

PRELIMINARY DATA ON PROXIMATE COMPOSITION OF SOME MEDITERRANEAN AND RED SEA FISHES

by A. HERZBERG

STANSBY (1961) points out that proximate composition is generally considered to be a subject too basic for research. Water, fat, protein and ash content of fish is however a prerequisite knowledge for any technological or biochemical investigation. Moreover, data on composition of fishes, even the most common commercial species, are given only sporadically for the Eastern Mediterranean and are almost entirely lacking for Red Sea. STANSBY recognizes several types of fish according to their oil and protein content. Much variation occurs especially in the amount of oil and correspondingly, in water content. One must, therefore, analyze samples of different ages of each fish, at different seasons and from different environments. The main causes for change in composition are thought to be the physiological state of the fish, food availability and perhaps climatic factors.

EL SABA (1934) in his work on Egyptian food fishes, gives values of 4.90 p. 100 fat content for *Mugil cephalus* in May in Port Said to 0.42 p. 100 in July in Alexandria; the range of fat content for *Mugil capito* is from 0.90 p. 100 in June to 5.10 p. 100 in March and for *Sardinella maderensis* from 1.0 p. 100 in June to 23.80 p. 100 in March.

One kind of fish may thus very easily figure in several categories of fat content and average values are mostly of limited value. Many investigations on fat content give no information on other components and sometimes an extensive analysis is given on composition of fat without mention of its general amount or percentage.

Materials and methods.

Analyses in the present work are being carried out according to the Standard Methods of the A.O.A.C.

Edible parts of fish were used, except when our results were wanted for comparison with those of other workers. Fish were obtained from the catch of the Station's research vessel, from local fishermen or shops; Mediterranean species perfectly fresh. Red Sea fish in reasonably good condition.

Results.

Preliminary results for *Sardinella aurita* show an almost constant protein content of 21.4 - 21.6 p. 100. Large seasonal fluctuations occur in fat and water content which account together for 75.5 - 77.0 p. 100 of the edible parts. During the months June-July a fat content of about

2.5 p. 100 was found. This went down to less than one percent from July to September and increased up to 10.6 p. 100 in October-November.

Species	Total solids	Fat	Protein	Ash
<i>Sardinella aurita</i> (Mediterranean)	24.6-34.1	0.8-10.6	21.4-21.6	1.9-2.5
<i>Euthynnus alleteratus</i> (Mediterranean)	24.5-28.6	0.5-3.7	22.0-24.9	1.4
<i>Saurida undosquamis</i> (Mediterranean)	23.3	1.1	21.0	1.7
<i>Saurida tumbil</i> (Red Sea)	19.8	0.8	17.3	1.6
<i>Nemipterus japonicus</i> (Red Sea)	21.6	1.2	17.2	3.4
<i>Mustelus cf. canis</i> (Red Sea)	23.1	0.2	27.6	1.6
<i>Squalus blainvillei</i> (Mediterranean)	21.7	—	22.4	—

TABLE 1. — Proximate composition in p. 100 of fresh weight (edible parts only).

Fluctuations were found in the water and fat content of *Euthynnus alleteratus* (0.5 to 4.3 p. 100 fat). Protein content varied from 22 to 25 p. 100 of total fresh weight.

Date	Standard length (in cm)	Total solids (p. 100)	Fat p. 100 of fresh wt.	Fat p. 100 of dry wt.
11.6	13-13.5	25.8	2.3	8.9 (Whole fish)
14.6	14-14.5	26.1	2.4	9.2
30.6	14-15	25.2	1.2	4.8 (Gonads ripe)
30.6	19-20	27.4	2.8	10.2
6.7	14.5	24.6	0.9	3.7
6.7	15.5	25.1	0.8	3.2
10.9	18-19.5	25.1	0.9	3.6
13.10	13.5-15.5	30.1	7.1	23.6
26.10	10.5-11.5	27.1	3.3	12.2
26.10	16-17.5	34.1	10.6	31.1
26.11	14.5-17	—	9.3	—

TABLE 2. — Total solids and fat content of *Sardinella aurita* (edible parts).

Other results show large amounts of water in the meat of two Red Sea species, caught during the hottest period. Both *Saurida tumbil* and *Nemipterus japonicus* contained about 17 p. 100 protein and about one percent of fat. Muscle of Mediterranean caught *Saurida undosquamis* contained 21 p. 100 protein and almost 77 p. 100 water. Data are summarised in tables 1 and 2.

Discussion.

The seasonal changes in fat content of *Sardinella aurita* are generally thought to be related to their sexual cycle, spent fish being especially lean. This view is not supported by the work of MAINGUY and DOUTRE (1958) who investigated fat content of clupeids in the Atlantic ocean off Senegal. Spawning of *S. aurita* in this area occurs during June-July (POSTEL, 1955). Maximal fat contents were found from April to July (9.4 p. 100 of wet weight) and only a small decrease was noted towards the end of July (7 p. 100).

ROSSIGNOL (1955), also found that no relation seems to exist between sexual stage and fat content of *S. aurita*. FURNESTIN (1939-1943) in his work on Atlantic sardines came to the

same conclusions. The leanness of *S. aurita* in the eastern part of the Mediterranean during the summer might be caused by food supply or climatic factors.

A comparison with the data of KRVARIC and MUZINIC (1950) on fat content of *Clupea pilchardus* shows that this species contains during the fisheries season much more fat than *S. aurita*. FURNESTIN (1939-1943) also reports a much higher fat level for Atlantic sardines than those found for *S. aurita* by MAINGUY and DOUTRE and those in the present investigation. This may be due to a generic difference, or, possibly, to environmental factors.

The comparison of composition of the same or similar species of fish under different climatic conditions, such as *Saurida undosquamis*, and others which occur in both the Mediterranean and the Red Sea may eventually yield interesting information. Investigations in this direction are at present being carried out.

Sea Fisheries Research Station, Haifa, Israel.

LITERATURE

- EL SABY (M.K.), 1934. — Dietetic value of certain Egyptian food fishes. — *Comm. int. Explor. sci. Mer Medit. Rapp. et P.V.*, **8** : 127.
- FURNESTIN (J.), 1939-1943. — Contribution à l'étude de la sardine Atlantique. — *Rev. Trav. Inst. Pêches marit.*, **13** : 221-386.
- KRVARIC (M.) and MUZINIC (R.), 1950. — Investigation in to the fat content in the Sardine tissues (*Clupea pilchardus*). — *Acta Adriatica*, Split, **4** : 289-316.
- MAINGUY (P.) et DOUTRE (M.), 1958. — Variations annuelles de la teneur en matières grasses de trois clupéides du Sénégal (*Ethmalosa fimbriata* BOWDITCH, *Sardinella eba* C.V., *Sardinella aurita* C.V.). — *Rev. Trav. Inst. Pêches marit.*, **22** (3) : 303-321.
- POSTEL (E.), 1955. — Résumé des connaissances acquises sur les clupéides de l'ouest africain. — *Cons. int. Explor. Mer, Rapp. et P.V.*, **137** : 14-16.
- ROSSIGNOL (M.), 1955. — Premières observations sur la biologie des sardinelles dans la région de Pointe-Noire. — *Cons. int. Explor. Mer, Rapp. et P.V.*, **137** : 17-20.
- STANSBY (M.E.), 1961. — Proximate composition of fish. — *In* : Fish in nutrition, ed. E. HEEN and R. KREUZER, F.A.O. London, 1962.
-

