PRELIMINARY RESULTS ON THE EFFECTS OF MOBILE FISHING GEAR ON BENTIC HABITAT OFF THE CATALAN COAST

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The fishing activity in the Catalan coast uses a variety of mobile gear types. The most common are bottom trawl and dredge. The impact of these harvesting methods may have on fishing stocks and the habitat supporting them is still to be determined. The main objectives of this study are: a) to analyze and compare the effects of the disturbance of these two gears on the benthonic macrofauna, in terms of abundance (n° species caught per taxonomic group, in percentage) and of biomass ($Kg*h^{-1}$), and b) an initial assessment of the survival rates alteration of the animals caught. The data analyzed were collected in two Catalan ports : Sant Carles and Vilanova.

Impact on the benthonic macrofauna. The impact of the bottom trawl on the four main exploited groups, shows slight differences between the results obtained in terms of abundance and those obtained on biomass (Fig.1). The impact of the dredge on the same four taxonomic groups presents very marked differences between abundance and biomass. The results indicate that, while the two gear types catch virtually the same groups of species, the importance of each of them in the total catch differs as a function of the gear considered. This difference between the two gear types is even sharper if we compare the biomass results. In the case of the bottom trawl, fish represent the largest group in both the number of individuals and in biomass. In spite of being one of the targets of bottom trawl fishery, not all of the fish caught are marketed. Part of catch is discarded. The largest group in the dredge landings, particulary where the biomass is concerned, are the molluscs. Of this group, there is a high percentage of the two target species : *Bolinus brandaris*, representing 20.7% of the total catch, and *Chamelea gallina* with 37.16%. The remainder of the catch consists mainly of non-commercial species, which are also discarded.

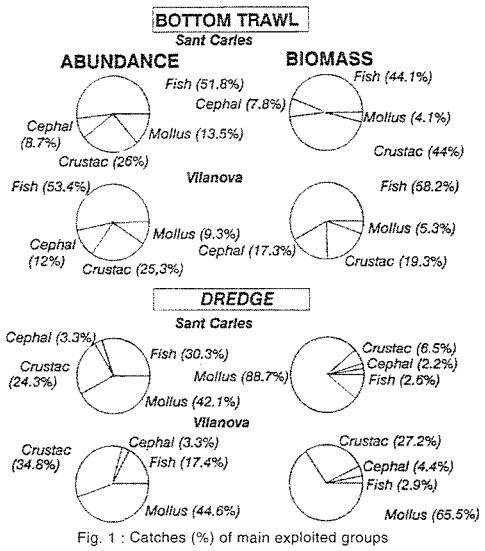

Fig. 1 : Catches (%) of main exploited groups

Surviving the net. The survival rate of the organisms descarded show a wide intra-specific variation. Assessing the by-catch groups of the hauls of dredge by port, in San Carles the most strongly affected are the echinoderms (Fig.2). Of these, the flexible types, such as holoturoids, asteroids and ophiuroids show a net survival rate of practically 90-100%. The sea urchins which are easily smashed and exposed them to predation, has the highest mortality. In Vilanova, the sessile organisms, such as posidonia, are the most disturbed by catch group, in that none of them survive. In biomass, their catch is 11-12 kg/h, the highest value in the entire haul. The tunicates, which are also flexible animals and the second most important group by weight, present a very high net survival rate. In general, the discarded fish caught with bottom trawl exhibit a minimum survival rate, for the majority of the fish are already dead when they reach deck of the boat. In contrast, the general discards of dredge show a very high survival rate, since the great majority are non-commercial molluscs, gasteropods and bivalves. Practically all of them are still alive after they have been caught and put on the deck. There is little evidence of the effect of disturbance due to dredge on the commercial species, like in fish, which are currently exploited with bottom trawl. On the other hand, it was found that this type of gear can have a very negative effect on all the species caught which are not commercial, as is the case with the posidonia and the sea urchins. Furthermore, what must also be considered is the possible benefit that the organisms able to survive the discards may have gained from the effect of the disturbance of mobile gears in the long-term.

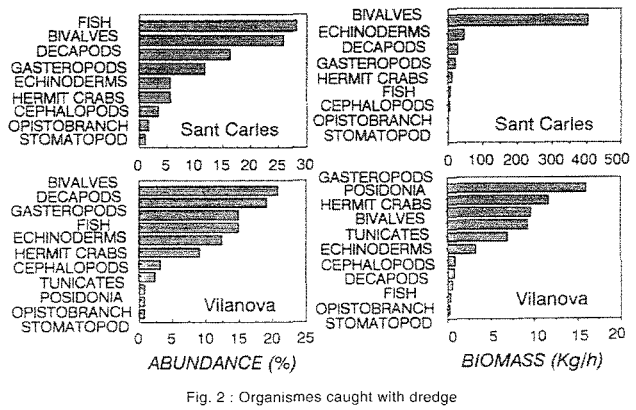

Fig. 2 : Organismes caught with dredge

This study was financed by the Generalitat de Catalunya (contract Ref. PCC 300 12/90).

PARVALBUMIN AND MYOSIN EXPRESSION IN THE TELEOST *DICENTRARCHUS LABRAX* (L.) WHITE MUSCLE DURING DEVELOPMENT

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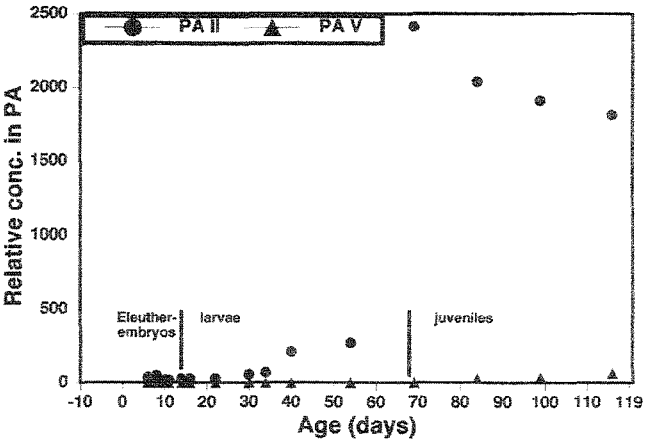
Parvalbumins are Ca^{2+}-binding polymorphic proteins that are abundant in fish white muscle sarcoplasm where they can act as muscle soluble relaxing factor.They are thermostable and display 1 to 5 muscle and species specific isoforms of nearby same low molecular weight (12 KDa). Myosin, the major myofibrillar protein, is a hexameric molecule made of two heavy chains (HC, 200 KDa) and four light chains (LC, 16 to 25 KDa). In terrestrial vertebrates, successive isoforms of HC and LC are expressed during muscle ontogeny.The sequential appearance and disappearance of different isoforms of these proteins in the muscle fibers have been recently observed in various freshwater fishes (FOCANT *et al.*,1992,1994; HURIAUX *et al.*,1994). These isoforms are most probably related to the requirements of the developmental stages of the growing fish.

The sea-bass (*Dicentrarchus labrax* L.) was chosen for this study with in view the availability of the developmental stages of this marine teleost and in order to increase our knowledge on the muscle development of this commercially important species.The specimens (from 3 days before hatching until 115 days post-hatching and adult) were kindly furnished by the "Ecloserie marine SEPIA Exploitation", Montigny-le-Bretonneux, France. Trunk muscle was dissected and muscle fiber membranes were destroyed in a buffered solution containing 50% glycerol.Sarcoplasmic proteins, including parvalbumins, were separated by centrifugation from insoluble myofibrillar material (actomyosin). After heating the sarcoplasmic extract at 80°C for 5 min in order to eliminate most of the proteins, the parvalbumin isoforms [PA II (75%) and PA V (25%) in the adult muscles] were analysed on PAGE in the presence of 10% glycerol at pH 8.6. They were separated according to their negative electric charge; their relative amounts were estimated by densitometry (versus the total sarcoplasmic protein content). The actomyosin complex was dissociated in sodium dodecylsulfate (SDS); the myosin HC and LC were respectively separated on discontinuous high (6% acrylamide, 30% glycerol, pH 8.8) and low (20% acrylamide, pH 8.4) porosity PAGE according to their molecular weight. An unforeseen finding is the very late detection of both parvalbumins and myosin despite the fact that earlier stages contain organized muscle fibers.The sequential apparition of the parvalbumin isoforms (relative amounts of PA II and PA V) during the development is illustrated in the figure.PA II appears first in the 30 days old larvae; its content reaches a maximum at 69 days (transition from larval to juvenile stage) and then slowly decreases. PA II corresponds thus to a "larval" isoform. PA V appears at this 69 days stage and augments very slowly. Myosin HC and LC are not detectable before the age of 40 days.The myosin HC of the larvae cannot be distinguished by their molecular weight from the adult ones. The stoechiometric distribution of the three light chains looks similar to that of adult myosin (LC_1 : 8%, LC_2 : 58%, LC_3 : 34%).

These results are in agreement with the histochemical observations of SCAPOLO *et al.*(1988) showing that myosin ATPase activity cannot be demonstrated in any part of the myotome before 65 days old larvae. According to these authors, the histoimmunological analysis during the different stages of the myotomal development revealed changes in the myosin composition : they suggested the presence of larval forms of myosin (Larval 1 until 28 days and Larval 2 until 20 months), analogous to the embryonic forms found in other vertebrate muscles. These forms without detectable ATPase activity could be very labile, in very low amount or not extracted in our experimental conditions. They histochemically distinguished the definitive adult form by the appearance of characteristic myosin ATPase activity, by 20 months in the trunk muscles. In barbel and trout (FOCANT *et al.*,1992,1994; HURIAUX *et al.*,1994) the "larval" parvalbumin isoform PA II rapidly increased from the hatching. Myosin light chains were also detected very early, the relative proportions of LC_1 and LC_3 quickly changing during the early steps of development. Myosin from embryonic and larval stages contained heavy chain isoforms distinct from adult ones, confirming the existence of different myosins.

Compared with other fish species, the development of the muscle of the sea-bass appears very slow and biochemically less determined. At least in the case of parvalbumins, the polymorphism constitutes a modulating mecanism for speed and power of contraction adapted to the growing fish. Older specimens are now under investigations.



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This work was supported by the FRSM of Belgium, contract N° 3.4514.93. B.F. and P.V. are "Research Associate" of the FNRS of Belgium.

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