Biology of *Trachyrhynchus trachyrhynchus* (RISSO 1810) (Osteichthyes, Macruridae) during the first years of benthic life °

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RESUME : Dans les fonds bathyaux chalutables (500-700 m) de la Mer Ligurienne *Trachyrhynchus trachyrhynchus* est principalement représenté par les jeunes des groupes 0, I, II, pas encore mûrs. Leur alimentation est benthique et essentiellement composée par *Calocaris macandreae*.

ABSTRACT : On bathyal fishing grounds (500-700 m) of the Ligurian sea *Trachyrhynchus trachyrhynchus* is mainly represented by young specimens of 0, I, II, groups. Their feeding is based on benthic prey, mostly on *Calocaris macandreae*.

INTRODUCTION;

The biology of Macruridae has recently attacted increasing interest of many workers, also in connection with the exploitation of new resources from deep waters. We can guess if in Mediterranean sea it is possible to fish, with bathyal trawling, species fit for an eventual commercial purpose. Among the seven Mediterranean species: *Coelorhynchus coelorhynchus* (RISSO 1810), *Coelorhynchus labiatus* (KOEHLER 1896), *Hymenocephalus italicus* GIGLIOLI 1884, *Chalinura mediterranea* GIGLIOLI 1893, *Chalinura guentheri* (VAILLANT 1888), *Nezumia sclerorhynchus* (VALENCIENNES 1836), *Trachyrhynchus trachyrhynchus* (RISSO 1810), the last two are particularly abundant at deep levels (700-1000 m) of the continental slope that may be reached by the trawl nets but aren't yet overfished. Being the latter, that is *Trachyrhynchus trachyrhynchus*, good flavoured and good sized, it may be a potential resource for demersal fishing, the lasting of which will depend on a series of parameters including the biological characters of the species, mainly the growth pattern. The growth of *T. trachyrhynchus* has been studied by Motais (1960) on specimens catched by longline at about 1,000 m depth : it was found that in spite of the environmental uniformity, there are sea-

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sonal rhythms causing marks on otoliths as in fishes living in shallow waters. The specimens studied were aged between 3-4 years & 7-8 (class VII, 42.5 - 43.6 cm length), with some doubt regarding the first group (class III), owing to the fact that young specimens were lacking in the catches.

Nearly six hundred *T. trachyrhynchus* have been collected from bathyal fishing grounds of the Ligurian sea since 1970 (Relini Orsi and Relini 1971, etc.); as most of them are small sized, we may add at Motais'study some data concerning particularly the young specimens' biology.

MATERIALS AND METHODS

The 591 *T. trachyrhynchus* specimens studied, have been caught on bathyal muddy bottoms in the Gulf of Genoa off the coast of Portofino, at two depths, 500-600 m and 600-700 m, in connection with red shrimps fishing (the trawler, 200 hp, was equiped with a net measuring 600 meshes at the cod end, 15 mm each).

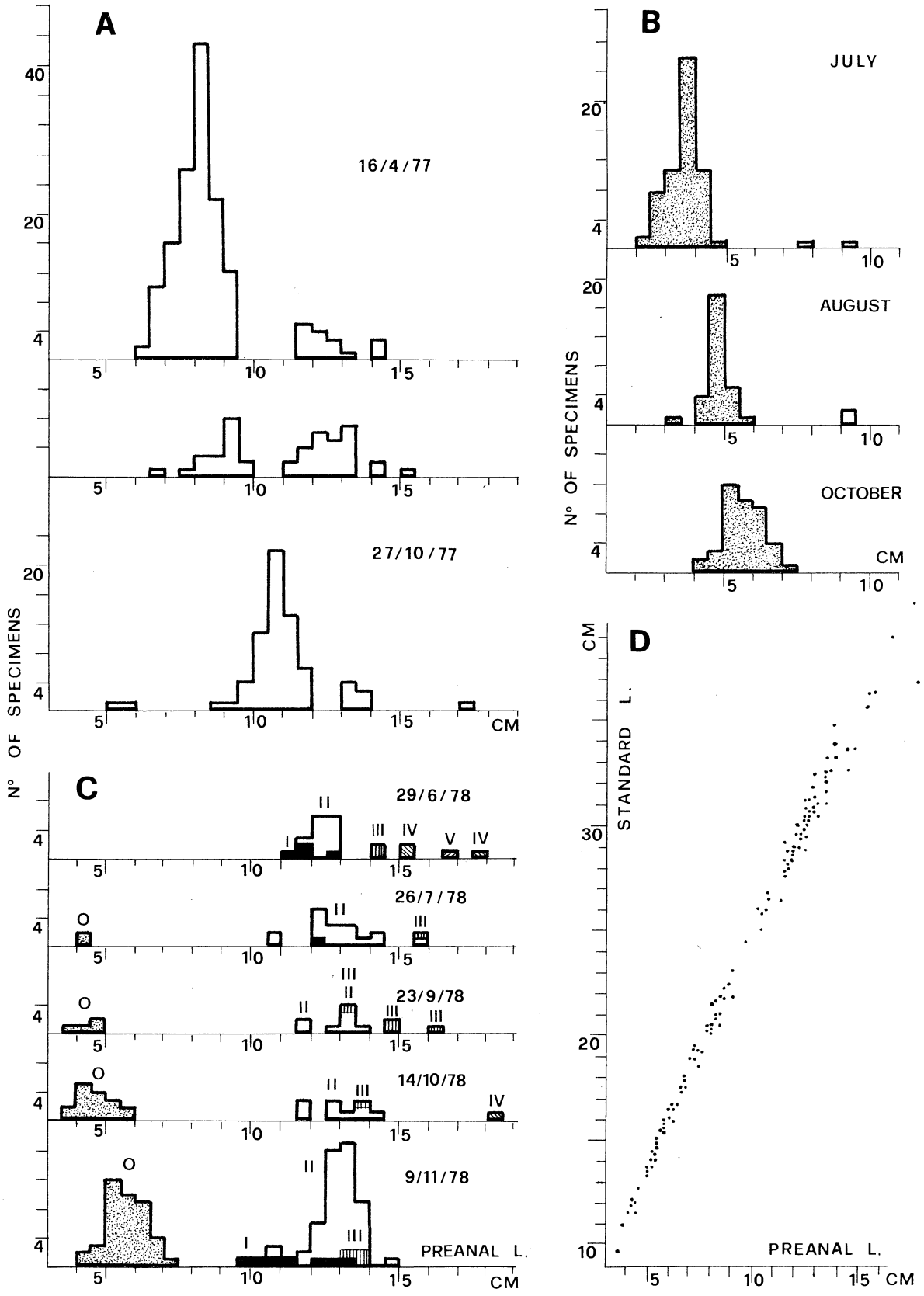
All the specimens were measured as snout-anus (preanal) length (see Bas 1963 and fig. I D). The frequency-length composition of samples corresponding to single catches (3-7 h trawling) are reported in fig. I A, B and C.

Sex was identified by microscopic observation of gonads in 100 specimens chosen at random among samples trawled from June to November on the same bottom. The age, excluding groups 0 and I, has been read on otoliths grinded from lateral face to central zone, by means of hyaline bands, which are due to a slow growth during winter (Motais 1960). Each hyaline or opaque band consist of many sub-bands that must be grouped; the lecture have been verified by examination of cephalic bones: the ceratohyal in particular has often definite opaque stripes corresponding to periods of fast growth (summer).

The stomach and gut contents of 100 specimens (from 60 to 175 mm) have been analyzed. The prey have been identified and counted when possible, by means of stereomicroscope with the aid of biological collections of the same environment.

THE 0 GROUP.

Little is known about the pelagic stages of *T. trachyrhynchus* : one


A
16/4/77
27/10/77
N° OF SPECIMENS
CM
B
JULY
AUGUST
OCTOBER
N° OF SPECIMENS
CM
C
29/6/78
26/7/78
23/9/78
14/10/78
9/11/78
PREANAL L.
CM
D
STANDARD L.
CM
PREANAL L.
CM

larva, described by Johnsen (1927), was 57 mm long without caudal rays.

Our smallest specimens come from 500-600 m depth. They have been observed since July and they show a fast growth in samples collected in montly succession (Fig. I B). The smallest one, fished in July is 24 mm preanal length and 74 mm total length, excluding only the tip of caudal rays. Its shape is already like an adult, with a well developed rostrum and a lower and withdrown mouth. The tissues are yet transparent, the black lining of branchial and abdominal cavities can be seen through the ventral wall and the large otoliths through the skin and the cranial bones. The colour consists in rare dots of melanophores; an other larval character consists of second ray of ventral fin surpassing anus.

I and II GROUPS.
The young *T. trachyrhynchus* of I group (fig. 1 A) were fished in spring mainly on 500-600 m bottoms : their average length is 80 mm from rostral tip to the anus, with an 35 mm increased since the autumn before.

Fig. I :
A) Samples of *T. trachyrhynchus* fished from spring to autumn on same bottom (3h trawling each). The growth of group I, on the left, can be noticed.

B) Samples of very young specimens fished on a 500-600 m bottoms (3 h trawling) a fast growth from July to October is noticeable.

C) Age of class composition of specimens fished on the same bottom (600-700 m, 7 h trawling each day).

D) Relationship between the preanal (snout-anus) and standard length in T. *trachyrhynchus*.

In autumn they averaged IIO mm preanal length. Group II is quite visible in the length frequency graphs of fig. I C : on 700 m bottoms this class is better represented than group I. On the left the O group - not so numerous as on upper levels - since July appears and with the beginning of autumn is increasing.

SEX RATIO AND MATURITY.
In the 100 specimens in which sex has been determined, 51 males and

49 females have been identified, that is a sex ratio I : I.

All the examined gonads were immature. Only the ovaries of 3 females showed, beside the growing oocytes, small zones of yellow yolk, probably deriving from eggs previously matured and lately aborted. These females were at least 160 snout-anus long and more than 3 years old. We must remember that Motais, measuring the gonad-somatic ratio, has indicated February as the reproduction month.

FEEDING.
A gastric or gut content has been found in 98 amoung 100 dissected specimens. Table I shows the identified prey (column A), the number of fishes (among 100) in which each prey was noticed (column B), and the total amount of prey counted (column C). As numbers Polychaeta, Ostracoda, Isopoda, Amphipoda are noticed to be the most important groups. Column D represents an attempt of recongnizing the indicated groups as biomass. Not being possible to weight the food items because often found in advanced digestion, the average weight of a "single Amphipod, Isopod" and so on, was measured, using whole specimens belonging to the species listed in column A : such the average weight was multiplied by the food items belonging to that class and the result was supposed the weight value of the whole digested group. So *Calocaris macandreae* become the first in weight, and Polychaeta the second.

CONCLUSION.
In summer, the young *Trachyrhynchus trachyrhynchus* reach the superficial level of bathyal fishing grounds of the Gulf of Genca and grow fairly quickly for three years, moving down to deeper levels. Males and females, in the same ratio, mature after three years. Their feeding is mostly based on small sized benthonic prey, mostly Crustacea and Polychaeta (striking differences in respect to Atlantic specimens studied by Geistdoerfer (1975) were noted); the most important part of the diet consist of *Calocaris macandreae*.

BIBLIOGRAPHY.
BAS. C., 1963 - Quelques données biométriques sur *Macrurus oxyrhynchus* et *Alepocephalus*. Rapp. Comm. int. Mer Médit., (17),2,341-342.

TAB. I : FOOD HABITS OF TRACHYRHYNCHUS TRACHYRHYNCHUS

TAXA IDENTIFIED (A)	FISHES (B)	FREY (C)	WEIGHT in g. (D)
POLYCHAETA			
Nephthys sp.	9	10	
Lumbriconereis sp.	3	3	..... 8.605
Other Polychaeta	37	37	
CRUSTACEA			
OSTRACODA	50	110	..... 0.100
CUMACEA	1	1	
TANAIDACEA	3	3	
MYSIDACEA	3	4	
ISOPODA	12	14	..... 2.307
AMPHYPODA			
Tryphosella similis	18	23	
Tryphosites longipes	13	14	
Lysianassidae	6	6	
Idunella pirata	1	1	
Maera sp.	9	9	
Rhachotropis sp.	3	3	..... 2.228
Leucothoe sp.	1	1	
Stegocephalidae	1	1	
Oedicerotidae	10	16	
Other Amphipoda	50	67	
EUPHAUSIACEA			
M. norvegica	1	1	
DECAPODA			
Pandalina sp.	1	1	
Pasiphaea sivado	2	2	
Calocaris macandreae	35	47	.....15.811
Alpheus glaber	1	1	
GASTEROPODA	1	1	
OSTEICHTHYES	2	2	

Number of fishes examined : 100.Fishes lacking a gut content : 2.

GEISTDOERFER, P., 1975 - Ecologie alimentaire des Macrouridae (Téléostéens, Gadiformes); Alimentation, Morphologie et histologie de l'appareil digestif, place des Macrouridae dans la chaîne alimentaire profonde. Thése, Université de Paris VI.

JOHNSEN, S., 1927 - On some bathypelagic stages of macrurid fishes. Nytt. Mag. Naturv., (65), 221-241.

MOTAIS, R., 1960 - Quelques observations sur la biologie d'un poisson abyssal *Trachyrhynchus trachyrhynchus* Risso et sur les conditions de vie en mer profonde. Bull. Inst. océanogr., (57), II65, I-79.

NOVIKOV, N. P.. 1970 - Biology of *Chalinura pectoralis* in the north Pacific. Soviet fisheries investigation in the Northeastern Pacific. Part 5, Moisecv P.A. ed. Moscow. Pishchevaya Promyshlennost. Israel Program for Scientific translation, Jerusalem 1972.

RELINI ORSI, L. & G. RELINI, 1971 - Recenti reperti ittiologici su fondi fangosi del Mar Ligure. Quad. Civ. Staz. Idrobiol., Milano, 3-4, 5-18.

SAVVATIMSKIJ, P. I., 1977 - The age and growth rate of grenadiers in the North Atlantic. Transl. Ser. Fish. Mar. Serv. (Can.), 3924, 9pp.