prey found in *Pelagia* ephyrae collected in 200-m vertical tows

Prey items	Shelf	Front	Open sea
Copepods	72 %	49 %	57 %
Other crustaceans	4 %	25 %	15 %
Molluscs	8 %	3 %	5 %
Siphonophores	4 %	1 %	2 %
Chaetognaths	4 %	6 %	2 %
Appendicularians	—	2 %	12 %
Fish larvae	8 %	12 %	5 %
Total number of prey	25	224	84

Pelagia ate various fish larvae

Fish larvae eaten	Shelf	Front	Open sea
Anchovy (*Engraulis encrasicolus*)	—	38 %	—
Ceratoscopelus maderensis	—	21 %	—
Hygophum benoiti	50 %	4 %	20 %
Lampanyctus crocodilus	50 %	8 %	60 %
Lampanyctus pusillus	—	—	20 %
Myctophum punctatum	—	4 %	—
Vinciguerria sp.	—	4 %	—
Sparidae	—	4 %	—
Unidentified	—	17 %	—
Total number of larvae in guts	2	26	5

Estimating feeding impacts from gut contents in combination with digestion rates

To calculate feeding rate:

 # prey in gut / digestion time = individual feeding rate

= prey eaten time^{-1}

To calculate impact in sea, you also need the numbers of predators m^{-3} and prey m^{-3}

#prey eaten time^{-1} X #predators m^{-3} / #prey m^{-3} = impact

Impact = proportion of prey standing stock eaten time^{-1}

Sabatés et al. (2010) had gut contents, but we needed digestion times for *Pelagia*

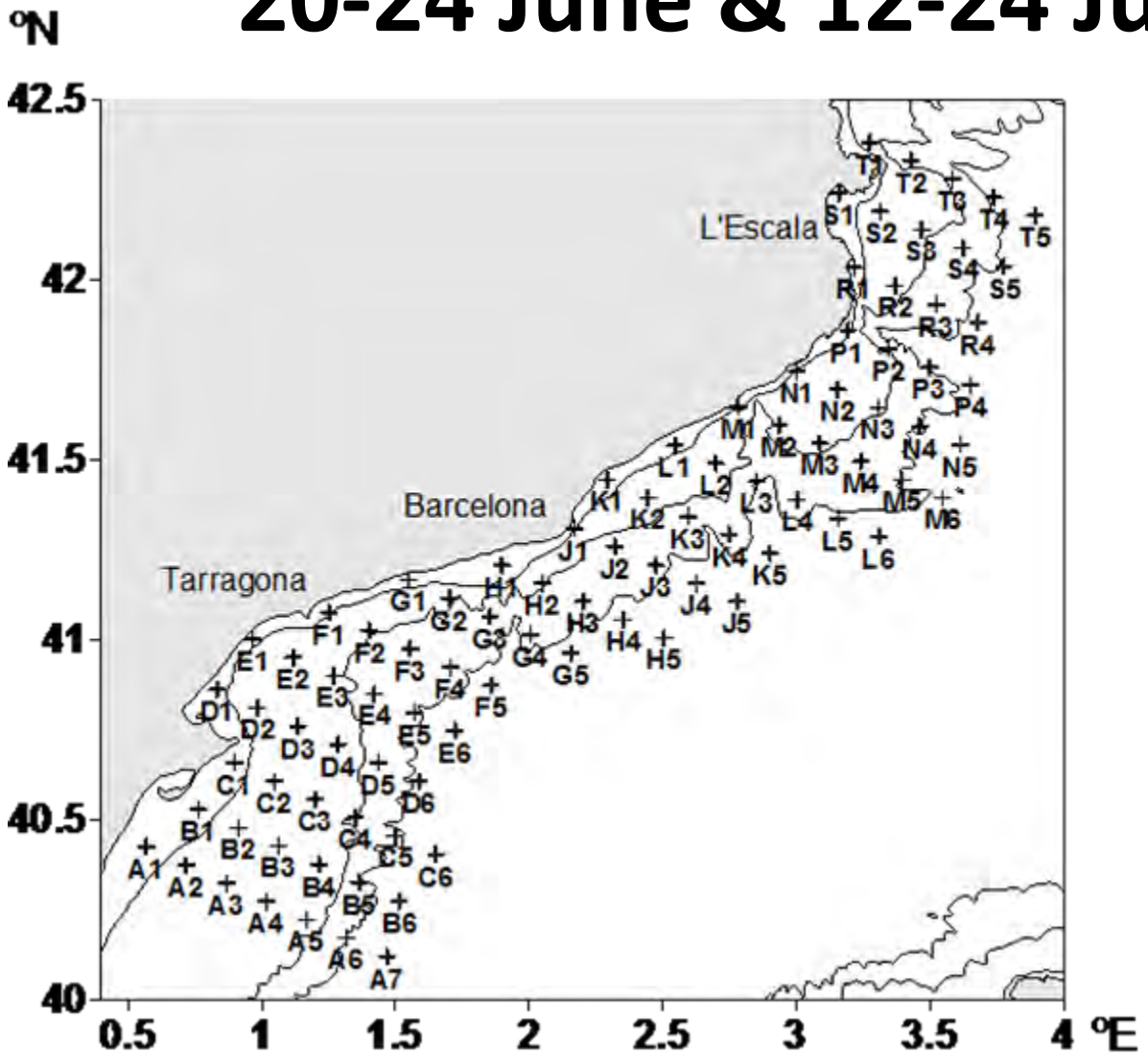
Digestion and recognition times of *Pelagia* given one fish larva (mean)

Diameter D (mm)	No.	Fish larva length L (mm)	Digestion Time	Significant Regression Factors	Recognition Time
Medusae 25–110 (49 mm)	50	4–35 (6.8 mm)	0.3–9.0 h (2.5 h)	T °C $p<0.001$	0.2–5.8 h (1.2 h)
Ephyrae 4–22 (13.4 mm)	110	1.5–13 (5.9 mm)	0.3–8.3 h (2.5 h)	L $p < 0.001$ T °C $p = 0.01$ D $p < 0.001$	0.3–5.8 h (1.2 h)

Calculated impact of *Pelagia* on fish larvae in 1995

	Shelf	Front	Open sea
No. of fish larvae eaten	2	26	5
No. of ephyrae examined	145	4400	1135
No. of larvae in each	0.014	0.006	0.004
No. of larvae per m^3	1.000	0.700	0.100
No. of ephyrae per m^3	0.470	5.012	0.646
If used 2.5 h digestion time % larvae eaten per day	5.2 %	33.8 %	22.8 %
If used 1.2 h recognition time % larvae eaten per day	10.8 %	70.5 %	47.4 %

Current Fish-Jelly Project cruises 15 June-5 July 2011 and 20-24 June & 12-24 July 2012

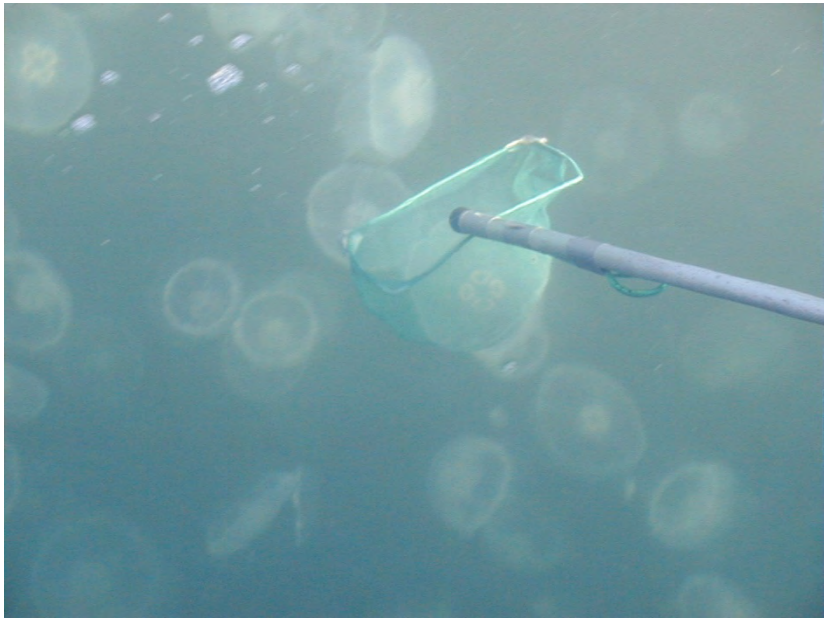


NW Mediterranean Sea

Collection of jellyfish for gut contents

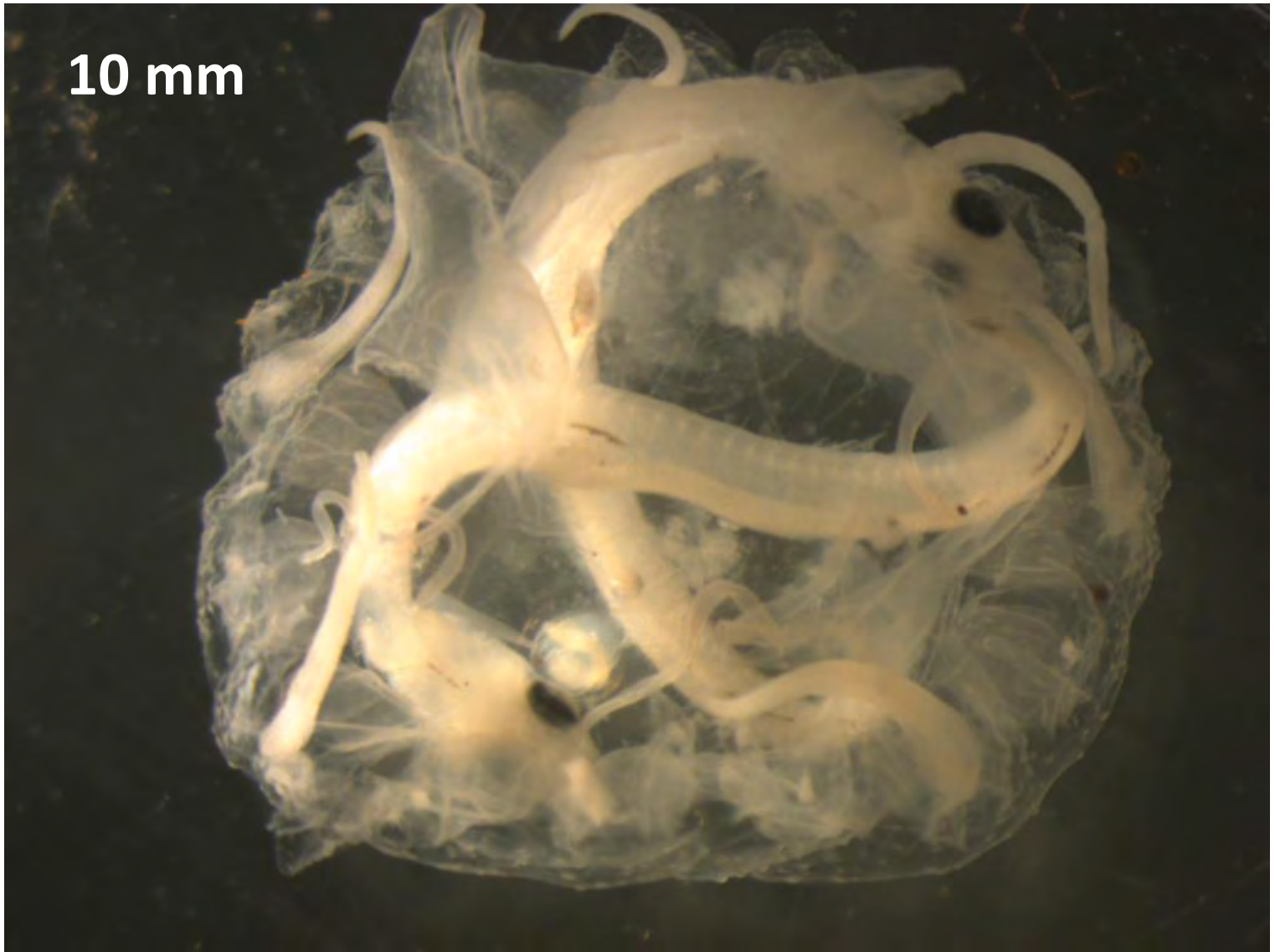
Problems with plankton tow collection for gut content analyses

- **Only small jellies (ephyrae, hydromedusae, ctenophores) can be used**
- **Some species spit out prey in the net**
- **Some species eat prey in the net**



***Pelagia* were collected for gut analysis by 'dipping' in 2011 and 2012**

Pelagia ephyrae contained an amazing number of fish larvae and eggs



Comparison of net-collected and dipped ephyrae

	1995 (net)	2011 & 2012 (dip)
% ephyrae with prey	8 %	57 %
% ephyrae with fish larvae	7.5 %	14 %
% ephyrae with fish eggs	0 %	10 %

The potential predation on fish eggs and larvae is even greater than estimated from net samples

Jelly predators of fish eggs and larvae

Species	% eaten/d	Location	Reference
Siphonophores	various	Gulf of California	Purcell 1981
Rhizophysa	28 % larvae		
Physalia	60 % larvae	Gulf of Mexico	Purcell 1984
Hydromedusa	herring	Vancouver	Purcell 1989,
Aequorea	≤97 % larvae	Island	1990, 1991
Scyphomedusae	anchovy		
Chrysaora	8-50 % eggs	Chesapeake Bay	Purcell et al.
	10-54% larvae		1994
Pelagia	5-70% larvae	NWMediterranean	This study
Ctenophore	1-44 % eggs	Chesapeake Bay	Purcell et al.
Mnemiopsis	10-54% larvae		1994

But most species have not been studied!

190 species of scyphomedusae (Arai 1997)

20 species of cubomedusae (Mianzan & Cornelius 1999)

840 species of hydromedusae (Boullion & Boero 2000)

200 species of siphonophores (Pugh 1999)

150 species of ctenophores (Mianzan 1999)