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Chemical Analyses of Some Ceylon Fishes—2.

By

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INTRODUCTION

Ceylon is an island surrounded by the Indian Ocean. Many varieties of marine species of fishes are caught in waters surrounding Ceylon. The catches vary from coast to coast with the monsoonal fluctuations.

The island is geographically situated in the tropical latitudes of high rainfall. The topographical landscape presents a central cluster of peaks surrounded by vistas of plains. Hence inland water bodies rise and meander in different directions of the country resulting in heterogeneous habitats yielding a host of freshwater fishes.

As the different types of Marine and freshwater fishes are manifold an investigation into the nature and constituents of various species from a chemical standpoint was initiated by Lantz and Gunasekera (1957). Their paper was with a view to rendering possible a better commercial utilization of fishes. The present work is an extension of the above with necessary deviations. Lantz and Gunasekera (1957), had published results of 30 species of Ceylon fishes. The present paper introduces results of 5 species and investigations are being continued to cover other species.

Investigations appearing in this paper were on fish samples obtained from different sales points in Colombo.

Proximate Chemical Analysis

Proximate chemical analysis is the determination of certain groups of substances without detailed investigation into various constituents composing each group. Proximate components of fish are moisture, ash or mineral matter, fat (oil) and protein. The amount of carbohydrates present n fish is very small. The proximate components will total roughly 100 percent.

iSampling of Fishes for Analyses

The number of fishes taken for analyses varied with the size of the species concerned. As it will appear in the tables the number taken for analyses varied from 6 to 23. Within each group, emphasis was paid to select fishes of approximately similar sizes.

To enhance the usefulness of the analyses, fishes have been further divided into six parts, namely, (*a*) edible flesh, (*b*) skins from edible flesh, (*c*) Heads, (*d*) Bones, fins, tails and scales, (*e*) viscera with-out liver, (*f*) liver.

Each part was then weighed separately and the percentage represented by the part was calculated. During the analyses samples were stored under [refrigeration] O°C.

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Analysis of Samples

Each part was ground and homogenized and sub-samples were taken and analysed for moisture, ash, fat and protein separately.

The moisture content was determined by subjecting the material to driage at 105–110°C to a constant weight. The total volatile matter lost at this temperature was taken as the moisture content.

Sample was gradually heated to 750°—800°C and allowed to stand a few hours to a constant weight. Residue left was taken as the mineral matter or ash content.

To estimate the amount of fat, the sample was digested with conc. HCl on a boiling water bath for a few hours, till tissues broke down. Oily parts present in the fragmented tissues were then extracted with a good fat (oil) solvent such as petroleum ether. Certain other fat like substances such as unsaponifiable matter also got extracted by ether. The total ether extractable matter was taken as the fat content.

To determine the protein content total nitrogen obtainable from the sample was multiplied by the universally used conversion factor 6.25. The total nitrogen was estimated by the Kjeldahl's procedure.

Methods of analyses used were those described in the A. O. A. C. (1950).

Calorific Value of Fish

Capacity of a substance to yield heat energy is termed as the calorific value of that substance. The amount of carbohydrates present in fish is very small. Heat energy contribution from carbohydrates was therefore taken as negligible.

Conversion factors for fat and protein as given by Schmidt (1948) are 1 gm. of fat (oil) as equivalent to 9.3 calories and 1 gm. of protein as equivalent to 4.1 calories. These two factors were adopted in calculating calorific values.

Application of Results

Fishes are commercially classified into edible and inedible varieties. Edible varieties in turn are classified into popular and unpopular varieties on the basis of consumer acceptance. In the fresh condition edible popular varieties do find a ready market while the edible unpopular varieties do not find such a ready market. In order to enrich our local diet with protein these unpopular varieties should be converted into acceptable, palatable products.

Dried fish, salted fish, canned fish, fish sausages ,etc., are acceptable to present day market. To solve the problem of possible utilization of fishes we lack the knowledge of quantitative chemical analyses of fishes.

The moisture content will indicate the amount of drying necessary to obtain a stable product Oils in dried fishes tend to give unpleasent odours, colours and tastes with time. Hence less oily fishes are suitable for drying, while oily fishes may be suitable for canning.

Conversion of fish wastes and unpopular fishes into fish meal is very important. Mostly fish meal is used for animal feeding. But suitable methods can be adopted to obtain fish meal acceptable for human consumption.

Final meal should contain the least amount of oil, since oil in the meal gets rancid on storage. Meal should be pressed sufficiently to remove oil. Experimental results will give the amount of oil present in the raw material. Moisture content will indicate the driage necessary. Hence the manufacturer will be in a position to determine the type of equipment and the method of processing best suited to obtain a final stable meal.

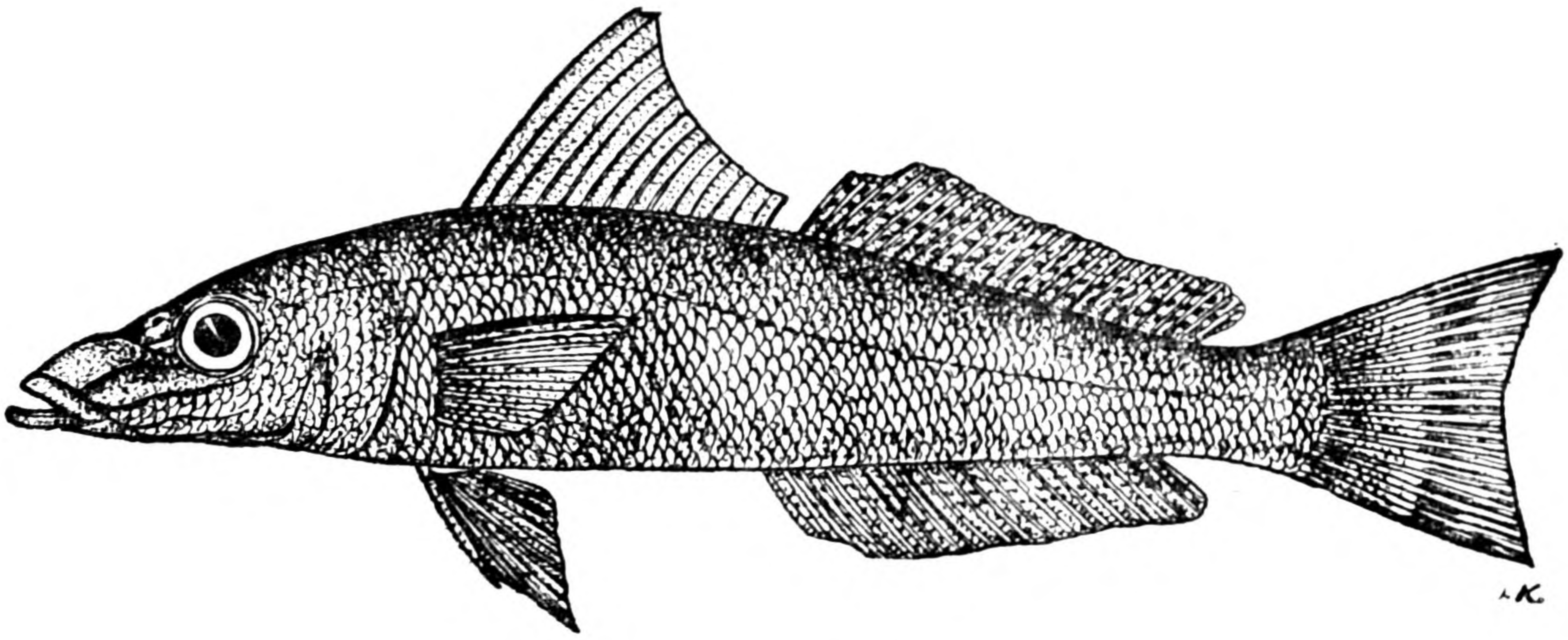
Briefly, the present investigation will assist the manufacturers of fish by-products.

Acknowledgement

The drawings appearing in this text were reproduced from the Marine and Fresh Water Fishes of Ceylon, by Ian S. R. Munro (1955). Thanks are extended to Mr. Dharmasiri Kariyawasam, Departmental Artist who made these excellant drawings. This paper closely follows the pattern set by the earlier authors (Lantz and Gunasekera, 1957) to whom due acknowledgement is made.

Tables of Analytical Results

Systematically tabulated analytical results of 5 species investigated are given in subsequent pages.



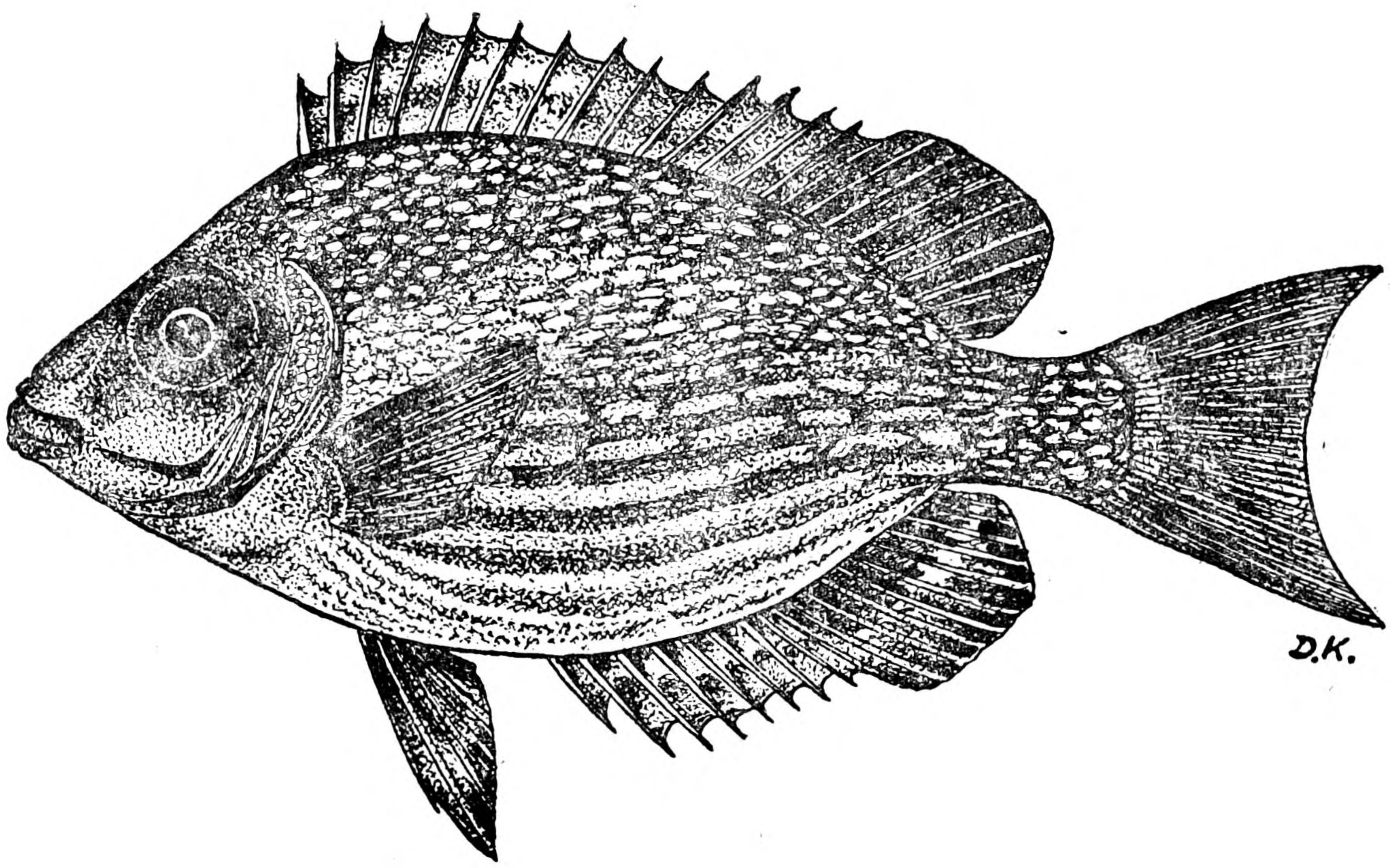
1. Sillago sihama (Forskal)
Silver whiting (E)
Kalanda (S)
Kilaken (T).

Sample : 17 Fishes weighing 1Kg. 176 gms.
Average weight : 63 gms.
Average length : 19 cms.

Part	*Per cent. Fish*	*Per cent. Moisture*	*Per cent. Ash*	*Per cent. Fat*	*Per cent. Protein*	*Cals./ 100 gms.*
(*a*) Edible Flesh	46.2	72.9	1.5	0.5	25.2	108
(*b*) Skins	5.2	68.6	1.5	1.2	29.2	87
(*c*) Heads	24.8	70.0	6.1	7.1	18.3	141
(*d*) Bones, fins, tails and scales	18.1	65.3	8.0	3.6	23.3	129
(*e*) Viscera	4.1	62.0	2.1	23.4	12.8	269
(*f*) Livers	0.5	64.8	1.0	22.9	12.2	262
(*g*) Whole fish	—	71.9	3.6	5.4	18.7	126
Whole fish calculated	—	69.6	3.7	9.8	20.2	173

Notes.—(1) Total weight 1 Kg. 176 gms. Loss on dismembering 3.6%.

(2) Inhabits coastal waters, estuaries and trawling banks.



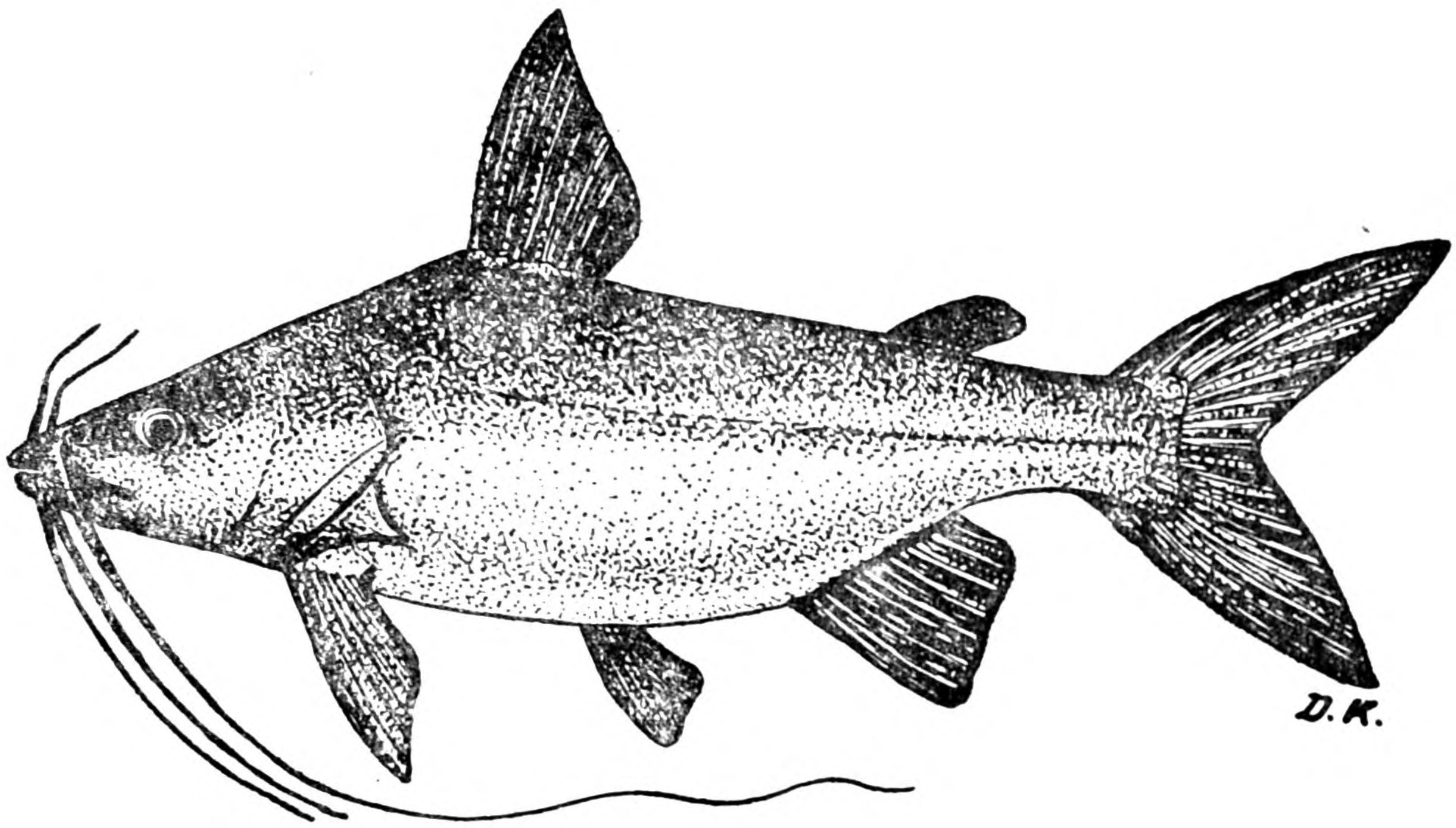
2. Siganus javus (Linnaeus)
Rabbit fish [E], Spine fish (E)
Nava [S], Orava (S)

Sample : 10 Fishes weighing 840 gms.

Average weight : 84 gms.
Average length : 19 cms.

Part	*Per cent. Fish*	*Per cent. Moisture*	*Per cent. Ash*	*Per cent. Fat*	*Per cent. Protein*	*Cals./ 100 gms.*
(*a*) Edible Flesh	47.2	72.1	1.2	3.8	21.2	122
(*b*) Skins	4.4	55.4	2.5	6.0	36.8	207
(*c*) Heads	18.7	70.8	5.1	6.6	18.0	135
(*d*) Bones, fins, tails and scales	16.7	61.0	11.2	7.3	19.9	149
(*e*) Viscera	7.5	63.6	1.9	22.8	10.9	256
(*f*) Livers	1.6	74.4	1.2	4.4	18.8	118
(*g*) Whole fish	—	70.8	4.1	6.6	19.2	140
Whole fish calculated	—	66.2	3.8	8.0	20.6	159

Notes.—(1) Total weight 840 gms. Loss on dismembering 5.3%.
(2) Inhabits coastal waters.



3. Macrones gulio (Hamilton-Buchanan)
Long whiskers catfish (E)
Vel anguluva, Mada anguluva, Mana ankutta (S)

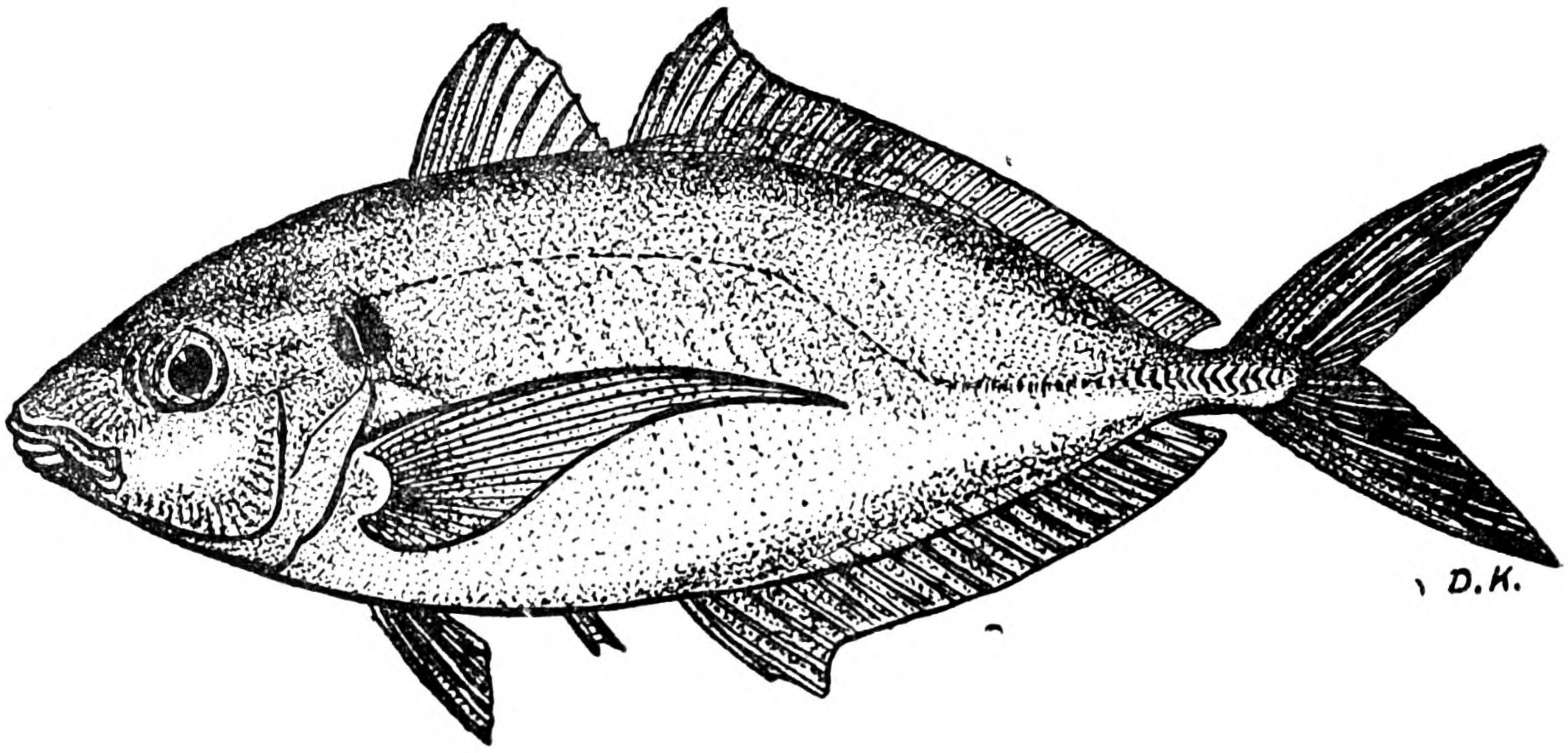
Sample : 12 Fishes weighing 909 gms.

Average weight : 76 gms.
Average length : 19 cms.

Part	*Per cent. Fish*	*Per cent. Moisture*	*Per cent. Ash*	*Per cent. Fat*	*Per cent. Protein*	*Cals./ 100 gms.*
(*a*) Edible Flesh	38.1	75.5	1.1	5.1	18.2	122
(*b*) Skins	6.7	55.9	0.3	18.9	24.4	275
(*c*) Heads	22.4	58.4	11.2	14.8	15.0	199
(*d*) Bones, fins, tails and scales	15.4	58.2	7.1	18.1	16.9	238
(*e*) Viscera	9.4	59.5	0.9	32.0	7.2	436
(*f*) Livers	2.9	80.1	1.0	6.3	11.3	105
(*g*) Whole fish	—	66.8	5.5	10.0	16.9	162
Whole fish calculated	—	65.0	3.6	15.9	15.5	211

Notes.—(1) Total weight 909 gms. Loss on dismembering 5.3%.

(2) Inhabits estuaries and moves into fresh waters also.



4. Selaroides leptolepis (Cuvier)
Slender scaled scad (E)
Sura paraw (S).

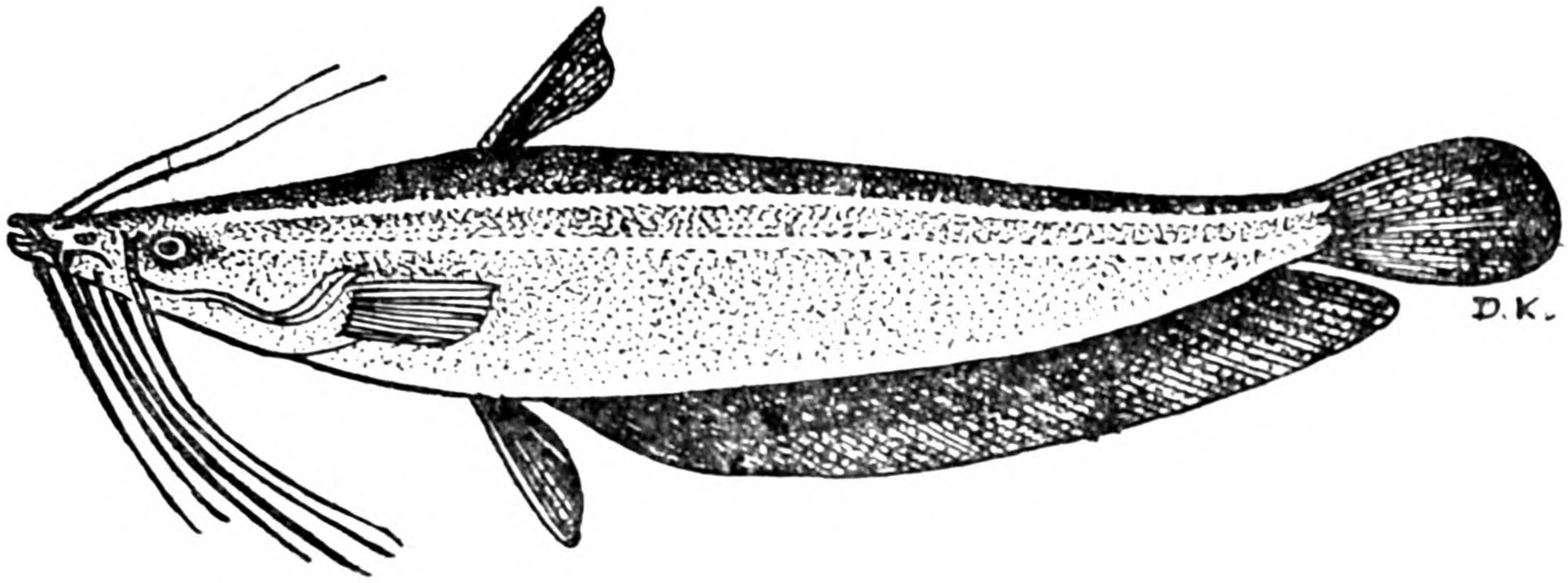
Sample : 23 Fishes weighing 750 gms.

Average weight : 33 gms.
Average length : 15 cms.

Part	*Per cent. Fish*	*Per cent. Moisture*	*Per cent. Ash*	*Per cent Fat*	*Per cent. Protein*	*Cals./ 100 gms.*
(*a*) Edible Flesh with skins	53.3	69.0	1.5	7.7	23.9	169
(*b*) Heads	23.3	64.9	9.4	9.6	16.9	158
(*c*) Bones, fins, tails and scales	16.7	65.1	6.2	6.6	23.0	153
(*d*) Viscera and Livers	5.5	67.1	2.4	14.6	14.7	195
(*e*) Whole fish	—	70.5	4.0	5.2	20.5	132
Whole fish calculated	—	66.5	4.9	9.6	19.6	170

Notes.—(1) Total weight 750 gms. Loss on dismembering 1.2%.

(2) Inhabits coastal waters, pearl banks and trawling grounds.



5. Heteropneustes fossilis (Bloch)
Stinging catfish (E)
Vel hunga, Hunga, Kaha hunga (S)
Shunken (T).

Sample : 6 Fishes weighing 700 gms.

Average weight : 117 gms.
Average length : 28 cms.

Part	Per cent. Fish	Per cent. Moisture	Per cent. Ash	Per cent. Fat	Per cent. Protein	Cals./ 100 gms.
(*a*) Edible Flesh	40.0	79.8	0.7	1.9	17.2	88
(*b*) Skins	14.3	68.1	0.6	5.0	25.2	149
(*c*) Heads	10.7	59.5	15.7	8.0	16.8	143
(*d*) Bones, fins, tails and scales	17.1	64.0	9.1	12.4	16.3	182
(*e*) Viscera and Livers	4.2	76.7	1.0	14.6	10.0	177
(*f*) Roe	8.3	63.0	2.0	8.3	25.0	184
(*g*) Whole fish	—	68.5	3.5	12.0	15.3	175
Whole fish calculated	—	68.5	5.1	7.2	18.5	142

Notes.—(1) Total weight 700 gms. Loss on dismembering 5.4%.
(2) Inhabits ponds and tanks in low-country, sometimes entering brackish waters.

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