FISHERIES DEPARTMENT, WESTERN AUSTRALIA

MONTHLY SERVICE BULLETIN

Vol. VI. No. 5. May, 1957

STAFF NOTES

The Superintendent, as Chairman, will accompany members of the Fauna Protection Advisory Committee on a six-day survey of areas in the South-West. The party will leave Perth on Monday, May 13, and will meet local authorities and farmers' organisations to discuss fauna problems. Fauna Protection Officer H.B. Shugg and Fauna Warden S.W. Bowler will accompany the Committee. On May 23 the Superintendent will leave Perth by air to attend a meeting of State and Commonwealth fisheries authorities to be held in Canberra.

The Clerk-in-Charge, Mr. B.R. Saville, will visit Geraldton on May 9 on an annual inspection of district office administration.

Technical Officer L.G. Smith resumed duty after long service leave on April 4.

Senior Inspector J.E. Munro commenced annual leave on April 10, on the expiration of which he will commence long service leave. During his absence Inspector H.J. Murray is acting as Senior Inspector and has taken over the Metropolitan district.

Technical Officer J.S. Simpson left Perth by air for Carnarvon on April 26. Mr. Simpson will join the research vessel "Lancelin" as technical officer in lieu of Mr. K. Godfrey, Senior Technical Assistant of the Division of Fisheries and Oceanography,

C.S.I.R.O., who has been assigned to other duties. Mr. Simpson will remain on the "Lancelin" for the duration of her northern assignment.

Relieving Inspector G.C. Jeffery is at present temporarily stationed at Bunbury.

The Supervising Inspector (Mr. J.E. Bramley) completed a reserve naval officers' refresher course in Sydney on March 22. He remained for a week in Sydney, where through the courtesy of the Superintendent of Fisheries (Mr. N.V. Harris), and principally in company with Inspector A. Arentz, of the N.S.W. Department, he was enabled to see something of the fisheries of the mother-State. He had the opportunity of witnessing the working of set prawn-nets of Lake Illawarra; he visited oyster farms at Georges River; and he spent some time at the Sydney fish markets. He also took the opportunity of visiting and inspecting the headquarters' laboratories of the Division of Fisheries and Oceanography at Cronulla, near Sydney. Mr. Bramley also spent several days in Victoria, where the Director of Fisheries and Game (Mr. A. Dunbavin Butcher) kindly made many facilities available to him. He visited the trout hatcheries at Snob's Creek; saw fishermen working at Lakes Entrance; accompanied inspectors on patrol; and inspected the Department's laboratories in Melbourne. He also attended a morning sale at the Melbourne fish market. Inspector W. Lynch, of Melbourne, accompanied Mr. Bramley on many of his trips, and Senior Inspector W. Green showed him over the markets. Mr. Bramley resumed duty on April 8.

At an informal gathering at Head Office on April 17, Miss Valma Hogan was presented with a lounge chair by the Superintendent, Mr. A.J. Fraser, on behalf of all the staff. The occasion was the eve of her marriage to Mr. V.R. Priest and her retirement from the permanent staff. We were very pleased not to have to say farewell as approval had been given for her to recommence duty immediately after Easter on a temporary basis pending replacement by a permanent senior.

PERSONAL PARS

It was recently announced that Dr. W.D.L. Ride, reader in zoology at Oxford University, England,

had been appointed Director of the Western Australian Museum in succession to Mr. L. Glauert, who resigned a little while ago after 47 years' association with that institution.

To the tributes and good wishes extended by all those associated with Mr. Glauert, we would like to add our sincere thanks and to acknowledge our appreciation of the invaluable assistance he has rendered to this Department over many decades. In addition to all that given in the normal functioning of the two institutions, Mr. Glauert was a member of a committee set up by the Commonwealth Government to advise its Customs Department on the export of native fauna. When that body was dissolved he was appointed to the State Fauna Advisory Committee, which was later given statutory authority under the Fauna Protection Act. Mr. Glauert has served continuously as a member right up to the present day.

The Western Australian Naturalists' Club, of which Mr. Glauert was a foundation member and is its current patron, dedicated the last issue of its publication "The Western Australian Naturalist" as a valedictory number in his honour. A handsome pigskin-bound copy was presented to Mr. Glauert by the editor, Dr. D.L. Serventy, on behalf of the Club at its last meeting.

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Dr. D.L. Serventy, Principal Research Officer of the Wildlife Survey Section, C.S.I.R.O., returned to Perth by air, on April 13, from Tasmania where he had been continuing the Section's mutton-bird research programme. Dr. Serventy obtained a number of mutton-birds to continue gonad studies under artificial and natural conditions.

ABROLHOS CRAYFISHERY

A record number of men and boats operating at Houtman's Abrolhos set the 1957 crayfishing season there off to a record start. The 1955 peak in the number of men and boats and the total catch during the period March 15 - 31 were all exceeded this year when

185 men operating with 121 boats caught 685,457 lb. of crayfish. The 1957 catch-per-man, though lower than in 1955, was higher than in 1954 and 1956, and must be considered satisfactory, although Abrolhos fishermen are again referring to serious overcrowding of fishing grounds. Only about three years ago it was believed that the maximum number of men needed to work economically the Abrolhos grounds was 65, and with 185 men operating it would seem that the fishermen's complaints are justifiable. However, the extension of grounds made possible by the use of bigger boats has given the men more room in which to work, while the steady increase in the price paid to fishermen for their catch has maintained incomes at a reasonable level even though the average catch-per-man has dropped.

The table below sets out the fishing intensity at the Abrolhos for the past four years during the period under review.

	1954	1955	1956	1957
Total Catch (lb.)	388,965	613,864	332,105	685,457
No. of Men	132	151	142	185
Av. Catch per Man	2,945	4,065	2,310	3,705

W.A. FISH PRODUCTION - 1956

The table on page 85 sets out production by species in excess of 10,000 lb. for the twelve months ended December 31, 1956. For comparison the 1955 production figures are also shown. The drop in total production will be seen to be largely attributable to the lower crayfish catch. The catch of salmon, ruff, cobbler and yellow-eye mullet also declined while that of mullet, sand whiting and prawns rose appreciably. As far as is known the prawn catch was a record one. Apart from the substantial take in the new grounds developed by departmental research in Exmouth Gulf, total production benefited by the unusually heavy runs in the Swan and Mandurah estuaries.

All figures are given in pounds (round weights).

Species	1956	1955
	10,685,853	
Crayfish	10,~~638,938~~	11,120,232
Salmon (including salmon trout)	4,821,941	4,912,450
Snapper	1,413,224	1,394,702
Ruff	767,407	897,179
Mullet, River or Sea	548,071	453,675
Cobbler	434,229	648,561
Whiting, Sand	416,011	325,202
Shark	263,990	255,229
Mullet, Yellow-eye	256,903	362,907
Jewfish	221,016	212,860
Prawns	131,104	18,638
Tailor	118,750	86,650
Trevally (Skipjack)	95.039	72,050
Samson Fish	64,887	36,232
Garfish	50,717	43,423
Mackerel, Spanish	50,216	16,469
Flathead	41,050	54,739
Bream, Yellow Fin	38,765	32,021
Whiting, King George	25,558	64,173
Crabs	22,502	17,763
Leatherjackets (Silver Flounder)	22,008	21,448
Perth Herring	20,171	24,230
Pike	17,539	17,228
Tuna	14,965	10,095
Cod	13,594	40,094
Groper	11,969	12,030
Bream, Black	11,049	13,012
Others	48,643	64,336
TOTALS	~~20,580,256~~	21,227,628
	20,627,171	

FREMANTLE DISTRICT

The boundaries of the Fremantle district have been amended. As from this month the Fremantle inspector will be responsible for the supervision of the following area :-

(1) The whole of the seafront extending from the sewerage drain on Swanbourne Beach, south to Long Point, and all the localities adjacent, including Medina and Calista.

(2) All the Swan River downstream of a line drawn from Point Walter to Point Resolution to the sea.

(3) All districts adjacent to :-

(a) The north side of the Swan River from Victoria Avenue, Claremont, to Fremantle.

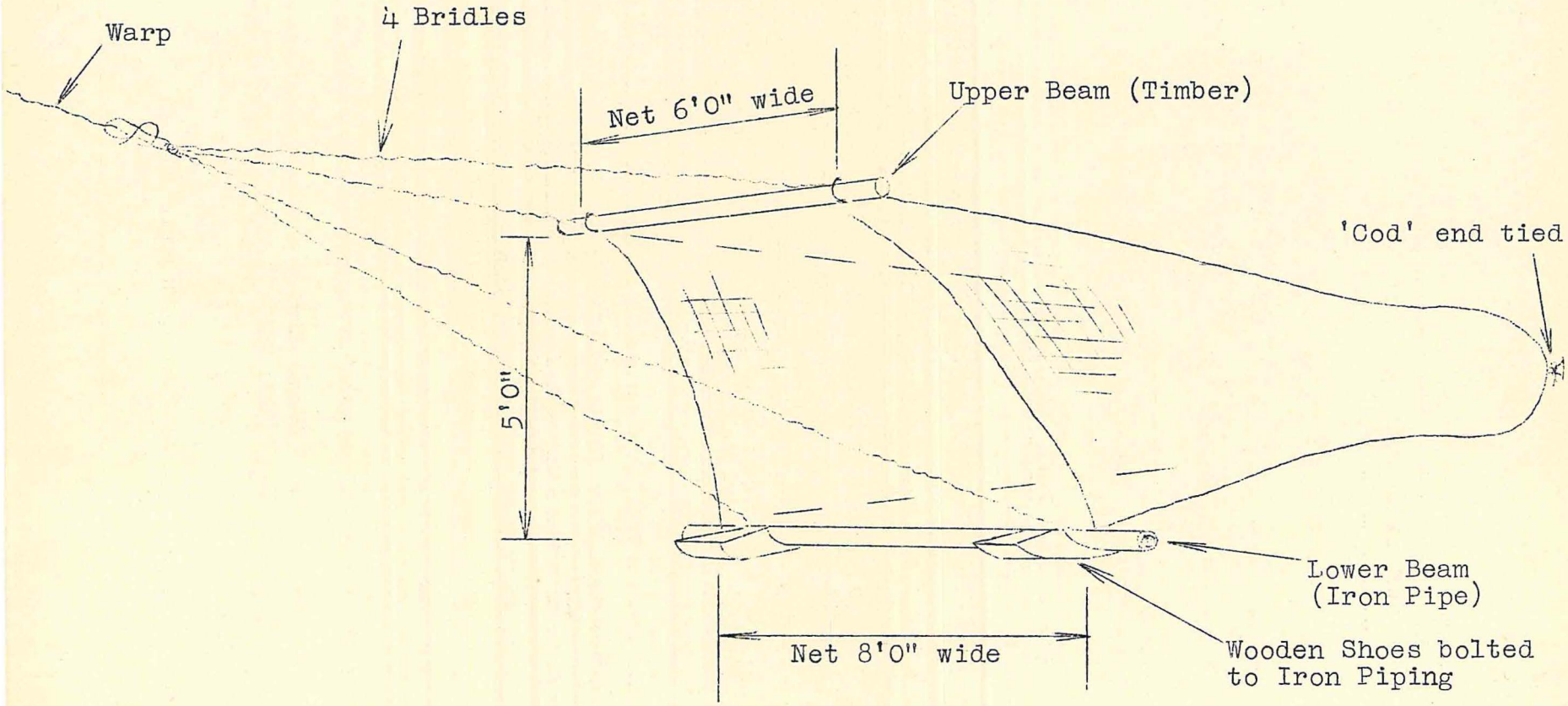
(b) The south side of the Swan River from Point Walter Road, Bicton, to Fremantle.

DUCK BANDING

Since publication of the previous issue of this Bulletin, an additional 203 ducks have been banded. Two hundred were black duck, one was a male mallard and two were mallard hybrids - all were banded at Queen's Gardens, Perth. The total banded since the inception of the scheme is now 4,319, mainly black duck and grey teal.

The total number of bands recovered has reached 275, a recovery rate in excess of 6%. Individual bands returned since the last issue were as follows :-

Band No.	Banding		Recovery		Distance Flown
	Date	Place	Date	Place	
			Black Duck		
2237	20/1/54	Karrinyup Lake	22/4/57	Lake Clifton	65 miles
6796	29/3/57	do.	do.	do.	65 "
6483	6/2/57	Queen's Gardens	14/4/57	Chittering Lake	45 "
			Grey Teal		
3977	28/3/56	Wardering Lake	20/4/57	Taarblin Lake	45 "
3893	25/3/56	do.	30/12/56	1 mile S. of Boyanup	90 "



BRISBANE RIVER BEAM TRAWL

BEAM TRAWL FOR PRAWNS

The Chief Inspector of Fisheries for Queensland (Mr. E.J. Coulter) has been good enough to send to the Department a sketch of the beam trawl commonly used for catching prawns in the Brisbane River. As this type of net is unknown in this State, and in view of its possibilities in local waters, Mr. Coulter's sketch is reproduced here.

The lower beam is a length of hollow piping, sometimes filled with concrete or, alternatively, suitably weighted. A wooden shoe or skid is bolted to the piping a short distance from each end. The upper beam is of timber. Rope bridles (four in all) are attached to each end of the beams, and are adjusted according to the depth of water to allow the upper beam to overhang the lower. The bridles are attached to a common warp some 15 to 20 feet from the trawl.

At Mr. Coulter's suggestion we are securing from him detailed instructions for cutting and hanging the net, and any officer or fisherman desirous of receiving a copy should apply to Head Office.

IDENTIFICATION OF SPANISH MACKERELS

Because of the growing popularity of the Spanish mackerels and their near relatives, not only from the commercial but also from the sporting viewpoint, and of the difficulty which has at times been experienced in identifying the different kinds, a technical description with plates is given as a guide to departmental officers and others who may be interested in the Scomberomorus species.

We are greatly indebted to Mr. I.S.R. Munro, of the Division of Fisheries and Oceanography, C.S.I.R.O., Cronulla, N.S.W., for allowing us to use his key, which was originally published in Memoirs of the Queensland Museum, Vol. 12, part II (1943), and to reproduce the drawings with which he illustrated

his paper. The Director of the Queensland Museum (Mr. George Mack) has kindly agreed to republication.

These mackerels by most Western Australian fishermen are called "albacore". In the Broome area they are generally known as "kingfish". These of course are misnomers. The true albacore is a tuna (Thunnus germo), which does not appear to be plentiful in Western Australia. The application of the name "albacore" to the spanish mackerels is misleading, and it is hoped that following the republication of the key this undesirable practice will be discouraged by departmental officers.

THE AUSTRALIAN SPECIES OF SCOMBEROMORUS LACEPEDE

(by I.S.R. Munro)

* * * * * *

The investigation of the Australian species of Spanish Mackerel has led to the establishment of the fact that there are four distinct species which belong to three subgenera. It has been generally accepted by Australian ichthyologists that there were three species in our waters. These are the Barred Spanish Mackerel or Giant Mackerel (S. commerson (Lacep.)), Grey Mackerel (S. semifasciatus (Macleay)) and some mysterious spotted variety hitherto erroneously recorded as S. guttatus (Bl.&Schn.). Examination of specimens in the Australian Museum collection and extensive field observations reveal that there is no species on the coast which has claim to the name guttatus. The "Spotted Spanish Mackerel" of Australian authors belong in reality to two distinct and easily recognisable forms; the discovery of one (S. niphonius) constitutes a new Australian record, whilst the other (S. queenslandicus) proves to be new to science.

These four species can be keyed out simply and distinguished from their close relatives Acanthocybium and Grammatorcynus as follows :-

Key to Australian Species of Scomberomorus

1. Two lateral lines, body scaly — Grammatorcynus bicarinatus

AUSTRALIAN SPECIES OF SCOMBEROMORUS

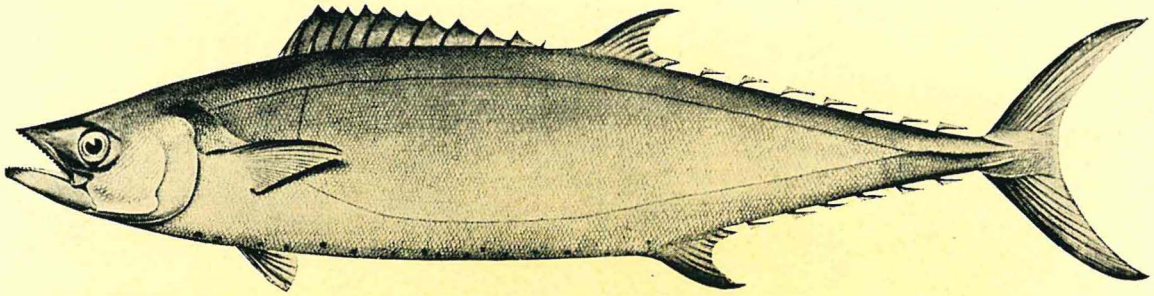


Fig. 1—Shark (or salmon) mackerel
Grammatorycnus bicarinatus (after McCulloch)

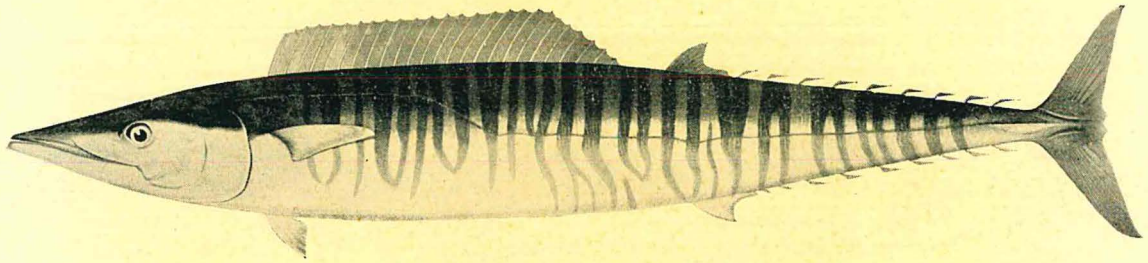


Fig. 2—Wahoo
Acanthocybium solandri (after Kishinouye)

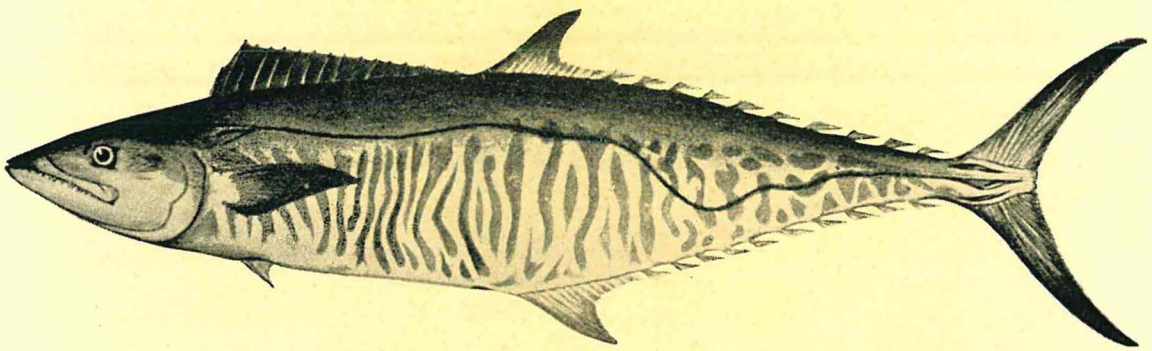


Fig. 3—Narrow-barred spanish mackerel or giant mackerel
Scomberomorus (Cybium) commerson (after Munro)

AUSTRALIAN SPECIES OF SCOMBEROMORUS—contd.

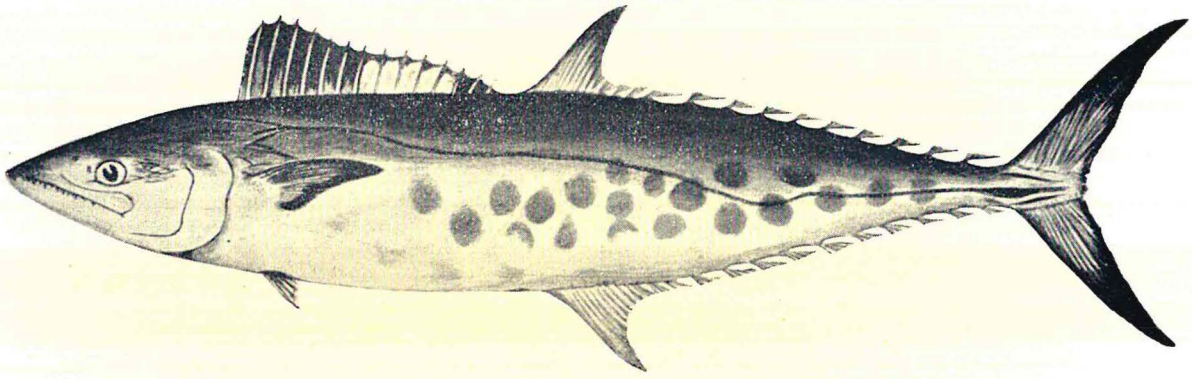


Fig. 4—School mackerel or blotched spanish mackerel
Scomberomorus (Cybium) queenslandicus (after Munro)

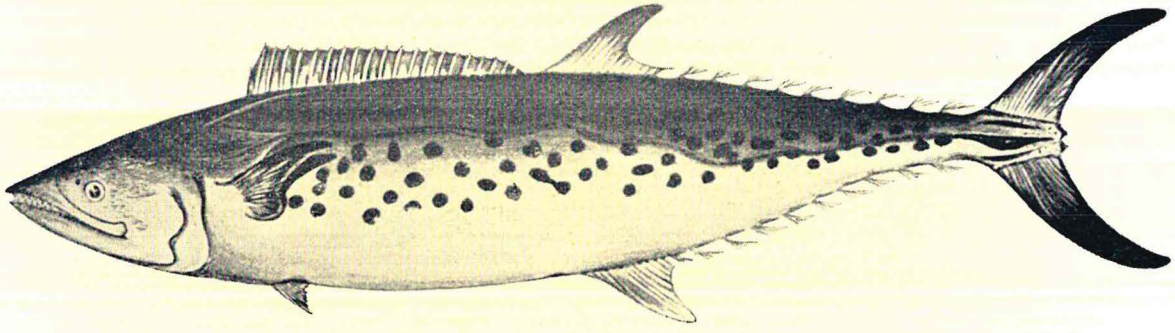


Fig. 5—Spotted spanish mackerel
Scomberomorus (Sawara) niphonius (after Munro)

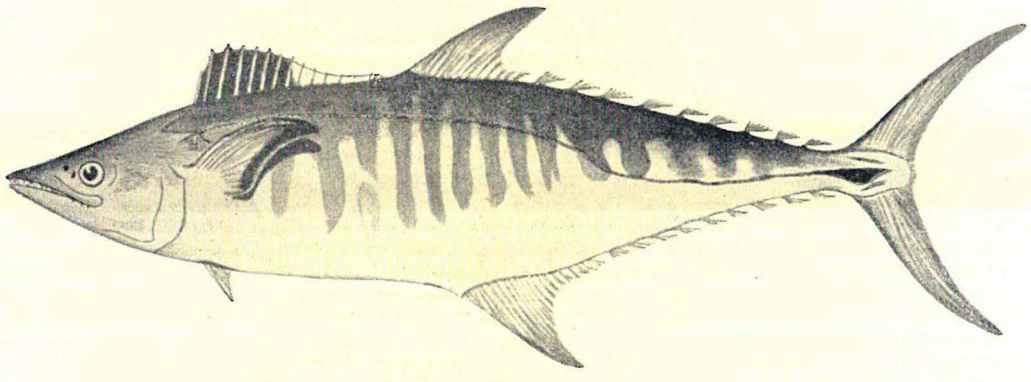


Fig. 6—Broad-barred spanish mackerel or grey mackerel
Scomberomorus (Indocybium) semifasciatus (after Munro)

4615/4/57—120

2. Single lateral line, body scales very minute

A. Spinous dorsal fin with 25-26 rays, jaws beak-like, gill-rakers absent, specialised scales above pectoral fin, lateral line with numerous long branches
Acanthocybium solandri

AA. Spinous dorsal fin with 14-20 rays, gill-rakers present, no great specialisation of corselet scales.

a. Gill-rakers rudimentary, never more than 1 + 6; teeth flat, compressed and minutely serrulate; 16-17 dorsal spines.

i. Body marked with numerous narrow wavy bands on belly; lateral line with sharp inflection below second dorsal finlet Scomberomorus (Cybium) commerson

ii. Body marked with diffuse rounded blotches, each larger than diameter of the eye and arranged in about three rows below lateral line; lateral line without a deep inflection
Scomberomorus (Cybium) queenslandicus

aa. Gill-rakers well developed, 2 + 8 or 9; teeth slightly curved inwards but not serrulate

i. Body marked with anastomosing spots about size of pupil of eye and confined to a band along middle of side; Spinous dorsal with 19-20 rays
Scomberomorus (Sawara) niphonius

ii. Body marked with a few broad straight vertical bands on its upper portion; Spinous dorsal with only 14 rays; head very small
Scomberomorus (Indocybium) semifasciatus

QUEENSLAND PRAWNS GO TO BRITAIN

Prawns processed by the Queensland Fish Board were expected to reach England by ship about April 18. They will be distributed by a Grimsby wholesale firm. An executive of this firm states that the demand for prawns in England is far ahead of the supply. Earlier samples from Queensland had been up to standard, he says, and the shipment which was on its way at the time of speaking was a bigger sample consignment which his concern had ordered.

ANTARCTIC WHALING

When the 69-day pelagic whaling season finished recently, it was estimated that the 14,500 blue whale units which international agreement permitted to be caught last summer would have been taken. A Dutch fleet had produced only 66,000 barrels up to March, compared with 79,500 barrels in the immediately preceding season. Japan's catch by March 12 had reached only 84% of the target, having totalled only 3,283 blue whales as against a target of 3,910. Latest returns show that 81,700 barrels of oil, 3,382 tons of whale-meat and 12 tons of vitamin-rich oil will be the result of the South African fleet's operations.

BASIC WAGE INCREASE

The Court of Arbitration in its quarterly declaration has increased the basic wage for the metropolitan area, commencing (in the case of the civil service) on April 26. This will mean that from the date mentioned adult male officers in the metropolitan area will have the sum of £7 per annum added to their salaries. Lesser increases will be paid to females and juniors. The salaries of officers in the South-West Land Division and "other areas" are not affected by the declaration.

THE CLEARING HOUSE

Can a Swordfish Sink a Ship?

The ferocity of spearfish or marlins, and swordfish, has formed the basis of many a fisherman's tale, and old books illustrated their pages with pictures of open boats pierced by the spears or swords of such fish. I have myself years ago seen a piece of planking from a boat so penetrated, yet there is always a Doubting Thomas in scientific circles when such tales are told.

The ferocity of these tropical and sub-tropical sea-fish, has, however, now a new champion in Prof. J.L.B. Smith, of Coelacanth fame. Professor Smith, who is at the Rhodes University at Grahamstown, in South Africa, has been examining the bales of hard rubber which still drift ashore in south-east Africa, although they were lost from ships torpedoed there during the last war. In the Mozambique Channel, where the bales are most numerous, they contain as many as four spear-tips broken off near the front. These have apparently got there from the marlins (and in one case a broadbill swordfish left its sword in a bale) charging headlong into any floating or submerged object with such force as to be stuc therein. Then it attracts the attentions of sharks, for shark teeth have been found embedded also, and in the fight that ensues, the marlins break off the tips of their spears. Most of the tips are 4in. to 6 in. long, and probably come from marlins 5 ft. or 8 ft. long.

Perhaps the bigger marlins have stronger spears which do not break so readily, though one black marlin had left the 24 in. top of its spear buried 13 in. into a bale, and it was almost unmovable.

Summer Visitor

The swordfish is an occasional British visitor in summer. An 11 ft. specimen was once caught off the Eddystone lighthouse, and in July, 1931, another

was landed at Brighton. This is an Atlantic variety. They also prey upon cod, tunny, etc., and even attack whales. If the swordfish spits the cod or tunny with its sword, a yard-long, wedge-shaped weapon, one wonders how it withdraws it. It is certainly a dangerous customer in the fisherman's net.

In one instance a fishing party in Mexican waters had a 9ft. long spearfish penetrate their wooden launch from one side, through the interior, so that half its body had penetrated the light planking, and the spear pierced the other side of the boat for nearly a foot.

If I told you the name of the film star in the dinghy you wouldn't blame the fish!

No Kin of Shark

A Massachusetts old time whaler, Fortune, returned once with a swordfish blade protruding from her copper-sheathing, the sword having gone 18½ inches through hard wood, 14½ in. of which was oak. The Dreadnought, which sailed from Colombo for London in 1864, was said to have sunk from a leak caused by a swordfish penetrating its copper sheating and planking and the Admiralty Court agreed that the loss was probably caused by this fish. Commercial swordfishing off the New England coast results in similar damage to several of the dinghies used.

Swordfish do not get their ferocity from any kinship with the sharks. Like the barracudas and some other bony fish, they rival them in the intensity of their hunting, rivalling also the ferocity of the tiger on land.

Eric Hardy F.Z.S.

("The Fishing News" London February 1, 1957)

Expedition Lands Rare Eel With Green Eyes

After a 24-day expedition, the Victoria University College (Wellington) deep-sea research team were discouraged but not defeated because bad weather limited fishing to a few hours.

During one spell the 12 ft. beam trawl struck an unusual rock bottom in 600 fathoms which resulted in the loss of 500 fathoms of wire rope and the special £70 trawl which had just arrived from Britain and was being used for the first time.

The expedition found many strange rare fish and evidence of giant parasitic eels.

"This is still something of a mystery to us, as we have not managed to catch one yet", said Professor L.R. Richardson, leader of the expedition.

Eels, and a rare cod caught for the first time in New Zealand, had been attacked by a creature which punched a shilling-sized hole in their skin and scales, and proceeded to draw out the victim's flesh through the frayed hole.

The team also caught the biggest synaphobranch ever seen. This green-eyed eel was 4 ft. in length.

(" The Fishing News" London March 15, 1957)

Partnership in Fisheries

--A Speech that Was Never Made

by Donald L. McKernan

Mr. McKernan is Administrator, Alaska Commercial Fisheries. The article printed here is portion of a paper which he was to present at the annual meeting of the Association of Pacific Fisheries in Seattle November 27. Mr. McKernan was prevented by weather from reaching Seattle, but has kindly made his paper available to this journal.

The partnership of fisheries and government in Alaska is an arrangement dictated by necessity, in which government as well as industry has exacting and grave responsibilities. Government must muster, as industry does, the kind of leadership to carry out its

part of the bargain, and I might add, without the measure of economic gain which parallels success. It must assemble a staff of scientists and technicians capable of assimilating the facts and knowledge about the fisheries. Government must not only know of the habits and biology of the fish, but it must know the industry and its problems; economic, competitive, and operational. Else arbitrary and impractical regulation binds fishermen and operators, government must assume the responsibility that goes with authority; it must act wisely, fairly, and decisively to ensure the maximum harvest consistent with perpetuation of the runs.

The fishing industry, carrying out its role of harvesting, processing, and distributing the wealth of the sea also has an equal responsibility to conserve the resource. Of greatest importance is the role of industry in making sure a strong, wise government agency is in control. While industry must be competitive and may not agree on many of the aspects of their own operations, they must band together as a single voice to insist that their government partner is competent and is conservative of action. The industrial leader of today must know a great deal more than his own economic problems; he must be able to judge whether or not predictions and decisions both he and his competitors are going to live with are based upon sound scientific logic and are practicable. He must be generally aware of the principles of good fisheries management and population dynamics.

If industry is to assume its majority, it must see that its fishery agency is devoid of politics and unwise pressures. "Ballot box biology" must be avoided. Emotional appeals or strictly economic regulation must not be thrust upon government as valid conservation measures.

By working with government; by being alert to signs of improper government actions; by insisting that partisan political pressures have no place in the conservation of our fisheries; and by realising yourselves that a small economic loss today to conserve the fisheries, is money in the bank in years to come, industry will be assuming its proper role as a partner with government in the harvest of our fishery resources.

("Pacific Fisherman" Portland, Ore. January 1, 1957)

Migrating Tuna Swims Upright

A Japanese fishing boat 700 miles east of Christmas Island found evidence that one kind of tuna migrates vertically, according to a U.S. Government report released in Washington.

Officials explained that late in 1955, a U.S. research vessel caught and tagged a number of yellowfin tuna near Christmas Island then released them. The fish are normally found in surface waters.

Thirteen months later, one of the same fish was recaptured by a Japanese fishing boat some 700 miles to the east and deep down in the ocean. The fish had grown considerably in the 13 months from 55 lb. to 85 lb.

("The Fishing News" London March 8, 1957)

U.S. Fishstick Production Drops 12 Million Pounds

Production of fishsticks in the U.S. in 1956 dropped 12.2 million pounds from production in 1955.

U.S. Fish and Wildlife Service announced early this month that total production last year was 53.2 million pounds, compared with 65.4 million pounds in 1955, and 50 million pounds in 1954.

Eleven manufacturing firms dropped out of the fishstick business in 1956. Only 47 companies were engaged in the production of fishsticks last year, compared with 58 firms in 1955.

Production of pre-cooked fishsticks in 1956 amounted to 46.3 million pounds. Almost 7 million pounds of uncooked sticks were produced.

("Western Fisheries" Vancouver, B.C. February, 1957)

Sardine Fishing Holiday Proposed in California

A two-year moratorium on California sardine fishing would be imposed under terms of a bill introduced in the legislature last month by Senator Richard Richards, Los Angeles.

Sen. Richards said the move was an effort to determine if a two-year period of no sardine fishing would replenish the supply in California's coastal waters. He said that the bill had the support of the Ocean Fish Protective Association and the California Wildlife Federation - both sportsmen's organisations.

Fishing moratoriums have been suggested by scientists and some industry groups since the disappearance of sardines several years ago. None has ever been invoked however.

California just experienced the third worst year in the history of the industry in 1956.

("Pacific Fisherman" Portland, Ore. March, 1957)

The "Something New" in Tuna

"Vegetable Broth" Wins a Place in Several Products of the California Fish Canneries

Employment of a "vegetable broth" in some packs of canned tuna is among the interesting and significant recent developments in the American tuna industry.

Initial use of the broth as an ingredient of canned tuna is generally credited by the California industry to Dr. Ernest Geiger, who introduced it in the Chicken of the Sea dietetic pack in order to give this salt-free specialty product a "pick-up" in flavour.

A formula of dehydrated vegetables, such as carrots, tomato, parsley, spinach, cabbage and a vegetable protein hydrolysate, was created and applied in liquid form to each can of dietetic tuna. The same broth is used to "spice" the Chicken of the Sea strained tuna baby food, also, by Van Camp.

Dr. Geiger, who is an expert on nutrition, and director of research and development for Van Camp Seafood Company, emphasises that this broth pack, rich in protein, has a high biological value and is particularly suited in diets for weight reduction and for use in diet-therapy. After success with these specialty products, Van Camp expanded the use of the broth into other packs, such as chunk and grated.

Among other canneries, Westgate-California Tuna Packing Co. of San Diego and Star-Kist are now using a broth addition to several or all of their packs.

In the case of Westgate-California's chunk, standard soy bean oil is added, and salt, as well as the broth from the dehydrated vegetables. This is true of the packing formula for Van Camp's grated and other styles.

Star-Kist uses monosodium glutamate with the broth - a product similar to a vegetable protein hydrolysate - the effect is much the same, according to laboratory technicians. The use of both is primarily for flavour. Star-Kist uses only distilled water in its chunk dietetic pack.

Dr. Geiger also says the amino acid in hydrolysed vegetable protein tends to inhibit oxidation, and some protein value is added to a can of tuna by the use of the broth. In the Van Camp process the hydrolysate is added in liquid form when the broth is in preparation.

In the packs of tuna, using broth, its addition appears to add flavour and improve colour and texture in the oil pack, as well as in the dietetic packs, where it acts as a substitute for salt in diets where salt is prohibited.

Van Camp Seafood Co. had used for some time in testing its dietetic pack and elsewhere a Beckman spectrophotometer which analyses the tuna and records the sodium content. In dietetic tuna, the sodium content must conform to a very low tolerance.

In a dietetic pack the broth is added at approximately the same stage as would have been the oil and salt, before the cans approach the closing machines,

and by the same overhead system of pumping through pipes that is standard in the addition of oil. It is delivered at a measured rate with spray injection.

Where broth and oil are used, the procedure varies with each cannery, but with both added separately. Sometimes the oil comes first, sometimes the other, depending on plant practice.

At Van Camp's San Diego plant, with its modern installation for the preparation and dispensing of broth, there are two large stainless steel kettles in which the dehydrated vegetables are placed, with water kept at a controlled temperature. There is also a smaller "holding" tank in the room which houses the broth tanks, upstairs over the main packing area. The broth is pumped by the overhead pipes to the packing lines, as it is needed.

The Broth is prepared in stainless steel steam-jacketed kettles with automatic temperature control. All pipe and fittings used in distributing the broths are also of stainless steel.

No salt is used in the preparation of the broth, as it may be employed in a dietetic low-sodium pack. Where the broth is used in normal packs the salt is added in solid form in the usual manner.

Through the fishery products division of the National Canners Association, in the proposed Standard of Identity for canned tuna, reference was made to the use of vegetable broth. The use of two or more of the following vegetables in packing of tuna was asked to be a part of the canned tuna standards : Beans, cabbage, carrots, celery, garlic, onions, parsley, peas, potatoes, red and green bell peppers, spinach and tomatoes.

("Pacific Fisherman" Portland, Ore. March, 1957)