

## ■ Freshwater prawn research breakthrough at USP

By Monal Lal, Johnson Seeto and Tim Pickering

A milestone in aquaculture research has been achieved at the Seawater Laboratory of the Division of Marine Studies at the University of the South Pacific (USP). In post-graduate research co-supervised by SPC's Aquaculture Section, the Monkey River prawn *Macrobrachium lar* has been successfully reared in captivity for the first time ever — from eggs through the planktonic larval phase of their lifecycle to the post-larval stage.

This prawn, known locally as *ura dina*, is indigenous to Fiji and a number of other Pacific Island countries, including the Solomon Islands, New Caledonia and Vanuatu. The largest river prawn in these places, *M. lar* is the basis of valuable inland fisheries for sale in local markets and restaurants.

*M. lar* has been a subject of research to assess its potential for aquaculture since the early 1970s in places such as Hawaii, with the hope that it can be farmed much like its cousin the Malaysian giant freshwater prawn, *Macrobrachium rosenbergii*, whose annual production value in Asia alone is estimated at around one billion US dollars.

The Monkey River prawn has a number of favourable characteristics for aquaculture, which include its large size, widespread acceptance among local communities as a delicacy, and the fact that it is a tough, hardy species that can survive out of water for short periods of time.

Another important characteristic of the species is that it is indigenous to many Pacific Island countries where there is interest in developing freshwater prawn farms. If research



An historical first. One of the *Macrobrachium lar* post-larvae reared in captivity at the Seawater Laboratory of the University of the South Pacific.

on *M. lar* culture techniques could make breeding and rearing more practical, then the introduction of an exotic prawn to establish freshwater prawn aquaculture in the Pacific Islands could be avoided.

A major drawback to further research into the suitability of *M. lar* for culture has been — until now — the inability to grow young prawns (known as post-larvae) in captivity after hatching from the egg. Past researchers could reach about Stage 6 or 7 out of an estimated 11–13 larval stages, but then the larvae would die for unknown reasons.

This has meant that post-larvae for any culture work had to be caught by hand from the wild, which is time consuming and tedious. This is a barrier for larger-scale farming operations involving this species, because the easiest and most sustainable way to obtain large numbers of post-larvae required for commercial farming is in a hatchery.

The earliest published attempts at growing *M. lar* larvae in the

laboratory all the way through to the post-larval stage was by Wilbert Kubota in 1972 at the University of Hawaii, followed by John Atkinson in 1977 at the same institution. Satya Nandlal recently completed his PhD thesis on the aquaculture of *M. lar* at the University of the South Pacific (USP). His research included extensive field trials and attempts to rear the species to the post-larval stage in the hatchery. Unfortunately, in all these studies the larvae could only be reared up to a certain stage, and then all larvae died.

The success of the present study in reaching the post-larval stage can be attributed for the most part to the development of a suitable feed that appears to better meet the nutritional requirements of the larvae, in addition to culturing it at its preferred salinity level in an appropriate rearing environment.

Another finding of this study is that *M. lar* larvae develop through approximately 13 stages in the ocean before they

change into post-larvae (compared with 11 stages for *M. rosenbergii*). After they become post-larvae, the animals migrate landward and eventually settle in high-elevation freshwater streams far inland.

So far, five post-larvae have been produced in the USP laboratory. They metamorphosed into post-larvae after 77, 78, 85, 101 and 110 days of culture, respectively. It is a major achievement, because what previously appeared to be impossible has now been proven possible. For the future, however, this species still compares very poorly with *M. rosenbergii*, which can routinely reach post-larval stage in only 20–30 days and with 20–50% survival of big batches. There is scope for much more research into *M. lar*, and the work done here is an important step towards further developing and refining techniques for its culture.

This study at USP was initiated as part of an SPC-coordinated regional strategy for domesticating *M. lar* — through linked studies in Fiji, Vanuatu and New Caledonia — and funded by the Australian Centre for Inter-



Post-graduate student Monal Lal holds one of the freshwater prawn broodstock used for his research, flanked by his supervisors Tim Pickering of SPC (left) and Johnson Seeto of Marine Studies at USP (right).

national Agricultural Research in collaboration with SPC. The study was undertaken by Master of Science student Monal Lal and supervised by Johnson Seeto and Dr Timothy Pickering of SPC.

Apart from larval culture research, investigations are also continuing on capture-based culture of *M. lar* for grow-out in small ponds by rural householders as a cash crop. A new tech-

nique for rearing prawn larvae — developed by Japan International Cooperation Agency Senior Volunteer Tomohiro Imamura while at USP — was instrumental in achieving this outcome.

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## ■ Mountains of pelagic biodiversity<sup>1</sup>

By Alistair Dove

**Source:** Deep Type Flow – Conversations about marine science and society.  
<http://deeptypeflow.blogspot.com/2010/05/mountains-of-pelagic-diversity.html>

If you ever saw the dramatic seamount scene in Blue Planet (and if you haven't, where ya been?), then you are probably familiar with the idea that submarine mountains can attract lots of animals; as Attenborough puts it, they “create oases where life can flourish in the comparatively empty expanses of the open ocean”. In that spectacular BBC sequence, jacks and tuna swarm

an Eastern Pacific seamount peppered with colourful schools of barberfish, *Anthias* and goatfish. Then the sharks cruise in, including silkys and hammerheads, there for a clean from the faithful barberfish.

There's a paper in the latest issue of PNAS that quantifies the richness of seamounts, so beautifully depicted by those

geniuses at the BBC Documentary department. The authors, led by Telmo Morato from the Secretariat of the Pacific Community in New Caledonia, analysed data gathered by longline fisheries in the western and central Pacific, close to and remote from seamounts. In a sense, a longline is a standardized sort of sampling unit like a quadrat, so they can be analysed across