

Institute (CMFRI) along with the Regional Seafarming Development and Demonstration Project of the Network of Aquaculture Centres of Asia (NACA), Bangkok conducted a training programme at Tuticorin on pearl oyster farming and pearl culture in which 26 candidates from 10 South-East Asian countries participated. This was in February 1991.

Below are some of the important publications based on the work of this Centre.

- Larval rearing and production of spat of pearl oyster *Pinctada fucata* (Gould). *Aquaculture*, 34:287-301 (1983);
- Pearl culture (K. Alagarswami Ed.) *Bull. Cent. Mar. Fish. Res. Inst.* 39, 142 pp (1987);
- Larval and juvenile rearing of black-lip pearl oyster *Pinctada margaritifera* (Linnaeus). *Aquaculture*, 76:43-56 (1987);

– Hatchery production of pearl oyster spat: *Pinctada fucata*. CMFRI Special Publication No. 49. 36 pp (1991);

– Pearl oyster farming and pearl culture. Training Manual No.8. February 1991. FAO/UNDP Regional Sea farming Development and Demonstration Project. RAS/90/002. Bangkok 10200 Thailand. 104 pp, 7 Fig., VIII Plates.

– Production of Cultured pearls(K. Alagarswami). 1991. Indian Council of Agricultural Research, New Delhi. 112 pp.

At present I am on study leave and I am working on the reproductive bionomics of the wedge clam Mesodesma glabratum along the coasts of Tuticorin for my Ph.D. Any information on the above species in particular and other related bivalves in general will be of much help to me.

Historical perspective on pearl oyster diseases

Source: C. Denis George
Cairns, Australia

C. Denis George, of Cairns, Australia, provided a copy of a letter he wrote on 17 January 1979, to the then Director of the Fisheries and Fauna Department of Western Australia, K.B. Bowen.

Some excerpts on pearl oyster diseases were of special interest:

'...The subject of the pearl shell mortalities attributed to mysterious diseases has received special attention in studies and personal observations were carried out since 1960 in Exmouth Gulf, Thursday Island, Cygnet Bay, Burma, Philippines, Hong Kong, Japan, Mexico, Papua New Guinea and Polynesia. Additional personal communications were received from Sudan, Fiji, Thailand and the Japanese pearl farms in Kuri Bay, Port Essington, Thursday Island and Port Moresby.

The phenomenon in all these areas indicates the existence of a definable pattern affecting the health of the pearl oysters. The decline of the physiological conditions are indicated by many forms: visceral mass becoming soft, glassy and watery, reproductive function discontinued or greatly reduced, crystalline-style feeding mechanism and the amount of faeces reduced, function of the pearl formation mechanism changed to effect deposition of calcium carbonate in the form of calcite instead of aragonite, heavy amorphous organic matter secreted mainly in the nacreous periphery of the valves, the growth processes disappear or discontinue, the oyster stops to grow all together and finally in most of the cases ends in death. Occasionally a recovery follows and this is indicated by a strong demarcation zone on the valves.

From the point of view of pearl-making the above stated symptoms result in: increased rate of nuclei rejection; rejection of inserted mantlepiece or their mummification; increased percentage of seed pearl formation; reduced nacre deposition or deposition of calcite or organic matter resulting to the drop of the quality of the pearl.

The observed fact in your (Australian) grounds that from two pearl oysters lying close by only one was affected, clearly indicates that this particular oyster was subjected to some form of third influence which is unrelated to a contagious malady, as otherwise it would have killed the second oyster as well.

The unidentified micro-organism discovered by Mr Peter Woolf of Sydney is of great interest. However, the question remains if it is the cause or the effect of the so-called disease.

During the 1969-70 peak of the heavy mortalities in the pearl farms from Port Moresby to Kuri Bay and Smith's Harbour, the rate on many occasions had reached 100 per cent. Many times, out of one cage containing ten oysters, only one had survived. Discounting the hypothesis that this particular oyster may have developed a condition of immunity, it is a further verification of the non-existence of malady.

In our pearl making experience over the many years, the normal post-operation death rate is 3 per cent. Every other abnormal mortality was traced to certain explainable causes.

From all the instances of pearl shell mortalities observed or studied by the writer, the only one which so far has not been understood is the one that occurred at Baja California of Mexico during 1938. However, investigations in the locality carried out by the writer during 1969 produced evidence indicating that the pearl oysters were affected while in their natural environment but the cause could not be identified. This is not the case with the Australian oysters where the mortality occurs in the pearl farms.

Denis also provided a list of publications, submissions, and a partial record from the media.

'...I started my pearl farm in 1949. By 1956 I developed techniques and first pearls. Over the years I became involved in all phases-levels-activities of the industry including the science of the pearl and of pearl oysters. Since 1960 I have been promoting the pearl for others (gratis) and I feel to have effectively contributed to current participation of Indo-Pacific people in the industry.

My first paper was in 1957. Besides early TV demonstrations and press articles, two of my papers are in bibliography of POIB issue #1. I am specialising in four species of pearl oysters and production of all types

In our opinion, there is nothing wrong with the Australian pearl oysters neither with the ecological environment. The mortality has become an endemic condition of the pearl farms and indicates the existence of other causes. It is related to the overall management of the pearl industry and the applied techniques and methods.

It must be remembered that the pearl shell mortalities is a permanent condition in the Japanese home industry since 1960 and as well in all the pearl farms of the South Seas established with their cooperation.

of pearls, techniques/applications, processing-handling-marketing including biology, physiology, environment, quality decline, cause of mortalities, etc.. I have a historical/ technical/scientific/trade library with extensive detailed documentation and files (including a 1932 film of Japanese producing black pearls in Palau).

I am concerned with the massive problems in all pearl grounds of the Indo-Pacific and particularly in the Tuamotus, as I had developed black pearls in 1968. The cause of mortality problems and quality decline is understandable and it can be rectified.'

Papers, Submissions and a Partial Record from the Media

- Development of Pearl Culture: The AHEP AN, July-Sept. 1957 (a prognosis on Australia's potential pearl development)
- Experiment in Packe Island: The AHEP AN, April-June, 1958 (first post-war Australian pearl farm, Torres Strait)
- The Oyster is his World: Bob Johnson, Sun Herald, February 2, 1959
- Pearl Industry for Australian Nationals: Submission to the Government of Queensland, November 25, 1960
- Pearl Man with a Problem: The Bulletin, January 18, 1961
- Development of the Pearl Industry in W.A. by Australians: Submission to the Government of W. Australia, March 1961
- Demonstration of Pearl Techniques: ABC-1V Documentary Broadcast nationwide on 21-23 April, 1961
- Nota single mod con: Larry Folley, The Australian Women's Weekly, February 27, 1963 (The Packe Island pearl farm)(Extensive media record on development activity and controversy with Japanese Pearl Policy is omitted)
- Pearl Expert Sees Rich Future for Pacific's White Gold: Pacific Islands Monthly, September 1965
- Pearls, Pearls, Pearls!: Pacific Islands Monthly, February 1966
- Australia Processes half pearls: Australian Fisheries Newsletter, June 1966 (first pearl process facility)
- The Cultured Pearl- Its history and development to the present day: The Australian Gemologist, issues June 1966 to January 1967 (fundamental paper, standing to this day. See pp.11 and 12 for Japanese

- problems/decline as was detected in 1960, and on Pearl Industry's trends.)
- Pearl cultivation in the South Seas: South Pacific Bulletin Fourth Quarter, 1968 (in French edition also).
 - Techniques of Pearl Cultivation: South Pacific Bulletin, Fourth Quarter, 1969 (in French edition also).
 - The Black pearls -History and Development: Lapidary Journal of America, April 1971.
 - There is Gold for Islanders in a Neglected Industry: Pacific Islands Monthly, September 1971
 - The Birth of a Pearl: Lapidary Journal of America, June 1972 (an original study with colour photography of surgical technique and colour microphotography on stages of pearl formation was made in Exmouth Gulf of W.A in 1961).
 - The Pearl: A report to the Government of Papua New Guinea, The FAO of United Nations and Asian Development Bank -On the background and history of the early and present day developments of the cultivation of pearl-shells and pearls in the Indo-Pacific region, January 1978 (Re-published by Lapidary Journal of America in six issues)
 - Comments on 1978 Shell mortalities: Personal communication to fisheries director of W. Australia, January 17th, 1979 (excerpts provided above: Ed.)
 - Australian Pearl Shell Resources -Pearling and Pearl Industries: Submission to the Senate Standing Committee on Science and the Environment, September 20, 1979 (34 pages and 21 Appendices)
- from which 11 are Japanese intimate documents on pearl policy and control of South Seas pearl).
- The Torres Strait Pearl Conspiracy: Pacific Islands Monthly, August 1962 (cause for the pearling industry's bankruptcy)
 - Application of Japanese Overseas Pearl Culture Policy in Australia: Submission to the Japanese Government, His Excellency the Ambassador of Japan in Australia, August 14 1985, 13 pp (on destructive effects and exploitation).
 - Development of Pearl Cultivation in Australia, Part 1- Historical Aspects on the Early Discovery of the Pearl Cultivation Technique: The Historical Society, Cairns, North Queensland, Bulletins 322-324, March to May 1987 (discovery of pearl technique and its 'acquisition' by a Japanese Fisheries Mission, in 1902).
 - Historical Review of the Post-War Pearling Industry and Development of Pearl Cultivation in Australia to December 1987 (limited publication for information of Government and for developmental purposes)
- '... These cover my papers and press items of significance in a chronological progress. There are volumes of glossy publications, TV documentaries, media articles, more reports/submissions to Government and documentation of developments which are omitted.'*

Kuwaiti pearl research resumes

By Sulaiman Almatar
Kuwait Institute for Scientific Research, Kuwait

Sulaiman Almatar, of the Mariculture and Fisheries Department, Kuwait Institute for Scientific Research, writes:

'... Before the Iraqi aggression on Kuwait, I was involved in a project to study the fishery on the pearl oyster P. radiata in Kuwaiti waters. I have completed a full year of data collection, including catch, size composition, and efforts. I also made many surveys using SCUBA diving

to locate oyster beds and to estimate density. I have managed to save most of the raw data from destruction by the Iraqis, and I am currently in the process of analysing the data to prepare a report.