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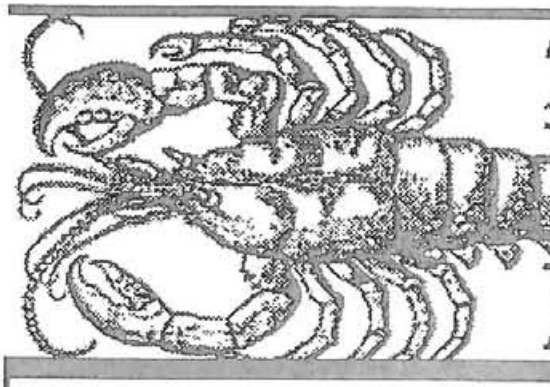

The Lobster NEWSLETTER

PERSPECTIVES

A Brief History of the International Lobster Workshops

From: J. S. Cobb and B. F. Phillips

The following was one of the opening addresses at the Fifth International Workshop and Conference on Lobster Biology and Management in Queenstown, New Zealand. The presentation was given by Professor Cobb. – Eds.

The Fifth International Workshop and Conference on Lobster Biology and Management in Queenstown, New Zealand took place 20 years after the first of the workshops. We, as instigators of the first one, thought this would be a good time to review what the workshops have been about and some of the progress that has come from them.

It was 20 years ago, nearly to the day, that the first workshop was held -- in Perth, January 26 - February 1, 1977. The main purpose of that workshop was to bring together a small group of lobster researchers from the USA and Australia, to talk about common issues and themes. Why have a series of workshops followed and why have they become, apparently, self-perpetuating? Certainly lobsters are commercially important and that drives a lot of the fisheries research. But it is more than that as Bill Herrnkind eloquently said at the end of the 1977 workshop: "*Lobsters are, in fact, a very significant biological entity: widely distributed, speciose, large in size, long-lived, enormous in number, ecologically consequential. ... Understanding how lobsters achieve their biological success is an important scientific contribution and cannot be inferred from sedentary invertebrates, pelagic forms, or terrestrial vertebrates.*" We have important things to learn - in ecology, in physiology, in evolution - from lobsters, and this goes well beyond, while continually feeding back to, the fisheries that support a lot of the work. The workshops have contributed significantly to our knowledge of lobsters and to building a world-wide community of lobster researchers.

Some basic facts outline the history of the workshops (Table 1). They have been held with increasing frequency: eight years elapsed between the first and second workshops (1985, Canada), 5 years intervened before the third (1990, Cuba), and ~ 3.5 years separates the last few meetings (1993, Japan; 1997, New Zealand; and 2000, USA). The size of the workshops also has grown, from 34 participants at first to the nearly 140 in New Zealand. The number of countries represented also grew, from 6 at first to over 20 in New Zealand. Perhaps the most heartening trend is the increase of participation by scientists from small or developing countries. The number of papers has increased proportionately to the number of participants, as you might expect.

The nature of the topics has shifted a bit over the years. The Australian workshop was pretty descriptive, with a lot of emphasis on

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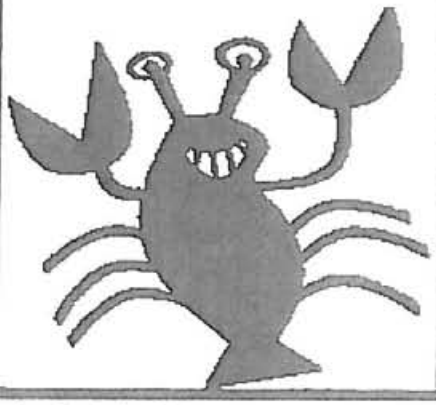
Puerulus settlement trials in Namibia

FROM: Kolette Grobler

Jasus lalandii supports an important commercial fishery in southwest Namibia, with associated research based at the Luderitz Marine Research Center. Two crevice collectors (Booth 1979) donated by B. Bowen and R. Brown (Perth, Western Australia) were tested from May 1994 to April 1995. The collectors were set on the seafloor in waters 10 m deep in lobster sanctuaries, one next to a seaweed farm and the other next to a kelp bed. Planned monthly checks were not always possible because of sea conditions.

Pueruli (both transparent and pigmented) and young juveniles occurred commonly on the collector near the seaweed farm but were less frequent in the other collector. Pueruli were 7-9 mm CL and were found only in August and October. Juveniles on the collectors were 13.6 to more than 35 mm CL (most were 15-30 mm CL) and occurred on each of the seven checks. The highest catch in a single collector was 15 lobsters (of which 7 were pueruli), in October 1994. Pollock (1973, 1986) reported pueruli to be most abundant further south, in the South Western Cape, from December to April, but our sampling missed much of this period; our February and April checks yielded no pueruli.

These initial results justified expansion of the project so 10 more collectors are being built for use in lobster sanctuaries. Settlement and growth rates and environmental parameters (temperature and oxygen) will be monitored, and there will be concurrent laboratory growth and behaviour studies. We may later expand the project to other Namibian lobster grounds as part of a long-term program to measure larval recruitment, female fecundity, and juvenile growth.



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Bilateral Eyestalk Ablation Induces Morphological and Behavioral Changes in Spiny Lobsters

FROM: E.V. Radhakrishnan and M. Vijayakumaran

Bilateral eyestalk ablation can accelerate somatic and reproductive growth in spiny lobsters (Quakenbush and Herrnkind 1981, Radhakrishnan and Vijayakumaran 1984a, b). In studies of the spiny lobsters *Panulirus homarus* and *P. ornatus*, we observed interesting changes in morphology and in feeding and reproductive behavior after eyestalk ablation.

Morphological changes: Lobsters had sharper spines on the

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carapace and antennae, and stouter walking legs two or three molts after bilateral eyestalk ablation compared with lobsters with intact eyes and of similar size. Structures resembling antennae, sometimes single, other times bifid or trifid, developed in place of the ablated eyes in some lobsters. Secondary sexual characters such as the decalcified 'window' on the sternal plates and ovigerous setae on the pleopods of females did not develop in lobsters that had been ablated either as juveniles or just before reaching maturity. This suggests the need for eyestalk hormones for the development and maintenance of these characters.

Behavioral Changes: Panulirus homarus is generally gregarious, preferring to live communally in shelters during the day and to forage for food at night, both in captivity and in the wild. Eyestalk ablation resulted in less gregariousness and less use of shelters. Ablated lobsters always moved with the abdomen extended and were more aggressive than normal lobsters.

Ablation induces hyperphagia, with feeding rates 40% higher than in normal lobsters (Radhakrishnan 1990). Ablated lobsters fed continuously, and had no difficulty locating or consuming food. Bilateral eyestalk ablation can also accelerate gonad development in spiny lobsters (Radhakrishnan and Vijayakumaran 1984b). In males, ablation causes an increase in the weight of the vas deferens and hypersecretion of matrix. We observed sexually active males following other lobsters and forcefully depositing spermatophoric matrix on individuals irrespective of sex. Interestingly, some ablated males carried asymetric spermatophores on their sternums, apparently a result of unsuccessful matings. Also, when males do not mate, the matrix oozes from the gonopore and sticks around the opening.

Most physiological changes in eyestalk-ablated lobsters are due to the loss of eyestalk hormones. The role of MIH (Moult Inhibiting Hormone) and GIH (Gonad Inhibiting Hormone) in controlling molting and reproductive physiology of spiny lobsters is now better understood (Radhakrishnan 1990). Hormones and neurotransmitters in the central nervous system may also influence behavior. For example, increased locomotor activity and non-occupation of shelter by eyestalk-ablated lobsters may be due to loss of Neuro-Depressing Hormone (NDH), a low activity component of the circadian activity rhythm of nocturnal crustaceans (Arechiga & Huberman 1980). Likewise, the higher feeding rates and the abnormal feeding behavior in ablated lobsters could be due to hyperphagia resulting from removal of Crustacean Hyperglycemic Hormone (CHH) from the eyestalk (Radhakrishnan 1990).

Is the increased aggression, acquisition of stouter legs, and sharper spines on the carapace, and the abnormal feeding and reproductive behavior of adaptive significance? We presume that lobsters acquired these characters as compensation for the loss of the eye, which is important for them to locate predators and to orient in encounters. Thus, the timing of the shift in lobsters from gregarious behaviour to the solitary life may be induced by ablation. Greatly enlarged and stronger spines on the carapace and antennae may improve protection from predatory attacks. Lack of response by bilaterally eyestalk-ablated lobsters to light cycles indicates loss of neural photosensitivity, with alteration to natural feeding and locomotor activity. Further work may provide more information on the adaptive significance of the behavioral changes induced by eyestalk ablation.

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Lobster (*Homarus gammarus L.*) Research in the northern Adriatic Sea

From: T. Scovacricchi and C. A. Burton

Stocks of the European Lobster (*H. gammarus*) are under extreme pressure in the northern part of the Adriatic Sea; both from illegal collection and environmental factors, particularly anthropogenic degradation and occasional anoxic events. In many locations, they are considered close to extinction.

Within the shallow and homogeneous sandy basin of the northern Adriatic Sea, their distribution is restricted to 'Tegnùe' or 'Beachrock' outcrops. The outcrops are discrete, low lying reefs of sedimentary and/or biogenic rock strata. These outcrops are widespread and significantly effect the marine ecosystem, providing both habitat and nursery areas for many commercial and non-commercial species.

Researchers at the CNR, Istituto di Biologia del Mare, Venezia have embarked upon a program to learn more about lobsters ecology and, ultimately, the prospects for stocking depleted areas with hatchery reared animals. The research is financed by the Ministero delle Risorse Agricole Alimentari e Forestali. Collaborative links were established with researchers from the Sea Fish Industry Authority in the United Kingdom and personnal exchanges have occurred between the institutes under the CNR Short-term Fellowship scheme. Utilizing locally caught broodstock, a pilot batch of juveniles has been reared and will be marked prior to release on to a selected area of tegnùa. The fate of the released stocks will be followed using both visual census and trapping techniques.

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FISHERIES & AQUACULTURE UPDATE

Growout of Juvenile *Panulirus argus* in Cages

From: Luís Tadeu Assad

The lobster fishery in Ceará State (Brazil) for the Caribbean spiny lobster, *Panulirus argus*, has been in crisis since 1986: there has been a constant decline in production and yield brought about through high fishing effort and the intense fishing of undersized lobsters (MMA 1997). Fishers urgently need to diversify so that they can increase their revenue and employment opportunities. With this in mind, we have initiated with the fishing community semi-intensive cultivation of juvenile *P. argus* in which undersized lobsters are grown to legal size in cages.

Methods: Preliminary trials at Ponta Grossa's Beach in 1994 used a 50 m^2 caged pond. After

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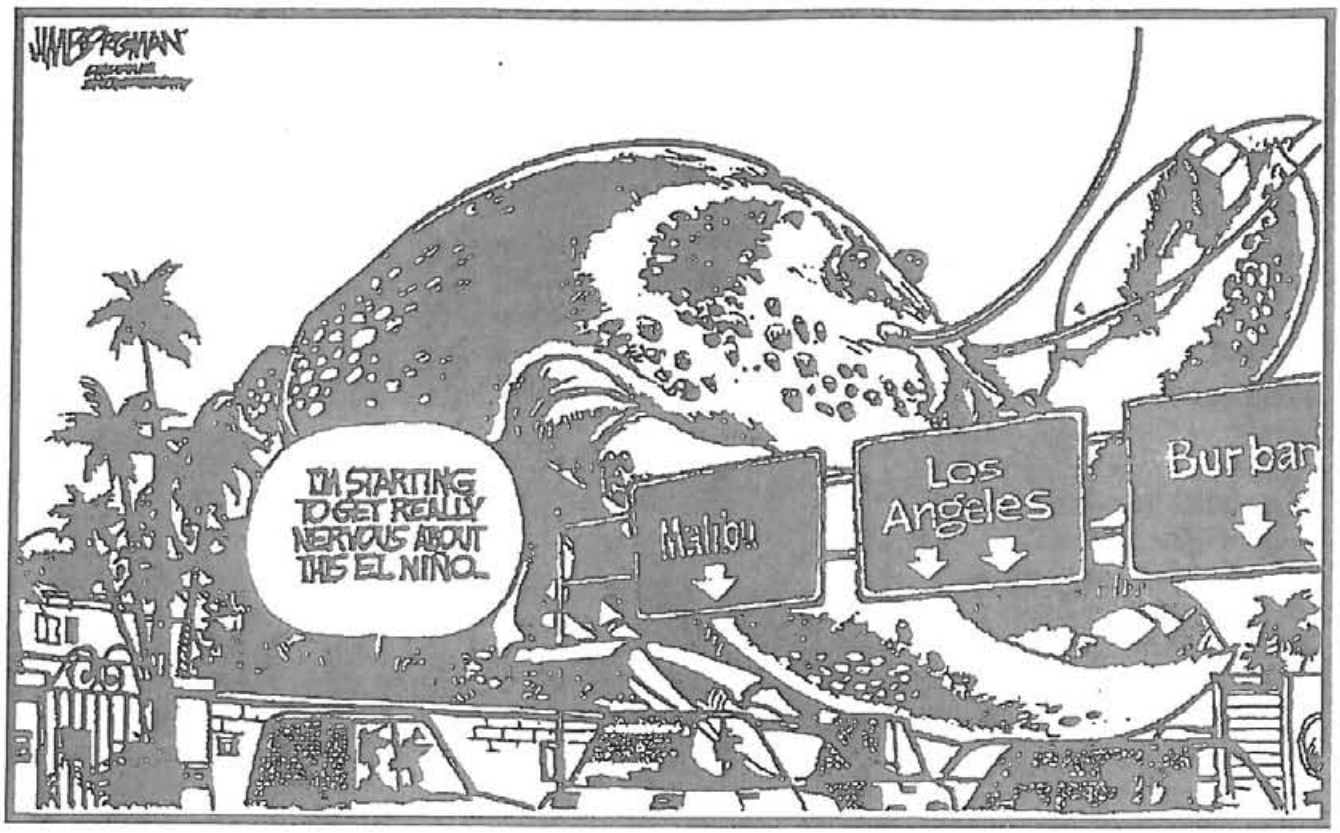

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