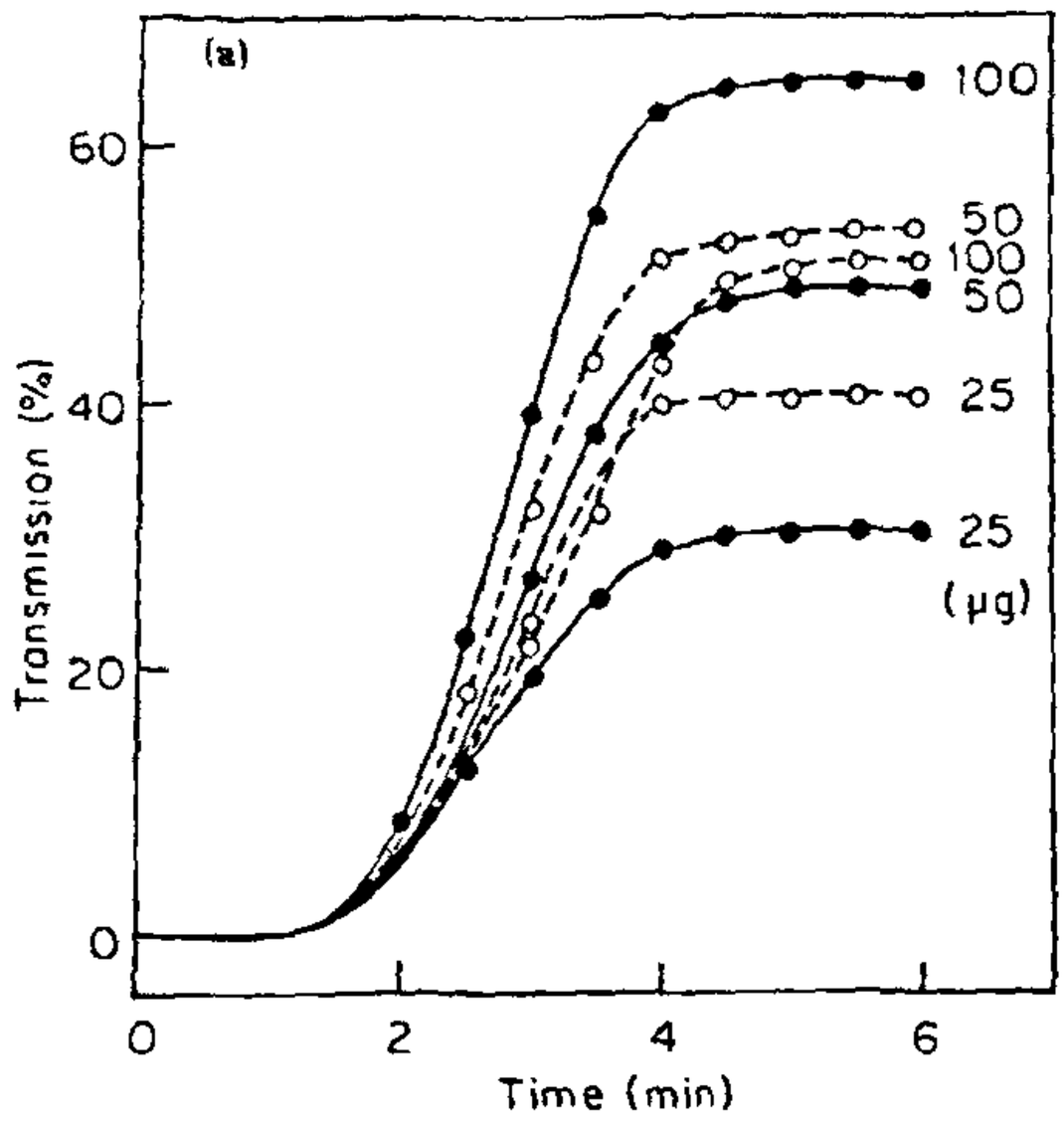

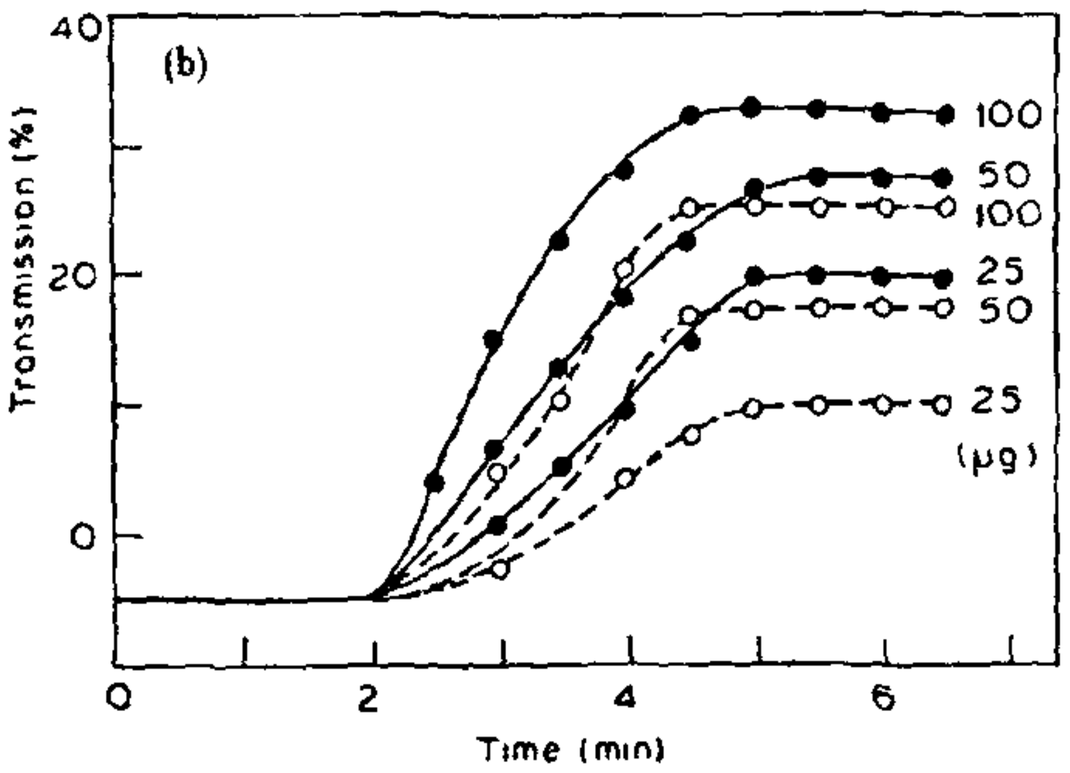

Figure 1a, b. Control (a) and acetylated (b) fish skin collagen-platelet aggregation curves with varying collagen concentration and platelet count: (●) 400,000/mm^3, (○) 200,000/mm^3.

collagen[13]. This may be due to the higher number of basic amino acids particularly epsilon amino group of lysine which play a critical role in platelet aggregation. Acetylated collagen can aggregate the platelets, but less actively. The amplitude of the curve has been considerably reduced and the lag phase also was delayed (figure 1b). The induction of platelet aggregation may be attributed to the triple helical structure and reduction in the platelet-aggregating activity can be due to the loss of epsilon amino groups on the collagen molecule due to acetylation. This clearly suggests that positive amino groups on the collagen molecule might play a critical role in collagen-induced platelet aggregation.

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1. Hugues, J., *Thromb. Diath. Haemorrh.*, 1962, **8**, 241.
2. Hugues, J. and Lapiere, C. M., *Thromb. Diath. Haemorrh.*, 1964, **11**, 327.
3. Zucker, M. B. and Borelli, J., *Proc. Soc. Exp. Biol. Med.*, 1962, **109**, 779.
4. Hovig, T., *Thromb. Diath. Haemorrh.*, 1963, **9**, 264.
5. Zucker, M. B., *Trans. N.Y. Acad. Sci.*, 1974, **36**, 561.
6. Mustard, J. F. and Packham, M. A., *Pharm. Rev.*, 1970, **22**, 97.
7. Fitzsimmons, C. M. and Barnes, M. J., *Thromb. Res.*, 1985, **39**, 523.
8. Hovig, T., *Throm. Diath. Haemorrh.*, 1970, **42**, 137.
9. Chesney, C. M., Harper, E. and Colman, R. W., *J. Clin. Invest.*, 1972, **51**, 2693.
10. Wilner, G. D., Nossel, H. L. and LeRoy, *J. Clin. Invest.*, 1968, **47**, 2616.
11. Wang, C. L., Miyate, T., Weksler, B., Rubin, A. L. and Stenzel, K. H., *Biochim. Biophys. Acta*, 1978, **544**, 555.
12. Vijaya Ramesh, D., Sehgal, P. K. and Dhar, S. C., *Agents Actions*, 1988 (communicated).
13. Vijaya Ramesh, D., Sehgal, P. K. and Dhar, S. C., *Conn. Tiss. Res.*, 1988 (communicated).
14. Kimura, S., Takema, Y. and Kubota, M., *J. Biol. Chem.*, 1981, **256**, 13230.
15. Bose, S. M. and Joseph, K. T., *Arch. Biochem. Biophys.*, 1958, **74**, 46.
16. Born, G. V. R., *Nature* (*London*), 1962, **194**, 927.

STUDIES ON CULTURE PEARL PRODUCTION FROM FRESHWATER MUSSELS

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PEARL, a precious gem is a biological commodity produced by certain bivalve molluscs. China and

Japan have perfected the technology of culture pearl production both in marine and freshwater environment[1,2]. The art of culture pearl production in marine environment is now a developed science in India[3]. The available information on freshwater culture pearl production technology in the country is meagre and the scientific interest in this direction is recent[4–6]. A research programme on exploring the possibility of producing culture pearls from freshwater mussels has been initiated in this Institute and the present account is based on preliminary studies which are of applied value in aquaculture.

Fresh, live specimens of freshwater mussels, *Lamellidens marginalis* (L.) and *L. corrianus* (Lea) (length range 55 to 90 mm) were collected from a farm pond (0.08 ha) at CIFA Kausalyagang and conditioned in the laboratory for 2 to 3 days prior to experimentation. In the first set of trials (May to December 1987) using 50 specimens of mussels, one shell valve of the animal was lifted ajar with a little force and a portion of the mantle at pallial line detached. A small cut piece of mantle (1.0 cm^2) from a live donor mussel as graft followed by a glass bead (5 mm dia) as nucleus were inserted into the mantle cavity of the recipient mussel. The mussels thus operated were transferred to two galvanized iron cylinders (1 × 0.25 m) with holes. The cylinders were hung in a natural pond habitat (2.02 ha) at a depth of 0.25 m. The mussels were examined after 8 months of culture period for pearl formation.

In the second set of trials beginning January 1988, 150 live mussels were operated adopting the surgical procedure followed for *Pinctada fucata* (Gould), a marine pearl oyster[7]. Pre-operative conditioning of mussels was done by maintaining them under laboratory conditions for 5 to 7 days without feeding. Small, moist cut pieces (2 to 3 mm) of live pallial mantle region of donor mussels were used as graft tissue without staining. Shell (Japanese) and ceramic beads (3 to 5 mm dia) were employed as nuclei for single implantation. The graft followed by nucleus were implanted in the ventral area of gonad of the recipient mussels. The operated mussels were maintained in the laboratory for 2 to 3 days, dead mussels and the ones that rejected the nuclei were removed. These mussels were then stocked at 25 animals/culture unit, i.e. galvanized iron cylinders and nylon net (16 mesh) bags kept suspended at a depth of 0.25 to 0.5 m in a 1.8 ha pond (figure 1).

In the first set of experiments (ambient temperature range: 21 to 35°C), the mussels recorded 90% survival at the end of 8 months rearing period.

Figure 1. Mussel culture in natural pond habitat.

Attached 'blister' or 'half' pearls with steel grey or silvery white nacreous covering (figure 2) were observed in 50% of the survived mussels (*L. marginalis* and *L. corrianus*).

In the second set of trials (ambient temperature range: 22 to 34°C), out of 150 mussels operated, 12 animals died within 24 h after surgery and 10 animals rejected the nuclei. The mussels stocked in galvanized iron cylinders died within one month of rearing period while no mortality was recorded in the mussels kept in nylon net bags. At the end of 3 months of culture period, free, spherical nacreous covered pearls (figure 3) were observed in the gonad of 9 mussels (*L. marginalis* and *L. corrianus*) out of 15 animals sampled. Worn-out nuclei were recovered from the remaining six mussels. The colour of the pearls varied from pink to light yellow sheen and silvery white. It is interesting to note that pearl

Figure 2. Blister pearls in freshwater mussels.

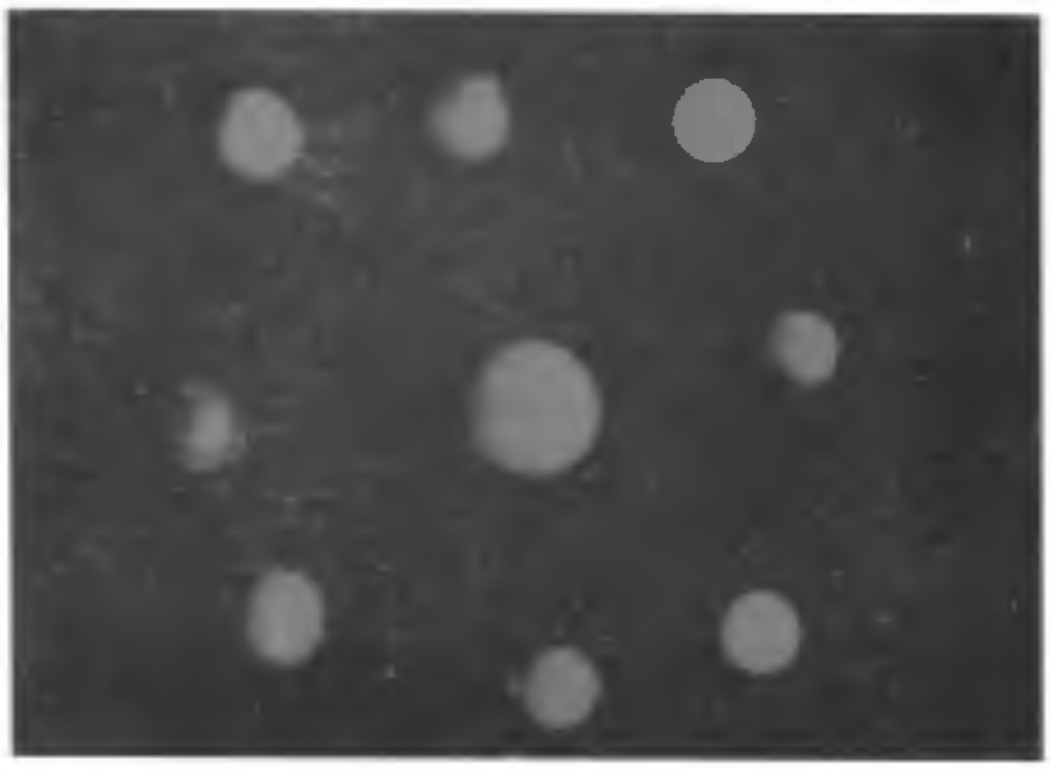

Figure 3. Culture pearls in freshwater mussels, Circled pearl: ceramic bead as nucleus.

nacre layer also formed over ceramic bead (figure 3, circled pearl) indicating the future avenues.

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1. Sherai, S., In: *The story of pearls*, Japan Publication Inc., Tokyo, 1970.
2. Ward, F., *Nat. Geogr.*, 1985, **168**, 193.
3. Alagarswamy, K., In: *Pearl culture*, CMFRI, Cochin, 1987, **39**, 98.
4. Janaki Ram, K., In: *International Training Programme on Composite Carp Culture under FAO/UNDP/Net Work of Aquaculture Centres in Asia*, Bhubaneswar, 1986, p. 161 (mimeo).
5. Khan, I. R., Patel, M. I. and Nariya, S. N., In: *National Seminar on Shell Fish Resources and Farming*, Tuticorin, 19–21 January, 1987, Abstract No. 70.
6. Subba Rao, N. V. and Dey, A., In: *National Seminar on Freshwater Aquaculture in India*, Nagarjuna Nagar, 27–30 December, 1987, Abstract No. 5.2.
7. Alagarswamy, K. and Dharmaraj, S., In: *Manual on Pearl Culture Techniques*, CMFRI, Special Publication, Cochin, 1984, p. 20.

ANNOUNCEMENT

INTERNATIONAL SYMPOSIUM ON BIOLOGICAL OXIDATION SYSTEMS

An international symposium, organized by the College of Agriculture and Environmental Resources Research Institute, Penn State University, USA, and the Department of Organic Chemistry, Indian Institute of Science, Bangalore, India, will be held at the Indian Institute of Science from 23 to 26 October 1989. The symposium will focus on the molecular mechanisms by which oxygen and its reduction products react in biological systems. The survival of aerobic organisms depends on their ability to harness the beneficial aspects of O_2 reactivity and minimize the deleterious effects caused by reactions of O_2 and its reduction products. It is believed that a more detailed understanding of the reactions could lead to ways of preventing or correcting aberrant metabolic reactions and to more effective use of the enzymes of biological oxidation systems or synthetic analogues in commercial applications. The symposium will discuss the chemistry, enzymology and molecular biology of these reactions. There will be a keynote address by Prof. Bengt Samuelsson (Nobel Laureate), plenary lectures by leading scientists, lectures by other invited speakers, and contributed papers.

For more information, contact Prof. K. M. Madhyastha, Chairman, Organizing Committee, Department of Organic Chemistry, Indian Institute of Science, Bangalore 560 012, India.

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