



# CMFRI newsletter

Number 7

October 1977 - March 1978

## ALL SEaweEDS ARE NOT WEEDS



The gulf weed, *sargassum*

THE word weed, which carries often a derogative sense, means an economically useless plant (now animal too!) growing wild at the expense or to the detriment of a useful one that is or has been under cultivation. In this sense, the weed is worth only to be weeded out. But, with man's slowly growing wiser by discovering the benefits many of these discarded plants can confer, more and more of the so-called weeds are stripping this cloak of ignominy and are gradually entering into his realm of domestication. No plant can be quoted as a better example of having adopted and raised to the status of cultivated plant, in the course of man's incessant search for more food and more industrial raw material, than the once-despised seaweeds. With land masses for cultivation getting scarce day by day, the promise of this humble denizen of the sea is by far greater for future, as it requires no land but the largely available wastewaters of the coasts for its raising.

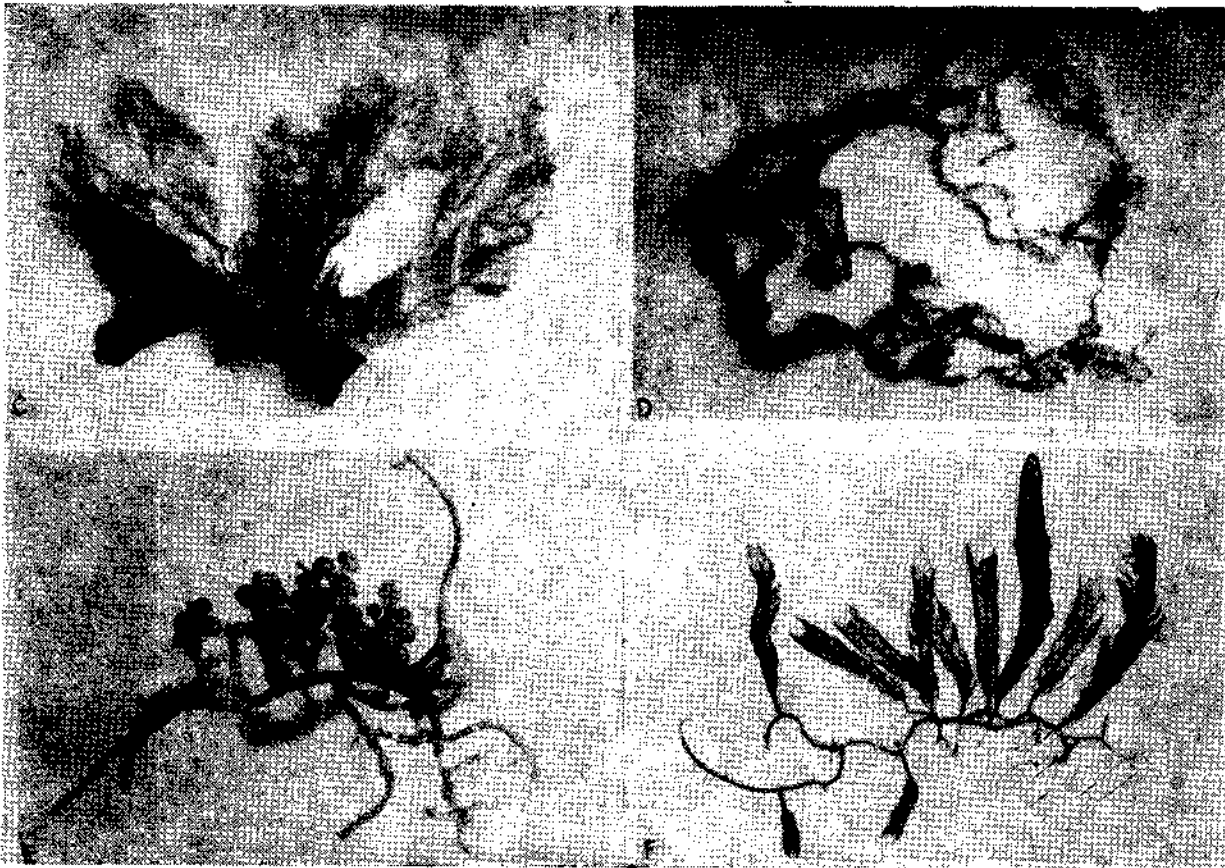
Seaweeds include all algae (plants with neither true leaves, stems, roots or vascular system, nor specialised sex organs as in the case of higher

plants) growing in the oceans and in brackish coastal waters, comprising from single-celled organisms to massive 'kelps' which are comparable in size to the flowering plants. Many of these marine algae, unlike their freshwater kins, are visible to the naked eye and are readily recognisable when

ies harvested by man, particularly in Japan and China, for local use as manure, medicine and even food. In these countries, of late, large industries have been developed to cultivate and process many of these seaweeds. It is nevertheless true that some members of the marine algae are look-

the fishery adversely. But this disrepute is not with the larger algae which, on the other hand, are useful to man in many ways. The great reputation enjoyed by the red alga, *Porphyra*, which largely goes in the making of soups and other condiments in developed countries, is well-known. Ja-

### Some of our economic seaweeds



C. *Ulva lactuca*;  
E. *Caulerpa racemosa*;

D. *Ulva reticulata*  
F. *Caulerpa sertularioides*

found growing or cast ashore on the beach. Apart from being primary producers—fixers of solar energy—and therefore, invaluable as sustainers of the food cycle of the sea, marine algae—of course, the larger ones—were for centur-

ed down on as pollutants. This is largely due to certain species of blue-greens and dinoflagellates which thrive in the inshore waters and emanate a disagreeable odour (and is 'fishy' to taste) when grow in profuse. They also then affect

pan, the country which produces most of it, earns millions of dollars by the industry on this alga alone.

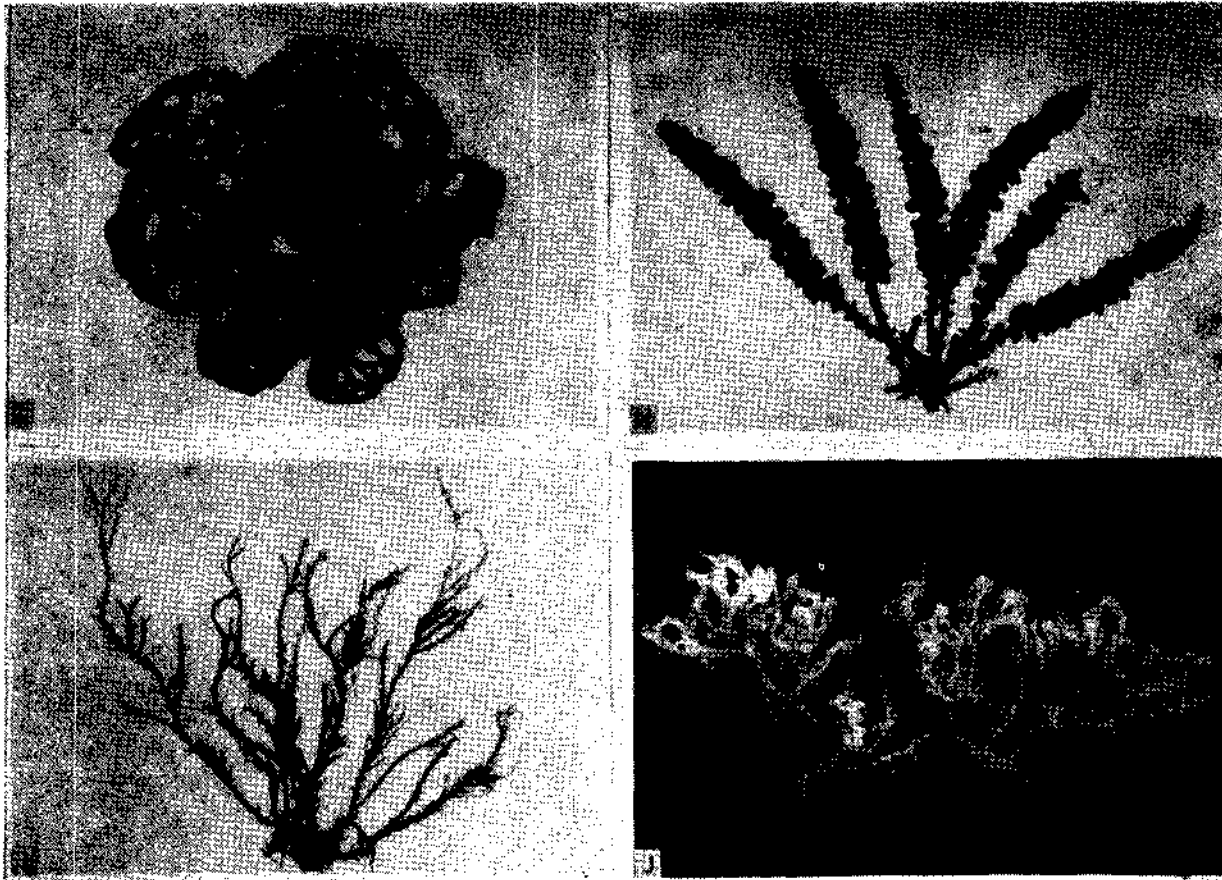
The marine algae are broadly grouped based on their pigmentation as: Green algae;

Brown algae: Red algae; and Blue-green algae.

The uses which the different products of marine algae are put to are legion. The quantity of iodine and potassium contained in the common kelp is large, and attempts have successfully been made to extract

them with a much involved process, is unparalleled in the diversity of its uses. It is extensively used in the making of food and medicines, and as an industrial raw material. Most of the agar consumed in the world market today comes from Japan, where many an industry flourishes in its manu-

facture. The best-known use of agar is as a solidifying agent in media used in the bacteriological culture. It is also used as a stiffening agent in a number of food products, as a sizing material, mucilage, and in clarifying liquids. With its quality of keeping substances in suspension it goes in the manufacture of various pharmaceutical preparations, photographic-film coatings and paints. Brewers use this to clarify and give body to beer. It is employed in canning meat and poultry, in laxative preparations, as a constituent of



G. *Hydroclathrus clathrus*;  
I. *Acanthophora spicifera*;

H. *Laurencia papillosa*  
J. *Caulerpa serrulata*

them. But, the discovery of mineral deposits containing these elements made their recovery from these algae unprofitable.

AGAR, or agar-agar, the gelatinous substance obtained from the red algae like *Geli-*

facture. The best-known use of agar is as a solidifying agent in media used in the bacteriological culture. It is also used as a stiffening agent in a number of food products, as a sizing material, mucilage, and in clarifying liquids. With its qu-

ality of keeping substances in suspension it goes in the manufacture of various pharmaceutical and cosmetic creams and jellies, as a dental-impression mould and in wire-drawing lubricants.

ALGIN is a colloidal substance obtained from the brown weeds, or kelps, of the

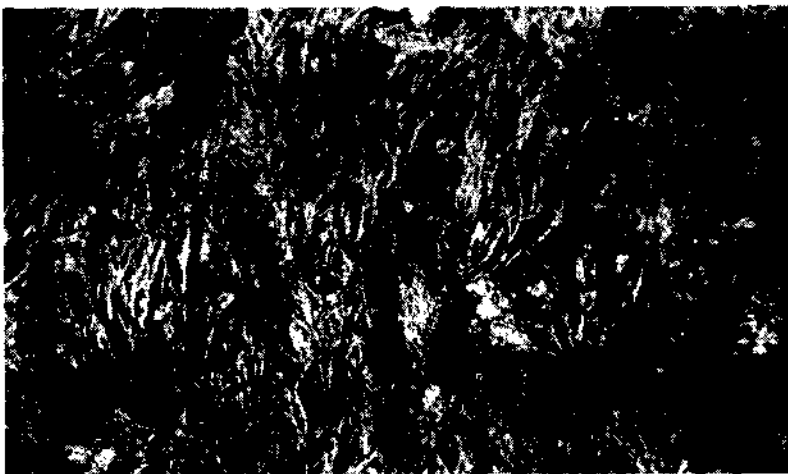
orders Laminariales and Fucales (which are also called alginophytes). (Our best-known genus is the gulf weed, *Sargassum*, of the family Sargassaceae in the order Fucales, characterized by branching thalli—the algal body, because of the peculiarity of its structure is called not stem, but thallus—with lateral outgrowths; they develop along shores, then break away to drift in the ocean. We have mainly 5 species of *Sargassum* growing in abundance particularly in the reef regions of Mandapam in the east coast. They are: *S. myriocystum*, *S. illicifolium*, *S. wightii*, *S. plagiophyllum* and *S. tenerrimum*). Algin is hard when dry and absorbent when moist. It too is equally extensively used in the preparation of various pharmaceutical products, food products, rubber products (such as, natural and synthetic latex creaming and thickening, finished articles, automobile carpetting, electrical insulations, babies' rubber pants, foam cushions and rubber coating on tyres), textile products (size compound for cotton and rayon, textile print pastes and plastic laundry starch), adhesives (for wall boards, paper bags, shipping containers, gummed tapes), paper products (food packages, pharmaceutical and detergent packages, milk containers, butter cartons, frozen-food packages, insulation boards, food wrappers, grease-proof paper, and acoustical tiles), and miscellaneous products (paints, ceramic glazes, porcelain wares, leather-finishes, autopolishes, welding-rod coatings, boiler compounds, battery-plate separators, wall-board-joint cement, beet-sugar processing and wax emulsions)

MANNITOL, a straight-chain alcohol, a white water-soluble crystalline powder, is another product which can be extracted from brown algae. This can be utilised as a substitute to glycerine in many places with better results. This too has a wide-spread use in pharmaceuticals, paints, leather, and in the preparation of lacquers. The plastic products derived with it are said to be better than that obtained with glycerine. Mannitol can also be nitrated to form nitro-mannite, a powerful explosive like nitro-glycerine. Manna sugar is a common name for mannitol because it is used as a dietary supplement.

VISUALIZING the role the seaweed could play in our coastal economy, the CMFR Institute from its inception has been much involved in investigation on methods of utilising the different species of seaweeds that grow along our many coasts. Various methods of extracting agar from our

common red algae were evolved and tested, and so were with the algin and mannitol from brown algae. The results of these investigations have since been published through various scientific and semiscientific articles. With the recent trend of focussing our research toward mariculture, efforts were considerably intensified to study this rather important resource more closely. Team of scientists were entrusted with the difficult task of carrying out surveys of seaweed beds all along our coasts and mapping them out in a manner at once comprehensible to the layman. This was a preliminary to venturing into a more complicated project of selecting suitable species and culturing them first in an experimental stage and then in a more broad-based pilot stage. Such experiments naturally included the more thorough study not only of the life-cycle of the various species, with all the numerous biological and ecological studies it entails, but

(Continued on page 6)



Culture of the red alga, *Gracilaria edulis*, on coir webs: The apical portion of the thallus is carefully inserted close together between the twists of the coir and left in the shallow water. With proper monitoring the alga grows to the harvestable size in about 60-80 days.

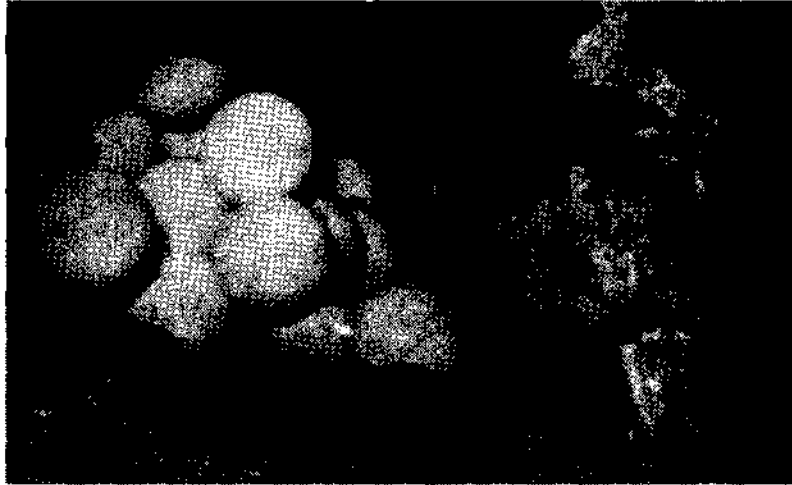
# THE VANISHING TURTLE

OF the four commonly exploited sea turtles of our east coast, namely, Olive Ridley (*Lipidochelys olivacea*), Green Turtle (*Chelonia mydas*), Hawksbill (*Eretmochelys imbricata*) and Leatherback (*Dermochelys coriacea*), the olive ridleys and the green turtles are the most severely hunted. Anyone who has visited the Tuticorin market on a Sunday is familiar with the number of green turtles brought there for slaughtering. It is estimated that 3000 to 4000 green turtles are captured annually from the Gulf of Mannar for meat. Besides, quite a few are killed for the calipsee (the light yellowish meat found in patches attached to the plastron) and calipash (the green fatlike meat inside the carapace below the scutes) which are exported to West Germany and United Kingdom. The olive ridleys are exploited for the same purpose on a greater scale from the coasts of Orissa and West Bengal. The other two species are also killed, though in lesser numbers, either for calipsee and oil, or for shell.

Thus indiscriminately killed are not only the adult turtles. A startling number of their eggs are regularly removed from the nesting grounds and sold in markets all along the coast. Though these reptiles are aquatic — confining to the sea for all their activities — they compulsively resort to land for egg-laying. The females periodically climb the unfrequented sandy shores and leave their eggs buried, to be hatched by warm sands, in nests easily locatable by their

own foot-prints. (It is, however, interesting that she would try, and would succeed to a certain extent, to confuse the nest-robbing animals by habitually crawling around a few spots in the vicinity and creating a few pseudo-nests that

mals levy a heavy toll on the eggs and hatchlings. A few metres' journey the hatchlings have to perform while they scramble for the waterline is replete with disaster, as they may, more likely than not, fall an easy prey to the ever-vigi-



The turtle laying eggs.

would simulate for all appearance the true nests, before retreating to water.) Apart from this large-scale removal of eggs by man, the birds and mam-

lant carnivorous birds and mammals. With this continuous slicing away, as it were, a block from its two ends, the turtle today is fast diminishing to the point of extinction.



TO THE KINDLY WAVES: The freshly hatched out youngones scramble down the shore when released.

How to prevent the depletion of this valuable living resource of our sea was for some time a tormenting question harrying our marine biologists and conservationists alike. The Madras Snake Park Trust have been collecting the turtle eggs from the coasts in and around Madras for the three years starting from 1973-74, incubating them in a hatchery and releasing the offsprings to the sea. Recently, a huge ridley's rookery in Orissa coast was protected by the State Forest Department there, and it is of some relief to hear that quite

a large number of eggs were saved by this timely action.

IN 1976-77, the CMFR Institute, launched a detailed programme, with the valuable collaboration of Mr. Romulus Whitaker of Snake Park Trust of Madras, for hatching eggs. During the brief period from 23-1-77 to 12-2-77, 14,546 eggs collected from 132 nests were kept in a hatchery set up at Thiruvammiyur, Madras, of which 8800 were hatched and the hatchlings returned to sea after an average incubation period of 48 days.

During the end of 1977, in answer to the plea from the marine ecologists and conservationists, the Tamil Nadu Forest Department placed the sea turtles on Schedule I of the Wild Life Act protecting by statute the nesting grounds of the sea turtle in the State, thus making the unauthorised egg-collection illegal.

In the beginning of 1978, the Institute has taken up the investigations on the distribution-biology, feeding habits, reproduction and behaviour of marine turtles as a full-fledged project, under the personal leadership of Dr. E. G. Silas, Director, with location of nesting grounds and breeding seasons, collection of data on landings, and biological studies to enable taking up turtle farming, as its objectives of practical utility. Obtaining permission from the Chief Wild Life Warden, Tamil Nadu Forest Department, to collect 20,000 eggs to carry out these investigations, a hatchery was set up at Kovalam Field Centre for hatching olive ridley eggs. So far this year, 11,423 eggs were collected from the stretch of coast between Adayar and Kovalam, out of which 5386 — 47% — were hatched after 45-50 days and hatchlings released to sea. Fifty of these hatchlings were tagged — with green, button-type plastic tags bearing numbers, respectively from 5001 to 5050 — prior to release. A few are kept in aquaria in the laboratory for experiments. If everything goes shipshape according to plan, by the completion of the 5-year period of the project we may be able to go a long way in rehabilitating this precious marine resource.

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#### *Seaweeds Contd.*

of the different products that could be obtained from each species and the probable uses they could be put to.

At present, the seaweeds (chiefly, the agarophytes) are collected on commercial scale from the neighbouring villages of Mandapam, namely, Vedalai, Pamban, Keelakarai, Periyapatnam, Pudumadam and Ervadi, and are sent mainly to the Cellulose Products of India, Ahmedabad. As estimated by the scientists at Mandapam, Shri. V. S. Krishnamoorthy Chennubhotla and colleagues, who are presently involved in the projects relating to the seaweed investigations, 20 to 25 thousand tonnes of fresh seaweed are harvested annually from this region. Fortunately, as the harvesting has strictly been seasonal, and as nature has more or less been favourable for the past few years, there is no need of apprehen-

sion of an immediate overexploitation. But, the nature could just as easily turn against us; and may be, the need might go up—there are visible signs of a growing interest for seaweed-based industries—then the only way to meet the demand would be by culture methods.

The culture experiments carried out so far, in both Palk Bay and Gulf of Mannar sides of Mandapam, yielded good results: on low-cost indigenous infrastructure, under properly monitored conditions, different species have grown to harvestable size in considerably less time than they would normally take in their natural habitats. Encouraged by these results, a pilot project has already been initiated and is presently well under way, to farm intensively the chosen species in larger areas.

## D. G. Visits Bombay Centre



Dr. Swaminathan accompanied by Dr. S. V. Bapat, Officer-in-Charge of Bombay Centre, goes round the labs.



Some of the research works are explained to Dr. Swaminathan.

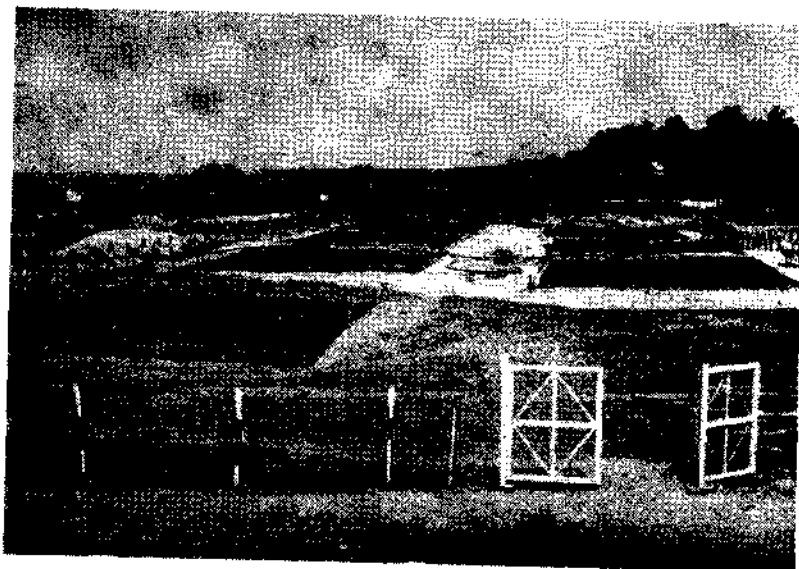
### An Unusual Catch of Catfish at Nagapatnam

On 5th October, trawlermen working along the coast of Nagapatnam brought news of sitting large shoals of catfish (*Arius* sp.) 5 kilometres away from shore. Wasting no time, katamaran fishermen of Keechakuppam set out to the spot with their bagnets, 'Isuvalai'. They bagged about 31,000 kg of fish just in two days, after which the fishery ended as abruptly as began. The catch, consisting of fish of 4 kg average weight, were soon sold out at a handsome price. According to Shri. K. S. Krishnan, Technical Assistant, who reported the incident, such large shoals of *Arius* appear very infrequently along this coast; the last record being 7 or 8 years before.

### Chank Fishery at Cochin

During July-August 76, the shrimp trawlers operating off Cochin netted an estimated 12,000 sacred chank, *Xancus pyrum* var. *acuta*, from a depth of 70 metres. The size of the shells ranged from 85 mm to 227 mm in length and 37 mm to 105 mm in breadth. The chanks were sold out easily at a price varying from Rs. 3 to Rs. 13 per shell. However, there was no fishery afterwards.





## Marine fish farm for Calicut

A view of the polythene-insulated tanks in the fish farm at Calicut.

A marine fish farm with polythene lining is devised at Calicut Research Centre. The seawater is pumped from the sea into the polythene-lined ponds with the aid of diesel pumps. An ingenious float is developed to facilitate the pumping of water with P.V.C.



Dr. Swaminathan goes round the fish farm.



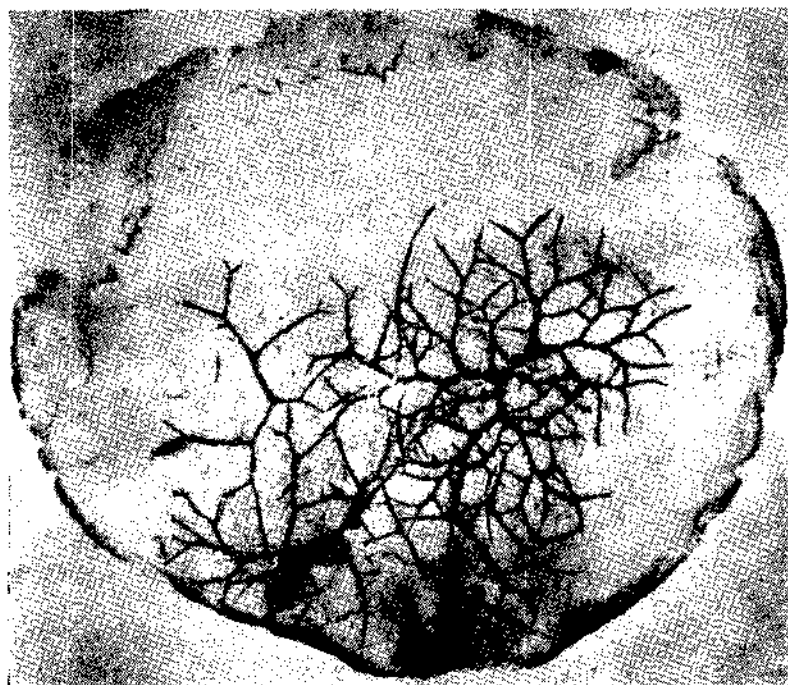
pipes. The postlarval forms of prawns and fishes which are available in plenty in the surf region during certain seasons are collected and stocked in the ponds. The water is periodically changed, and also cheap artificial food is given. The fish farm is designed and managed by Dr. R. S. Lal Mohan of Calicut Centre.

Dr. Swaminathan, Director General ICAR, accompanied by Dr. G. Seshappa, Officer-in-Charge, Calicut Centre, is visiting the marine aquarium.



## Heavy boring-sponge attack on window-pane oysters

The economically important window-pane oysters of Zuary estuary in Goa is facing a serious threat from the much-feared boring sponge *Clione*, the veritable enemy of the oyster beds. Over 60% of the oyster population is seriously infected. In almost all cases, it is the upper flat valve that is affected and the infection is wide-spread among all size groups from 56 to 115 mm. The shells are afflicted with linear and reticulate borings which, in severe cases, extend to the shell margin. In Goa these oysters are regularly harvested for their shells which are used in making window panes. The afflicted shells have naturally no market value as they are liable to go to pieces while processing.



Shell of the window-pane oyster with reticulate borings.

## Dr. Silas attended the International Seminar on Fisheries Research Management at Philippines

Dr. E. G. Silas, Director, participated in the International Seminar on Fisheries Research Management held at Bangui City in Philippines during 11-17 December. The Seminar, in which 29 management scientists from 11 developing Afro-Asian countries participated, focussed attention on varied problems in different areas, relating to elements of management, nature of planning, methodology and techniques including programming, contingency planning, and techniques of management of human resource. The Director gave a talk on 'the research management policy of the restructured Indian Council of Agricultural Research', in which he explained the method of working of the Council: its

organisation, the management of research institutes through the Management Committees and the Council, the institutional frameworks involving the Joint Staff Council, Grievance Cell and Staff Research Council, the staff recruitment and the Agricultural Research Service, the foundation training to ARS personnel, the periodic assessment of the institutes' progress by Achievement Audit Committees, and the interdisciplinary and inter-organisational collaborations in the planning, and the implementation of research projects in the institute. The information was much appreciated by the participants as well as the organisers of the seminar.

Dr. Silas visited the SEA-FDEC research laboratories at Tigbaun, Leganes, Binangunan and Manila. He also visited the International Rice Research Institute at Los Banos, Laguna, and the Philippines Council for Agriculture and Resource Research. The large-scale hatchery system for *Penaeus monodon* and the breeding of milkfish at Tigbauan has especially attracted him because the problems they try to solve there are very much akin to the ones which we confront here in India. The work carried out in Tigbauan within a period of 2½ to 3 years, he says, is very creditable. He feels that short-term visits to these laboratories on study | training tours will very much benefit our scientists who are working on similar problems.

## INTENSIVE CULTURE OF PRAWN IN A PERENNIAL FIELD

The Institute has taken up an intensive culture of marine penaeid prawns in a 0.25-ha perennial field at Kannamali, about 20 km southwest of Ernakulam, belonging to Shri. B. M. Edward of M/s. India Sea Foods. The rectangular farm is connected with the open backwaters both on the eastern and southern sides through sluices. The farm is relatively shallow, the maximum depth not exceeding 1.5 m. After the preliminary study on the environmental features and productivity, the culture work was started in October. The farm was treated with Mahuwa oil cake at the rate of 2 tonnes per hectare to eradicate the undesirable organisms and predators. After the removal of the dead organisms, free exchange of tidal water was allowed between the farm and the backwater through the sluices guarded with velon screens for about two weeks, in order to remove any lingering poisonous effect of the mahuwa cake. The stocking of Naran and Poovalan seeds collected from the brackish-water canals with the aid of a simple velon net was done in November.

### OILSARDINE CATCH POORER IN 1977

Oilsardine, one of the most important pelagic resources of the southwest coast, suffered a set back in 1977. The total landing during the year was 13% less than 1976. The decrease was due mainly to the ineffectual spawning and to the consequent decrease in the recruitment of the fresh year-class.

The prawn seeds, ranging from 10 to 30 m in length, were stocked at the rate of 1,15,000 per ha.

Subsequent observations showed that the prawns were actively feeding on the food naturally available in the farm and, therefore, no artificial feed were provided. From the

length-frequency observations carried out in March, it was found that Naran (*Penaeus indicus*) gained 100 mm and Poovalan (*Metapenaeus dohsoni*) 60 mm in the course of four months. The culture programme is carried out under the immediate supervision of Dr. P. V. Rao, head of the crustacean division.



The dead organisms are being fished out from the farm.

## ICAR and SEAFDEC Collaborate in Aquaculture Research and Development

The Indian Council of Agricultural Research and the Southeast Asian Fisheries Development Centre entered into an agreement to collaborate in the fields of research and development, training and extension, and production of living aquatic species. The Southeast Asian Fisheries Development Centre (SEAFDEC) is a treaty agreement organization established in 1973 among six nations, namely: Malaysia, Singapore, Thailand, Vietnam,

Philippines and Japan, to devote to the development of aquaculture research in these countries, with its head office at Metro Manila, Philippines.

Under the agreement, the ICAR and the SEAFDEC will exchange scientists and technologists; and scientific literature, information and methodology. They will also mutually import and export scientific equipments as available and required in programmes of common interest.

## VISITORS

Dr. L. M. Sprague, Agriculture & Rural Development Department, World Bank, Washington, D.C., visited the Institute on 14th October.

Dr. John Gulland, Department of Fisheries, FAO, Rome, visited on 19 October.

A Six-man South-East-Fisheries-Development-Centre Delegation under the leadership of Mr. Antonio C. Villaluz visited the Institute during 13-17 November. The Delegation visited also the Madras and Tuticorin Centres.

Dr. John Chadwick, President of the Commonwealth Foundation, visited the Vizhinjam Centre on 30 January.

Dr. Chua Thia-Cheng, School of Biological Science, University of Science, Penang, Malaysia, visited on 4-1-78.

Dr. Yusif Abu-Gideri, University of Khartoum, Khartoum, Sudan visited on 7-1-78.

Sir Charles Pereira, Commonwealth Mission of Aquacultural Research, IDRC/TAC, visited on 23-1-78.

Mr. Deb Menasreta, Tokyo, Japan, visited on 23-1-78.

Dr. K. Koriniho, SEAFDEC Bangkok, Consultative Mission on Aquaculture Research, visited on 23-1-78.

Dr. W. H. L. Allsop, IDRC Director of Fisheries, Vancouver, British Columbia, visited on 23-1-78.

Dr. Karl F. Kossack, Dept. of Statistics and Computer Science, University of Georgia, U.S.A., visited on 13-2-78.

Mr. V. L. C. Pieters, Ministry of Fisheries, Colombo, Sri Lanka, visited on 22-2-78.



Dr. Chadwick examines the rope-cultured maussels at Vizhinjam

## GENERAL

The Director, Dr. E. G. Silas, is nominated as the Chairman, Task Force on Inland and Estuarine Fisheries including culture programmes. He is also nominated as Member, Task Force on Fisheries Research and Education, Task Force on Agricultural Research and Education, and Steering Committee on Fisheries Development of the Kerala Planning Board.

Dr. Silas is nominated as a Member of the Management

Committee of the Krishi Vigyan Kendra at Pondicherry.

The sixth Meeting of the Management Committee of the Institute was held on 2nd November.

A special meeting of the Institute Joint Staff Council was held on 19th November.

### Engagements

The Director has attended the Sixth Plan Proposal Meeting at I.C.A.R. New Delhi in October.

The Director, Dr. E. G. Silas, attended the First World Conference on Malayalam and Kerala Culture held at Trivandrum in November and presented a paper on "Resource base for development of fishing industry in Kerala".

The Director attended the 57th meeting of the Executive Committee and the First Meeting of the Fisheries Advisory Committee of the Kerala Agricultural University, at Trivandrum on 26th November.

## TRAINING

### Alie Poernomo of Indonesia

Mr. Alie Poernomo Tirthoredgo, Director of the Shrimp Culture Research Centre, Japara, Indonesia, on a 2½ month fellowship of the FAO, visited the Institute from 11



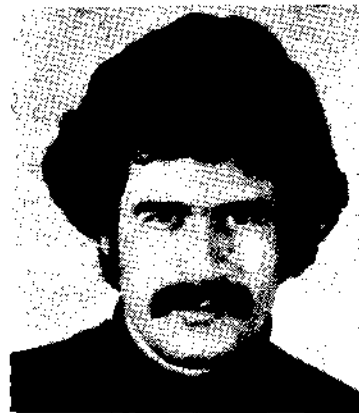
November 77 to 24 January 78 to study techniques of prawn filtration/culture in the paddy fields of Kerala. Mr. Poernomo, a graduate in Fisheries of the Academy of Agriculture, Bogor, has, since 1972, been organising and implementing research programmes on milkfish/shrimp culture in Indonesia. He has visited various countries like West Germany, Denmark, Taiwan, Japan, Korea, Malaysia and Thailand undergoing training in fishery biology, marine biology and fish culture.

During the course of his study in the Institute he got trained on the various aspects of prawn culture in paddy fields and perennial fields. He has also visited, among other places, the Tuticorin and Madras Research Centres of the Institute.

### Ebrahim Abdul Rahim of Bahrain

Mr. Ebrahim Abdul Rahim Abdul Qudir, Research Officer, Fisheries Resources Bureau, Ministry of Commerce and Agriculture, Bahrain, was in the Institute for a training in shrimp biology and fisheries on a 2-month fellowship. A graduate in Chemistry of the Kuwait University, Mr. Qadir has been working on the biology and population dynamics of shrimps in Bahrain waters. During his training course in the Institute he was given an intensive training on taxonomy, distribution, nutrition, age and growth, maturation and spawning, mark-recovery ex-

periments and population characteristics of our commercially important prawns. He also



visited the Mandapam Regional Centre to observe the fishery of *Penaeus semisulcatus* which forms the most important constituent of the prawn fishery of that coast.

The third training course in prawn/fish culture under the Krishi Vigyan Kendra at Narakkal was commenced on 14 November. The following candidates were under training:

1. Shri. P. X. Sebastin, Paiyyappilly, Narakkal.
2. Shri. C. K. Radhakrishnan, Chethukalathil, Kedamangalam, N. Parur.
3. Shri. T. M. Suthan, Thekkapaty, Ezhikkara, N. Parur.
4. Shri. P. K. Sivan, Poovath, Narakkal.
5. Shri. O. M. Sainudeen, Ottathengumkal, Ezhikkara, N. Parur.
6. Shri. N. K. Balan, Man-nuchirayil, Perumpedanna, N. Parur.

### KRISHI VIGYAN KENDRA

7. Shri. C. D. Parameswaran Chakothara, Kedamangalam, N. Parur.
8. Shri. K. J. Anakloth, Kocherey, Edavanakad.
9. Shri. P. T. Sukumaran, Paiyyappillythara, Edavanakad.
10. Shri. K. K. Chandrasekharan, Kalathilparambil, Kedamangalam South, N. Parur.

### Training abroad

Shri. D. Vincent, Technical Assistant of Calicut Research Centre, has proceeded on deputation under Colombo Plan for a training in Marine Pollution Chemistry at the University of Liverpool, Department of Oceanography, U. K. The period of training will be from January 78 to July 78.

## CONSULTANCY

The following government departments, institutions, agencies and persons received our services by way of technical consultancy:

1. Dr. P. S. B. R. James, Professor of Fishery Biology, University of Agricultural Sciences, Fisheries College, Mangalore, Karnataka.
2. Shri. John Kurien, Centre for Development Studies, Aakulam Road, Ulloor, Trivandrum-11.
3. Dr. K. Srinivasa Rao, Reader, Dept. of Zoology, Andhra University, Waltair, Visakhapatnam-3.
4. The Assistant Commissioner (FS), Ministry of Agriculture & Irrigation, Dept. of Agriculture, Krishi Bhavan, New Delhi-1.
5. The Managing Director, Great Asiatic Line Ltd., 1616 Madrasa Road, Kashmere Gate, New Delhi-6.
6. Director of Fisheries, Govt. of Madras, Teynampet, Madras-6.
7. The Joint Director of Fisheries, Govt. of Orissa, Cuttack.
8. Dr. P. M. Misra, Joint Director of Fisheries, Govt. of Orissa, Cuttack.
9. The Director, Bureau of Statistics & Economics, Govt. of Orissa, Bhubaneswar, Orissa.
10. Shri. K. N. R. Nair, Assistant Director, The Marine Products Export Development Authority, XX III/80 (3A) II Floor, Aliya School Road, Kochin-2.
11. District Statistical Officer, Ernakulam, Cochin-16.
12. Director of Fisheries, Govt. of Kerala, Trivandrum.
13. Shri. T. Suryanarayana Murthy, Assistant Director of Fisheries, Rajahmundry, Andhra Pradesh.
14. The Director, Pre-Investment Survey of Fishing Harbours, No. 64 Palace Road, Bangalore-52.
15. Shri. S. J. Chari, B.Sc., M.R.I.C., Joint Director of Fisheries (Deep Sea Fishing) i/c and Member Secretary, Chidambaram Committee, Madras-6.
16. Dr. G. K. Chadha, Associate Professor of Economics, Centre for the Study of Regional Development, Jawaharlal Nehru University, New Mehrauli Road, New Delhi-57.
17. Shri. G. M. Kulkarni, CMFR Trainee, Central Institute of Fisheries Education, Versova, Bombay-61.
18. Dr. M. S. Prabhu, Director, Pelagic Fisheries Project, Cochin-16.
19. The Director, Bureau of Economics & Statistics, Multistoried Building, Vidhana Veedhi, Bangalore-1.
20. The Proprietor, Valco Corporation, Market Road, Cochin-11.
21. Director of Statistics, Govt. of Tamil Nadu, Madras-6.
22. Charles M. Cherian, Agricultural Officer, United States Department of Agriculture, American Consulate General, 78-B Desari Road, Bombay-26.
23. The Programmer, Planning & Data Division, National Institute of Oceanography, Dona Paula, Goa.
24. Shri. A. Shridharan, Voltas Ltd., Maneckji Wadia Building, 127 Mahatma Gandhi Road, Bombay.

### Vellar estuary: a rich clam bed

Vellar estuary in Tamil Nadu is immensely rich for the edible clams the population of which is estimated to 3300 metric tonnes. But, as the clams in general are accepted as food only by the poorer section of the coastal people, not more than 750 tonnes are fished annually, and the bulk of this catch are burned without removing the meat for making lime. The clams being burrowing animals are easily fished by hand-picking and, therefore, the people employed in this fishery are mostly Harijans and those poor fishermen who have no means to go for regular fishing for fin-fish.

The three important species in the estuary are: *Meretrix*

*casta*, *Katelysia opima* and *Sanguinolaria diphos*. But the fishery is mostly of *M. casta*. Considering the importance of these bivalves in the economy of the coastal people, the Porto-Novo Research Centre of the Institute took up an extensive study of this resource, under the leadership of Shri. P. V. Sreenivasan. The study included the extent and causes of fluctuation in monthly abundance of the different species. Experiments are now being undertaken on their large-scale culture under controlled conditions with the probable improvement in the palatability of their meat as one of the aims.

## STAFF NEWS

### FIVE - YEARLY ASSESSMENT

The Institute takes pride in announcing that out of 107 scientists of different grades presented for the first Five-Yearly Assessment under the provisions of the Service Rules for A.R.S. 104 were favourably considered; 68 were appointed to the next higher grade and 36 granted advance increments from 1st July 1976.

### Scientists appointed to the higher grade

Shri S. Muthuswamy, S to S-1  
 Shri C. P. Gopinathan, S to S-1  
 Shri K. J. Joseph, S to S-1  
 Shri K. Narayana Kurup, S to S-1  
 Shri V. Kunjukrishna Pillai, S to S-1  
 Shri M. Devaraj, S to S-1  
 Shri K. J. Mathew, S to S-1  
 Dr. M. K. George, S to S-1  
 Shri G. S. Daniel Selvaraj S to S-1  
 Shri P. Parameswaran Pillai, S to S-1  
 Shri K. M. S. Ameer Hamsa, S to S-1  
 Shri R. Sarvesan, S to S-1  
 Shri P. Devadoss, S to S-1  
 Dr. V. Sriramachandra Murty, S to S-1  
 Shri K. K. Appuputatan, S to S-1  
 Shri Alexander Kurian, S to S-1  
 Shri D. C. V. Easterson, S to S-1  
 Shri P. V. Sreenivasan, S to S-1  
 Shri S. Lazarus, S to S-1  
 Shri M. Kathirvel, S to S-1  
 Shri K. Rengarajan, S to S-1  
 Shri Y. Appannasastry, S to S-1  
 Shri N. Surendranatha Kurup, S to S-1  
 Shri N. Neelakanta Pillai, S to S-1  
 Shri G. P. Kumaraswamy Achari, S to S-1  
 Shri Kuber Vidyasagar, S to S-1  
 Shri G. Sudhakara Rao, S to S-1  
 Dr. P. A. Thomas, S to S-1  
 Shri C. Suseelan, S to S-1  
 Shri R. Marichamy, S to S-1  
 Shri K. Y. Telang, S to S-1  
 Shri D. B. James, S to S-1  
 Shri G. Subbaraju, S-1 to S-2  
 Dr. G. S. Sharma, S-1 to S-2  
 Shri C. P. Ramamirtham, S-1 to S-2  
 Shri D. Sadananda Rao, S-1 to S-2



Dr. A. V. S. Murty.

Dr. P. V. Ramachandran Nair, S-1 to S-2  
 Shri V. S. Krishnamurty Chennubhotla, S-1 to S-2  
 Shri S. K. Dharma Raja, S-1 to S-2  
 Dr. M. D. K. Kuthalingam, S-1 to S-2  
 Dr. N. Radhakrishnan, S-1 to S-2  
 Dr. (Mrs.) Kagwade, S-1 to S-2  
 Shri M. S. Muthu, S-1 to S-2  
 Shri S. Mahadevan, S-1 to S-2  
 Shri K. Rangarajan, S-1 to S-2  
 Shri M. H. Dhulkhed, S-1 to S-2  
 Shri K. C. George, S-1 to S-2  
 Shri P. Bensam, S-1 to S-2  
 Shri V. M. Deshmukh, S-1 to S-2  
 Dr. P. Vedavyasa Rao, S-1 to S-2  
 Dr. K. Radhakrishna, S-1 to S-2  
 Dr. B. Krishnamoorthi, S-1 to S-2  
 Shri G. Luther, S-1 to S-2  
 Dr. S. V. Bapat, S-1 to S-2  
 Shri G. Venkataraman, S-1 to S-2  
 Dr. M. J. George, S-1 to S-2  
 Dr. B. T. Antony Raja, S-1 to S-2  
 Dr. K. Alagarwami, S-1 to S-2  
 Shri K. Venkatanarayana Rao, S-1 to S-2  
 Dr. S. Ramamurthy, S-1 to S-2  
 Shri M. Mydeen Kunju, S-1 to S-2  
 Shri M. S. Rajagopalan, S-1 to S-2  
 Shri A. Noble, S-1 to S-2  
 Shri K. Nagappan Nayar, S-1 to S-2  
 Dr. A. V. S. Murty, S-2 to S-3  
 Shri G. Seshappa, S-2 to S-3  
 Shri K. H. Mohamed, S-2 to S-3  
 Dr. M. S. Prabhu, S-2 to S-3

### Grant of advance increment

Shri M. M. Meiyappan, S; two.  
 Shri A. Regunathan, S; two.  
 Shri P. Livingston, S; three.  
 Shri P. E. Sampson Manickam, S; two.  
 Shri K. S. Sundaram, S; three.  
 Shri K. Devarajan, S; two.  
 Shri K. V. Somasekharan Nair, S; three.  
 Shri T. M. Yohannan, S; two.  
 Shri A. Charles Christian Victor, S; two.  
 Shri K. K. Sukumaran, S; three.  
 Shri P. Natarajan, S; one.  
 Shri P. Nammalwar, S; three.  
 Shri V. S. Rengaswamy, S; one.  
 Shri R. Thiagarajan, S; two.  
 Shri S. Shanmugham, S; three.  
 Shri K. Prabhakaran Nair, S; three.  
 Shri A. A. Jayaprakash, S; three.  
 Shri Mohamed Zafar Khan, S; two.  
 Shri S. Krishna Pillai, S; one.  
 Shri G. Nanda Kumar, S; two.  
 Shri K. Ramadoss, S; three.  
 Shri M. Rajagopalan, S; two.  
 Shri R. Soundararajan, S; three.  
 Shri K. G. Girijavallabhan, S; two.  
 Shri K. N. Rajan, S; two.  
 Shri N. S. Radhakrishnan, S-1; one.  
 Shri P. Sam Bennet, S-1; one.  
 Dr. M. Vasudev Pa., S-1; two.  
 Dr. V. Balakrishnan, S-1; two.  
 Dr. V. Balan, S-1; one.  
 Shri V. Ramamohana Rao, S-1; one.  
 Dr. K. Satyanarayana Rao, S-1; three.  
 Shri K. A. Narasimham, S-1; three.  
 Shri M. Kumaran, S-1; two.  
 Shri C. Mukundan, S-1; one.

### APPOINTMENTS

Miss K. Valsala as Field Assistant (T-1) at Cochin; 14-10-77.  
 Shri Jacob D. Eapen as Field Assistant (T-1) at Cochin; 17-10-77.  
 Shri Jose Kütty as Field Assistant (T-1) at Cochin; 17-10-77.  
 Shri K. K. Surendran as Field Assistant (T-1) at Cochin; 18-10-77.  
 Shri K. Chellappan as Field Assistant (T-1) at Cochin; 18-10-77.  
 Smt. Swarnalatha as Field Assistant (T-1) at Cochin; 18-10-77.

Shri M. N. Kesavan Elayathu as Field Assistant (T-1) at Cochin; 19-10-77.

Shri P. Poovannan as Field Assistant (T-1) at Madras; 21-10-77.

Shri T. Gangadharan as Field Assistant (T-1) at Cochin; 22-10-77.

Shri K. Chandran as Field Assistant (T-1) at Cochin; 22-10-77.

Shri T. Krishnankutty as Field Assistant (T-1) at Cochin; 22-10-77.

Shri C. S. Sas'dharan as Field Assistant (T-1) at Cochin; 22-10-77.

Shri K. Narayana Rao as Field Assistant (T-1) at Kakinada; 22-10-77.

Shri S. Satya Rao as Field Assistant (T-1) at Waltair; 22-10-77.

Shri V. Achutha Rao as Field Assistant (T-1) at Waltair; 22-10-77.

Shri G. Arumugham as Field Assistant (T-1) at Tuticorin; 25-10-77.

Shri M. Chandrasekhar as Field Assistant (T-1) at Waltair; 25-10-77.

Shri Mathew Joseph as Field Assistant (T-1) at Vizhinjam; 19-10-77.

Miss T. A. Omana as Field Assistant (T-1) at Vizhinjam; 17-10-77.

Shri R. Somu as Field Assistant (T-1) at Mandapam Camp; 24-10-77.

Shri N. Varatharajan as Field Assistant (T-1) at Mandapam Camp; 24-10-77.

Shri A. Prosper as Field Assistant (T-1) at Mandapam Camp; 26-10-77.

Shri M. Radhakrishnan as Field Assistant (T-1) at Mandapam Camp; 26-10-77.

Shri M. Chellappa as Field Assistant (T-1) at Mandapam Camp; 26-10-77.

Shri K. Srinivasagan as Field Assistant (T-1) at Madras; 4-1-78.

Shri Dalwadi Praduemen Mohanlal as Field Assistant (T-1) at Bombay; 1-12-77.

Shri Shreekanth Shraedhur Sugwekar as Field Assistant (T-1) at Bombay; 2-12-77.

Shri Shakul Hameed as Field Assistant (T-1) at Madras; 7-1-78.

Shri Padmashekara as Field Assistant (T-1) at Mangalore; 6-3-78.

Shri C. K. Dinesh as Field Assistant (T-1) at Karwar; 6-3-78.

Shri Mascarenhas Robert as Field Assistant (T-1) at Karwar; 6-3-78.

Shri N. Chempanna Gowda as Field Assistant (T-1) at Mangalore; 7-3-78.

Shri D. Nagaraja as Field Assistant (T-1) at Mangalore; 8-3-78.

Shri S. Hanumantharaya as Field Assistant (T-1) at Karwar; 8-3-78.

Shri M. Manivasagam as Field Assistant (T-1) at Tuticorin; 22-10-77.

Shri P. Palani as Field Assistant (T-1) at Mandapam Camp; 22-10-77.

Shri S. Sankaralingam as Field Assistant (T-1) at Mandapam Camp; 21-1-77.

Shri N. Valhianathan as Field Assistant (T-1) at Tuticorin; 29-10-77.

Shri C. Maninagan as Field Assistant (T-1) at Tuticorin; 29-10-77.

Shri S. Raja Packiam as Field Assistant (T-1) at Tuticorin; 22-10-77.

Shri G. Srinivasan as Field Assistant (T-1) at Tuticorin; 24-10-77.

Shri J. Narayanaswamy as Field Assistant (T-1) at Calicut; 18-10-77.

Shri M. P. Sivadasan as Field Assistant (T-1) at Calicut; 17-10-77.

Shri M. Bose as Field Assistant (T-1) at Madras; 29-10-77.

Shri A. K. Padharja as Field Assistant (T-1) at Waltair; 27-10-77.

Shri T. Dandapani as Field Assistant (T-1) at Madras; 29-10-77.

Smt. V. K. Janaki as Field Assistant (T-1) at Calicut; 19-10-77.

Shri V. G. Surendranathan as Field Assistant (T-1) at Calicut; 19-10-77.

Shri A. Ramakrishnan as Field Assistant (T-1) at Madras; 31-10-77.

Shri P. Venkatakrishnan Rao as Field Assistant (T-1) at Puri; 27-10-77.

Shri K. T. Thomas as Field Assistant (T-1) at Vizhinjam; 19-10-77.

Shri A. K. Velayudhan as Field Assistant (T-1) at Vizhinjam; 22-10-77.

Shri M. Balram as Field Assistant (T-1) at Karwar; 8-3-78.

Shri S. D. Dhuri as Field Assistant (T-1) at Bombay; 19-11-78.

Shri Y. V. Venkatachalamurthy as Field Assistant (T-1) at Mangalore; 9-3-78.

Shri G. Krishnaiah as Field Assistant (T-1) at Mangalore; 13-3-78.

Shri B. Sridhara as Field Assistant (T-1) at Mangalore; 16-3-78.

Shri K. M. Mathai as Administrative Officer at Cochin; 26-11-77.

Smt. A. K. Kunjupannu as Junior Clerk at Cochin; 2-1-78.

Shri K. O. Chinnan as Junior Clerk at Calicut; 22-12-77.

Miss V. Parakutty as Junior Clerk at Calicut; 20-12-77.

Miss V. Gouri as Junior Clerk at Waltair; 22-3-78.

Shri Yeppappa B. Gamanagatti as Junior Clerk at Karwar; 31-3-78.

Shri Sayed Ahmadali as Scientist S-1 at Cochin; 26-9-77.

Shri H. Mohamed Kasim as Scientist S-1 at Cochin; 30-9-77.

Shri C. Suseelan as Scientist S-1 at Cochin; 5-10-77.

Shri C. P. Gopinathan as Scientist S-1 at Cochin; 5-10-77.

Shri N. Surendranatha Kurup as Scientist S-1 at Cochin; 5-10-77.

Shri K. G. Girijavallabhan as Scientist S-1 at Madras; 7-10-77.

Shri D. B. James as Scientist S-1 at Port Blair; 14-10-77.

Dr. P. A. Thomas as Scientist S-1 at Goa; 10-10-77.

Shri Dharamvir Singh Sehra as Scientist S-1 at Cochin; 11-10-77.

Shri K. K. P. Panikkar as Scientist S-1 at Cochin; 22-10-77.

Smt. Geetha Bharatan as Scientist S-1 at Cochin; 5-12-77.

Shri V. Josanto as Scientist S-1 at Cochin; 15-11-77.

Dr. C. M. James as Scientist S at Cochin; 5-10-77.

Shri P. Karuppuswamy as Scientist S at Calicut; 6-10-77.

Shri S. Dharmaraj as Scientist S at Tuticorin; 7-10-77.

Shri T. S. Velayudhan as Scientist S at Tuticorin; 28-10-77.

Shri G. Radhakrishnan as Scientist S at Cochin; 28-12-77.

Shri V. Demudu as Watchman at Waltair; 14-10-77.

Shri R. Sonaimuthu as Sweeper at Mandapam Camp; 1-10-77.

Shri K. Rajappan as Watchman at Narakkal; 10-10-77.

Shri K. S. Vaidyalngam as Daftry at Cochin; 31-10-77.

Shri K. B. Aravindakshan as Bosun at Cochin; 3-10-77.

Shri R. Appaya Naik as Watchman at Mangalore; 3-11-77.

Shri Vali Mohamed as Watchman at Madras; 13-11-77.

Shri K. G. Tawde as Watchman at Veraval; 19-2-78.



Shri Lohita K. Suvarna as Watchman at Karwar; 30-3-78.

Shri Mahabaleshwar R. Kotharkar as Watchman at Karwar; 31-3-78.

Shri K. Sasidharan Pillai as Watchman at Cochin; 3-1-78.

Shri B. Zainudheen as Watchman at Cochin; 2-1-78.

Miss N. Leela as Daftry at Cochin; 7-1-78.

Shri P. I. Koya as Watchman at Minicoy; 28-1-78.

Shri N. Burayya as Watchman at Kakinada; 1-3-78.

Shri N. Vellaichamy, Laboratory Attendant (S.S. Grade III) at Mandapam Camp, retired on 30-11-77 after 12 years of service.

### Promotions

Shri S. Pitchai, Watchman (S.S. Grade I), as Daftry (S.S. Grade II) at Mandapam Camp; 17-2-78.

Shri D. Motcham, Lascar (S.S. Grade I), as Daftry (S.S. Grade II) at Tuticorin; 19-1-78.

Shri J. Balasubramanian, Peon (S.S. Grade I), as Daftry (S.S. Grade II) at Mandapam Camp; 14-1-78.

Shri S. Periasamy, Daftry (S.S. Grade II), as Laboratory Attendant (S.S. Grade III) at Mandapam Camp; 19-1-78.

Shri S. Muthuramalingam, Daftry (S.S. Grade II), as Laboratory Attendant (S.S. Grade III) at Mandapam Camp; 19-1-78.

Shri K. S. Vaidyalingham, Daftry (S.S. Grade II), as Laboratory Attendant (S.S. Grade III) at Cochin; 19-1-78.

Smt. M. O. Leela, Junior Clerk, as Senior Clerk on ad hoc basis at Cochin; 1-3-78.

Shri V. V. Lakshminarayanan, Junior Clerk, as Senior Clerk on ad hoc basis at Cochin; 1-3-78.

Shri B. Vijayakumar, Junior Clerk, as Senior Clerk on ad hoc basis at Cochin; 1-3-78.

Shri B. Bavanandan, Junior Clerk, as Senior Clerk on ad hoc basis at Tuticorin; 1-3-78.

Smt. T. K. Ponnamma, Junior Clerk as Senior Clerk at Cochin; 1-3-78.

Shri A. Narayanaswamy, Senior Clerk, as Assistant on ad hoc basis at Cochin; 27-2-78.

Shri B. Koragu Naik, Senior Clerk, as Assistant on ad hoc basis at Mangalore; 27-2-78.

Shri P. Ganesan, Senior Clerk, as Assistant on ad hoc basis at Calicut; 27-2-78.

Shri P. Aithappa Naik, Assistant, as Superintendent at Cochin; 19-2-78.

### Transfers

Dr. S. Kulasakara Pandian, Scientist S-1, from Cochin to Narakkal.

Shri A. Lakshminarayana, Scientist S-1, from Cochin to Narakkal.

Shri M. Rajamani, Scientist S-1, from Cochin to Narakkal.

Shri G. Gopakumar, Scientist S-1, from Cochin to Vizhinjam.

Shri Madan Mohan, Scientist S-1, from Cochin to Vizhinjam.

Shri G. Syda Rao, Scientist S-1, from Cochin to Mangalore.

Shri P. Muthiah, Scientist S-1, from Cochin to Tuticorin.

Miss Gracy Mathew, Scientist S-1, from Cochin to Tuticorin.

Miss Mary K. Manisseri, Scientist S-1, from Cochin to Tuticorin.

Shri E. V. Radhakrishnan, Scientist S-1, from Cochin to Madras.

Dr. E. Vivekanandan, Scientist S-1, from Cochin to Madras.

Shri N. Ramachandran, Scientist S-1, from Cochin to Madras.

Shri Vinay D. Deshmukh, Scientist S-1, from Cochin to Bombay.

Shri S. K. Chakraborty, Scientist S-1, from Cochin to Bombay.

Shri G. Mohanraj, Scientist S-1, from Cochin to Mandapam.

Smt. Geeta Bharatan, Scientist S-1, from Cochin to Kovalam (Madras).

Shri N. Rajamaniswami, Assistant, from Mangalore to Cochin.

Shri V. Chemutty, Assistant, from Calicut to Cochin.

Shri P. K. Sakkarai, Senior Clerk, from Mangalore to Cochin.

Shri A. Narayana Gokhale, Senior Clerk, from Cochin to Madras.

Shri S. Pitchai, Senior Clerk, from Vizhinjam to Port Blair.

Shri R. Kalanjim, Junior Clerk, from Karwar to Cochin.

Shri B. Vijayakumar, Junior Clerk, from Waltair to Cochin.

Smt. R. Chandrika, Junior Clerk, from Cochin to Waltair.

Shri S. Duraipandian, Watchman, from Vizhinjam to Tuticorin.

Shri M. Govindaraj, Watchman, from Madras to Cochin.

Shri E. F. Francis, Watchman, from Narakkal to Cochin.

Shri S. Pitchai, Watchman, from Tuticorin to Mandapam Camp.

Shri N. Ravindran Andi, Fieldman, from Mangalore to Bombay.

Shri O. Muthukaruppan, Motor Driver, from Cochin to Mandapam Camp.

Shri T. Krishnakutty, Field Assistant, from Cochin to Karwar.

Shri K. Chandran, Field Assistant, from Cochin to Karwar.

Shri C. T. Josekutty, Field Assistant, from Cochin to Janjira-Murud.

Shri T. Gangadharan, Field Assistant, from Cochin to Veraval.

Shri M. Chellappa, Field Assistant, from Mandapam Camp to Dumas.

Shri T. Krishnan, Field Assistant, from Mandapam Camp to Dumas.

Shri N. Varadharajan, Field Assistant, from Mandapam Camp to Ongole.

Shri A. Ahmed Kamal Pasha, Field Assistant, from Mandapam Camp to Goa.

Shri M. Radhakrishnan, Field Assistant, from Mandapam Camp to Srikakulam.

Shri A. Prosper, Field Assistant, from Mandapam Camp to Malvan.

Shri P. Poovannan, Field Assistant, from Madras to Kovalam.

Shri K. Srinivasagan, Field Assistant, from Madras to Kovalam.

Shri A. Ramakrishnan, Field Assistant, from Madras to Kovalam.

Shri K. Shahul Hameed, Field Assistant, from Madras to Kovalam.

Shri H. Kather Batcha, Junior Technical Assistant, from Janjira-Murud to Madras.

Shri M. R. Arputharaj, Junior Technical Assistant, from Veraval to Tuticorin.

Shri S. Seetharaman, Junior Technical Assistant, from Dumas to Bombay.

Shri V. Thanapathy, Junior Technical Assistant, from Goa to Nagapatnam.

Shri S. Subramanian, Junior Technical Assistant, from Srikakulam to Madras.

Shri C. Kasinathan, Junior Technical Assistant, from Madras to Mandapam Camp.

Shri O. M. M. J. Habeeb Mohamed, Junior Technical Assistant, from Malvan to Mangalore.

Shri R. Vijayaraghavalu, Laboratory Attendant, from Madras to Cochin.

Shri V. K. Krishnankutty, Laboratory Attendant, from Karwar to Calicut.

Shri C. M. Rajappan, Laboratory Attendant, from Vizhinjam to Port Blair.

### Reliefs

Shri G. Pankajakshan Nair, Watchman (S.S. Grade I) at Vizhinjam, is relieved on resignation; 23-11-77.

Shri A. G. Rana, Peon, on resignation; 14-11-77.

Shri V. S. Subramanian, Senior Clerk at Cochin, to take up the post of Assistant at C.T.C.R.I., Trivandrum.

Shri K. V. George, Technical Assistant (T-4) at Cochin, to take up the post of Project Officer at Marine Products Export Development Authority, Cochin; 19-1-78.

Shri Patel Gulbhai Nanabhai, Junior Clerk, on resignation; 27-1-78.

Shri S. Vijayabhaskar, Junior Assistant, to take up the post of Technical Officer in the Export Inspection Council; 17-2-78.

### Retirement



Shri K. V. Sankaran, Laboratory Attendant (S.S. Grade III) at Cochin, retired on 31-10-77 after 22 years of service. Shri Sankaran joined the Institute on 10-9-55 as a Watchman.

### Weddings

Shri V. A. Narayanan Kutty, Junior Technical Assistant, married Kum. Janamma at the bride's residence at Cherai on 13th November 1977.

Shri P. Muthiah, Scientist S-1 at Tuticorin, married Selvi. Sathi, on 7th December 1977 at Thiru Manakavalam Pillai Kalyana Mandapam, Palayamkottai.

Kum. Molly Manisseri, Scientist S-1 at Tuticorin, is married to Shri P. J. Joy at St. Francis Church, Amballoor, on 15th January 1978.

Shri M. Gopinathan Nair, Motor Driver at Cochin, married Kum. D. Jagadamma at the bride's residence at Cheppara on 21st January 1978.

Shri N. Neelakanta Pillai, Scientist S-1 at Cochin, married Kum. Jaya on 6th February 1978 at Chottanikara Devi Temple.

### OBITUARY



We record with profound regret the untimely demise of Shri V. Ramamohan Rao, Scientist S-1 at Waltair, on 26-12-77 after an ailment for some time from a heart attack Sri Rao who joined the Institute in September 1955 as a Research Assistant, was subsequently promoted as Scientist Grade S-1. He, who was 48, leaves behind his wife, 2 sons and a daughter.

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I, K. N. Krishna Kartha, hereby declare that the particulars given above are true to the best of my knowledge and belief.

Dated: March, 1978.

Sd/- K. N. Krishna Kartha,  
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## PROVISIONAL ESTIMATES OF MARINE FISH LANDINGS IN INDIA DURING 1977 (FIGURES IN TONNES)

Sl. No.	Name of Fish	West Bengal	Orissa	Andhra	Tamil Nadu	Pondicherry	Kerala	Karnataka	Goa	Maharashtra	Gujarat	Andamans	Lakshadweep	Total
1.	Elasmobranchs	73	1658	6450	18327	352	5796	3238	625	7746	17565	90	296	62216
2.	Eels	1	—	438	232	5	6	3	—	3849	8463	—	—	12997
3.	Cat fishes	134	1035	5662	15205	137	7947	5162	918	8318	8958	28	—	53504
4.	<i>Chirocentrus</i>	107	752	1217	2475	63	547	717	32	2634	3327	38	—	11909
5. (a)	Oil Sardines	—	—	—	714	—	117356	31145	807	108	—	—	—	150130
(b)	Other sardines	—	1227	10927	26259	1156	20754	180	4066	1024	—	86	—	65724
(c)	<i>Hilsa ilisha</i>	96	2948	41	343	—	36	44	—	352	329	—	—	4189
(d)	Other <i>Hilsa</i>	—	492	1654	5784	43	14	113	1	978	5547	25	—	14651
(e)	<i>Anchoviella</i>	4	486	8947	13388	548	10105	174	9	269	—	103	—	34033
(f)	<i>Thrissocles</i>	365	197	1398	3008	405	1648	831	293	1679	105	—	—	9929
(g)	Other clupeids	705	778	2363	2652	—	512	1677	520	22782	9458	11	—	41458
6. (a)	<i>Harpodon nehereus</i>	1060	86	960	14	—	—	4	20	50803	32289	—	—	85236
(b)	<i>Saurida &amp; Saurus</i>	—	5	875	572	103	5169	385	239	1135	42	—	—	8525
7.	<i>Hemirhamphus &amp; Belone</i>	—	—	135	1574	4	281	57	13	32	104	53	58	2311
8.	Flying fish	—	—	84	526	3	—	—	—	—	—	—	30	643
9.	Perches	—	55	2727	7918	391	14121	1489	505	2973	1213	196	211	31799
10.	Red mullets	—	1	315	832	32	240	19	—	171	779	4	29	2422
11.	Polynemids	25	406	698	1592	5	69	3	1	862	39968	—	—	3929
12.	Sciaenids	819	312	10182	13756	258	11965	2762	2779	17086	14180	—	—	99887
13.	Ribbon fish	306	174	8546	4594	143	7440	237	449	6338	—	—	—	42407
14. (a)	<i>Caranx</i>	—	103	4003	6120	490	15673	760	1149	1167	1002	134	65	30666
(b)	<i>Chorinemus</i>	12	386	530	1465	5	540	506	44	230	401	—	—	4119
(c)	<i>Trachynotus</i>	—	—	—	73	—	7	—	—	—	—	—	—	80
(d)	Other carangids	—	—	78	22	—	78	41	—	—	—	—	—	219
(e)	<i>Coryphaena</i>	—	1	137	58	2	28	—	—	—	—	—	—	226
(f)	<i>Elacate</i>	—	9	7	230	1	158	1	23	—	—	—	—	429
15. (a)	<i>Leiognathus</i>	15	233	5903	17783	318	7708	1631	458	358	—	97	—	34504
(b)	<i>Gazza</i>	—	—	—	54	7	—	—	—	—	—	—	—	61
16.	<i>Lactarius</i>	1	18	1132	740	175	823	101	375	247	7349	—	—	10961
17.	Pomfrets	143	1018	2529	628	53	3712	249	296	17295	9174	30	—	35127
18.	Mackerel	—	195	1040	5674	398	19968	26214	7661	875	—	111	—	62136
19.	Seer fish	32	672	3261	6424	34	3250	1831	213	3220	2022	119	41	21119
20.	Tunnies	—	37	449	3238	—	6705	622	107	312	332	37	1166	13005
21.	<i>Sphyraena</i>	—	3	108	1702	9	353	3	—	—	154	76	15	2423
22.	<i>Mugil</i>	—	—	170	923	14	38	—	46	48	900	130	—	2269
23.	<i>Bregmaceros</i>	—	—	—	—	—	—	—	—	30	—	—	—	30
24.	Soles	—	72	680	908	78	5778	985	335	1245	729	—	—	10810
25. (a)	Penaeid prawns	602	802	6266	8197	103	40150	3335	1436	26675	8861	45	—	96472
(b)	Non Penaeid Prawns	269	17	5109	159	2	174	—	24	66978	1260	—	—	73992
(c)	Lobsters	—	—	2	286	20	40	4	7	434	424	—	—	1217
(d)	Crabs & other Crustaceans	—	6	719	11018	296	4621	207	637	93	2471	—	—	10035
26.	Cephalopods	—	—	408	1375	62	4973	965	164	596	1439	—	23	20068
27.	Miscellaneous	1920	888	4561	19204	747	26254	11457	479	15510	10525	119	281	91945
	<b>TOTAL</b>	<b>6689</b>	<b>15072</b>	<b>100756</b>	<b>206046</b>	<b>6462</b>	<b>345037</b>	<b>97152</b>	<b>24731</b>	<b>264452</b>	<b>189638</b>	<b>1532</b>	<b>2215</b>	<b>1259782</b>

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