OSTI NEWSLETTER

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Contents

International Coastal Cleanup Day - September 16, 2006

The International Coastal Cleanup Day (ICC Day) was jointly organised by UNEP - South Asia Cooperative Environment Programme (SACEP) / South Asian Seas & Indian Coast Guard on the 16th September 2006 almost all over the Indian Coastline. Response for the cleanup was encouraging and the public interest was also enormous with participation from Gujarat, Goa, Maharashtra, Karnataka, Kerala, Tamilnadu, Pondicherry, Andhra Pradesh, Orissa, West Bengal, Andaman & Nicobar islands and Lakshadweep Islands.

The clean up campaign was very successful and extensively covered by many national and regional newspapers & media (radio and television). It also led to cleanup of the coast on other dates, in areas not covered on the 16th.

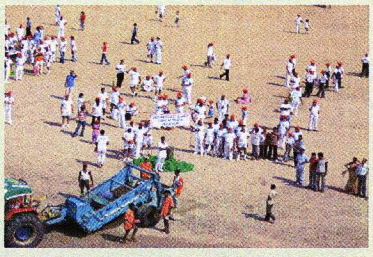
Almost 28000 people, including 2600 students, professionals and civilians participated in this cleanup, which is observed on the third Saturday of September every year. It is estimated that more than 300 MT of waste was collected all over the coastline in an effort, which spanned a single day! The waste collected was segregated into degradable and non-degradable, before disposal by the local municipality.

Apart from the cleanup and collection of data, the organisers in Chennai conducted a competition for the Colleges/Universities on maximum collection and the best method for collection. To encourage awareness in the school children, painting, essay, oratorical, quiz and other competitions were conducted by the local administration / organisers.

This campaign was the first of its kind in many areas and astonishingly pulled in volunteers in large numbers, especially morning walkers, who were inspired by the multitude of human population cleaning the beaches.

Apart from beach cleaning, various Ports and Harbours also joined in the campaign and cleaned their premises more extensively that day compared to their daily routine. This campaign has struck a chord in many Indians who would like the ICC Day observation to continue next year and in many more years to come.

Photographs taken on ICC day



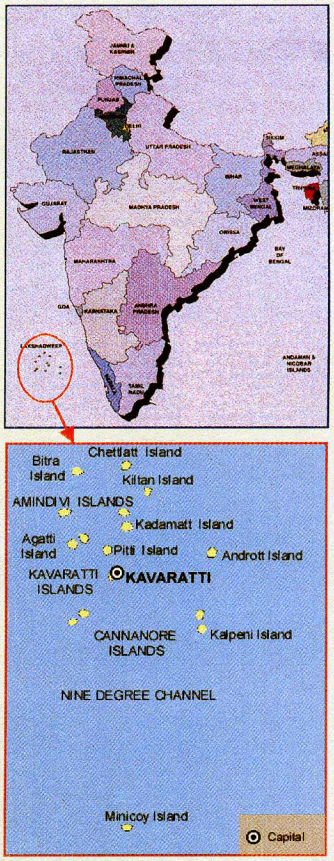
Focus on an Island

Lakshadweep Islands

Bangaram Island

Just off the coast of Kerala are a widely scattered group of coral islands - 36 of them -collectively known as Lakshadweep.

There is something indescribably romantic about the very notion of an uninhabited island and Bangaram justifies that feeling. Teardrop shaped, it is encircled by a continuous halo of creamy sand. Like all the other islands of Lakhadweep, luxuriant plantations of coconut provide coolness even during the hottest part of the day. There are three uninhabited islands in the same atoll consisting of Tinnakara, Parali-I & Parali-II, each easily accessible by outboarding, sailing rowing and for the athletic, by kayaking or wind-surfing from Bangaram-perfect for a day's outing. All the islands share the same lagoon.



But that is not all. The warm, clear, deep waters of the Indian Ocean with its myriad marine flora and fauna are an irresistable invitation to the scuba diving fraternity of the world. The exquisite coral formations including the black coral formations, the large variety and number of coral fish, the angel, the clown, the butterfly, the surgeon, the groupers, not to mention the abundance of the awesome, but harmless sharks, mantarays, sting rays, moray eels (morena) and turtles, make diving here an addictive experience, enough to make impressive any diver's logbook with the stamp of the Diving School at Bangaram. Both CMAS and PADI (Professional Association of Diving Instructors) courses are offered at Bangaram along with non-certification Resort and Elementary courses. The centre is equipped with top of the line Scubapro equipment.

Aerial view of Bangaram Island

Instrument / Technique

MICROPLATE READER

The SPECTRAmax™ 190 microplate spectrophotometer provides rapid and sensitive measurements of a variety of analytes across a wide range of concentrations. It measures the optical density (OD) of samples in 96-well microplates at a selected wavelength for a single point in time (endpoint), over a specified period of time (kinetic), or over a selected wavelength range (spectral scan).

The onboard microprocessor calculates and reports the absorbance (or % transmittance) for each well of the microplate. Typical applications include DNA quantitation, endpoint assays and kinetic measurements. With SOFTmax PRO, the contents of the wells in a microplate can be mixed automatically by shaking before each read cycle, making it possible to perform kinetic analysis of solid phase, enzyme-mediated reactions. The temperature of the microplate chamber can also be regulated from 4°C above ambient to 45 °C. NIOT has installed a plate reader along with a plate washer for the routine screening and analysis of samples.

ELISA Plate Reader

Plate Washer

Popular Article

THE SEARCH FOR GONADOTROPIC HORMONES IN CRUSTACEA

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Yes, the search is long enough to stop it. This never happened for insects or fishes in finding out the exact gonadotropic principles, so that manipulative methods could be adopted rather quickly either to control them (insects) or augment reproduction (fishes) to the extent of commercial exploitation. The tardiness in finding similar stimulatory principles for crustaceans is, in my opinion, not due to their complexity or variability but due to the inadequate as well as unfocussed search by invertebrate endocrinologists. To me, realization of this truth emerged every time I attempted to write and rewrite a literature review on crustacean endocrinology. I was really pained to repeat and reiterate the staled and stagnated information, without having any continued advancement in the ideas on the hormonal regulation of egg production in Crustacea, to be precise.

In insects, the control of female reproduction is rather simple and homogeneous. The juvenile hormone is the principal gonadotropic hormone in all insectan orders, except the dipteran flies, which employ the moulting hormone, ecdysteroid, to control vitellogenesis. Invariably, fat body is the vitellogenin synthesizing organ in insects. Similarly, hormonal regulation of reproduction in fish is homogeneous not only among them but also similar to other oviparous vertebrates. On the contrary, crustaceans, by virtue of their diversity in their distribution, coupled with a fascinating range of reproductive strategies, seem to possess complex regulatory mechanisms to control reproduction. Furthermore, the alternation of moulting with reproduction in the adult crustaceans has also contributed to the complexity of the regulatory system, especially in respect of apportioning the nutritive storage materials for these two energy-demanding physiological processes. As a result, crustaceans have contrived a multihormonal network to delicately interlink moulting and reproductive processes.

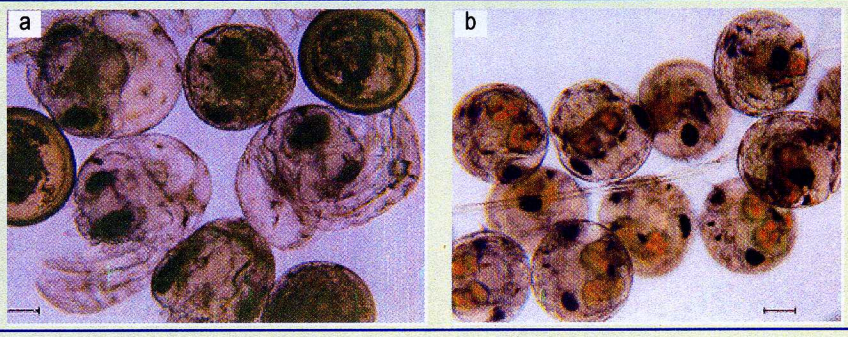
The principal hormones produced by crustaceans and employed in reproductive control include neuropeptides, terpenoids and steroids. By far, the eyestalk neuropeptides are the best- studied hormones in respect of their structural elucidation and physiological functions. The existence of a gonad inhibiting hormone (GIH; also called VIH, as it possesses appreciable inhibitory effect on vitellogenesis) was first demonstrated by Panouse, when he observed rapid ovarian maturation by ablating the eyestalk of the grass shrimp *Palaemon serratus*. Indeed, crustacean reproductive endocrinology had its beginning with this discovery and the later works proved eyestalk of the malacostracans to be the seat of other inhibitory neuropeptides to negatively control Y organ and mandibular organ synthetic activities. Incidentally, these two endocrine glands have a proximate controlling effect on reproduction (see below).

Amino acid sequence studies have uncovered the high degree of homology among these neuropeptides to include them in a single family of neuropeptides, namely, crustacean hyperglycemic hormones. Although the primary structure of VIH has been known for a few species, the mode of inhibitory action is not well understood. Available evidence, however, indicates its role in the control of vitellogenin synthesis in hepatopancreas. Alternatively, it also purportedly inhibited the uptake of vitellogenin into the oocytes.

While there is agreement on the gonad inhibitory role of eyestalk neuropeptides, discordant results and opinions were expressed on the gonad stimulatory hormones. As many as four hormonal factors belonging to the following chemical categories, neuropeptides, terpenoids, steroids and biogenic amines have been implicated in the reproductive control of crustaceans. In addition to the inhibitory neuropeptides of eyestalk, brain and thoracic ganglia also produce peptides with gonad stimulatory activity. Although these peptides have been proposed as gonadotropic molecules in crustaceans since long, neither the primary structure nor their mode of action on target organs has been elucidated.

Then came the crustacean juvenoid, methyl fornesoate(MF)! It is a sesquiterpenoid compound, produced by mandibular organ. Chemically, it is the immediate precursor to JH III of insects. Although a few malacostracans such as the crayfish species seem to use this molecule in the control of gonad maturation, its specific effect on the ovary or testis is controversial, since its stimulatory effect on the Y organ in producing ecdysteroids has been revealed in recent studies. It is important to note here that moulting and female reproductive activities overlap in many crustacean species. Hence the specific effect of MF on reproduction or moulting is difficult to delineate. Agreeably, the idea of MF being a crustacean gonadotroph, came from insects which use a similar terpenoid, JH III to control reproduction.

In a similar vein, ecdysteroidal control of reproduction has also gained importance in a few crustacean species. 20-hydroxyecdysone (20E) in insects has a definitive role in stimulating vitellogenesis in higher Diptera. Ecdysteroid-mediated signalling pathway in the transcriptional activation of vitellogenin in the yellow-fever mosquito *Aedes aegypti* has been clearly defined. An interesting deviation in the action of 20E in crustaceans is that the EcR of crustaceans dimerizes with a RXR, instead of the RXR homologue, *ultraspiracle* as in insects. The finding of EcR expression together with RXR in the ovary of a marine crab has underscored the importance of ecdysteroids in the control of vitellogenesis in crustaceans. However, our recent study on ecdysteroids in decapods has indicated a role in



Precocious hatching of pleopodal embryos in 50mg/ mole crab (*Emerita asiatica*) injected at C3 stage (a) control (b)remained at stage VII of embryonic development. Arrow indicates the undeveloped embryos. The embryos of the crabs under observation were plucked and wet-mounted on glass slides in clean filtered seawater and photographed on Labex, Labovision (India) microscope at a magnification of 4X.

embryonic moulting rather than in inducing vitellogenesis (See Figure).

Interestingly, vertebrate steroids such as estradiol-17â and progesterone have been found to control vitellogenic cycle in a variety of decapod crustaceans. This is in conformity with vertebrate system inasmuch as these two steroidal hormones transcriptionally activate vitellogenesis and meiotic maturation in the post-vitellogenic oocytes, respectively. However, receptor studies for these gonadotropic hormones in the target tissues need to be done before making any conclusive decisions on their stimulatory role in vitellogenin synthesis. Yet, the question remains unanswered as to the synthetic source of vertebrate steroids and the type of eyestalk neuropeptide to control their activity.

With regard to biogenic amines, the stimulatory action on ovarian development and gonadal maturation is only indirect by way of influencing the release or prohibition of hormonal factors from neurosecretory perikarya.

Taken together, a hierarchical mode of hormone action involving chemically diverse molecules is emerging for crustaceans. Hormonal coordination of both moulting and female reproduction by the two steroid hormones, ecdysteroids and estradiol-17â has also been posited for decapods with overlapping activities of these two energy-demanding physiological processes by our work on a mole crab and *Macrobrachium*. A foregone conclusion is that there is multiplicity of hormonal action in the control of female reproduction in crustaceans, and the eyestalk neuropeptides as well as the neurotransmitter-like biogenic amines could coordinate the actions of the gonadotropic hormones by their restraining/ stimulatory activity.

In summarizing this tiny commentary on reproductive endocrinology of crustaceans, I lean on the advice of our honorable President, Dr. A.P.J.Abdul Kalam, who stated in his book "Wings of Fire" that too much of basic research is also bad in accomplishing a target-oriented research project. Why not we stop the reductionistic approach in characterizing the action molecules of reproductive control and launch on experimental studies using the available information on the integrative network of factors controlling both reproduction and moulting in crustaceans. We will not only succeed in our endeavours in the search for gonadotropic control mechanisms, but also use them effectively in induced egg maturation of commercially important crustaceans.

Novel Discovery of New Marine Species off Indonesia - "A Treasure Trove"

An expedition of scientists led by Mark Erdmann from the U. S. based organisation, Conservation International, has announced the discovery of 52 new species of marine life in the Bird's Head Seascape off Indonesia's Papua Province. Mr. Sebastian Troeng, CI Director of Marine Strategies has reported 24 new species of fish, 22 new corals and 8 new species of shrimps. The most novel discovery was 2 species of epaulette shark, which "walk" on their fins. The sharks are reported to be small and about 3-4 feet in length. The pectoral fins are large and are used to almost walk on the substrate since they are shallow-water bottom dwellers. The researchers were surprised to find new species of sharks instead of bacteria, worms or other lower forms of life, since the elasmobranchs represent higher forms.

Other new species include the "Flasher Wrasse", called so due to the bright colours exhibited by the male during mating, scores of new reef building corals, new species of Fusilier Fish or "Yellowtail" and a shrimp that resembles a Praying Mantis. The richness of coral and other species found in this region, also known as "Asia's Coral Triangle" is predicted to gain more importance than Australia's Great Barrier Reef.

This seascape stretching over 70000 sq. miles is home to more than 1,200 species of fish and almost 600 species of reef-building coral, or 75 percent of the world's known total, confirming the Western Pacific as the richest marine habitat and the epicentre of marine biodiversity. The team has requested the Indonesian Government to protect this fragile and rich ecosystem from fishermen who use cyanide and dynamite to net their catches and to regularise commercial fishing along the coast. Talks of increasing the marine protected areas and parks in this region are also underway.

Source: Conservation International, http://www.conservation.org/xp/frontlines/2006/09180601.xml

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