# Preserving taxonomy

Consider the anglerfish. While not an attractive fish by any stretch of the imagination, it none-the-less attracts attention with its fearsome appearance and unusual reproductive strategy.

According to Alastair Graham, manager of the Australian National Fish Collection (ANFC) at CSIRO Marine Research in Hobart, anglerfish get their name from the 'fishing rod-like' structure (illicium) that grows out from their forehead. At the tip of this 'rod' is a fringed or bulbous 'lure' (esca), sometimes containing luminous bacteria, which is used to attract prey.

This unique predatory device is used in combination with body camouflage, to lure prey towards an enormous set of jaws, while large, backward pointing teeth, ensure there is no escape.

The anglerfishes' most curious feature, however, is their mode of reproduction. In some anglerfish families, males parasitically attach to the female in order to reproduce. Over time, they lose most of their inner organs and depend on the female's body to survive. Scientists have found the genital remnants of as many as five or six males attached to a single female, providing a 24-hour, seven-day, sperm supply.

This unusual tale is just one of thousands preserved in the ethanol-filled jars, drums and tanks that crowd the shelves and floorspace of the collection. Without the efforts and expertise of taxonomists such as Graham, ANFC curator Dr Peter Last, and their colleagues, many such intrigues of the deep would remain sealed in their alcoholic tombs.

**Australian National Fish Collection technician Spikey Riddoch contemplates the jaw of a white shark among the shelves of the collection. Taxonomic information provides the foundation for further studies in biology, conservation, and fisheries management.**

## Baseline research

Since the ANFC's foundation by Ian Munro in 1943, some 135 000 finfish specimens representing more than 3000 species, have been collected. These include Australian, Antarctic and Indo-Pacific oceanic, demersal (bottom-dwelling), inshore, estuarine and river fishes. Several hundred of these specimens are of species new to science and are waiting to be 'described'.

Scientific description utilises two main numerical techniques; 'meristics' to count the number of bones, cartilage and fin rays in different parts of the fish, and 'morphometrics' to measure the length of, or distance between physical features. Observations of fish shape, size, colour and other general features are also noted.

Fish can then be classified into groups of individuals (family, genus, species and so on) that, based on these observations and numerical results, taxonomists consider to be related.

This taxonomic information is an essential foundation upon which further studies, such as biology, conservation, and fisheries management issues depend. Without it, the integrity of 'higher' research would crumble.

'Taxonomy is the sort of biological research you need to do before anything else – it's a kind of baseline' Last says.

'If this baseline is not accurately resolved the quality of related research will be

questionable. The challenge is to correctly identify species so that modelling, ecological studies, fisheries management decisions and other "top-level" research, are all based on good information.'

Despite the efforts of taxonomists, however, there are just too many new species being discovered, and too few taxonomists to describe and classify them all. Over the past 10 years the ANFC has almost doubled in size, and new species are being discovered at a faster rate today than at any time over the previous 200 years.

'There are more fishing boats in remote zones now, and we're frequently receiving fish that are new to science,' ANFC taxonomist Gordon Yearsley says. 'If we dropped all the other aspects of our work and just described species, we'd all be kept going for the rest of our careers.'

Part of the problem is that taxonomists in all fields of research are a dying breed. Many of the remaining taxonomists are facing retirement, and the scientific community stands to lose 20 plus years of accumulated knowledge, with each one.

'Taxonomists acquire a wealth of knowledge in their careers, but much of that learning is never fully documented,' Last says.

'It takes an instant to learn what taxonomy is, but a lifetime to fully understand the characteristics of only a small segment of life's diversity.'

Last speculates that perhaps the recent interest in understanding biodiversity and the bioprospecting potential of many of our natural resources, will fuel a much needed resurgence in taxonomy – including the grooming of a new cohort of taxonomists.

## Back to the future

Meanwhile, the ANFC is fortunate to have a small group of younger members who will help carry fish taxonomy into the 21st century. The team has a number of projects on the go, including the description of fishes found around Macquarie Island, south of Tasmania.

'Macquarie Island is a big Patagonian toothfish catch area. But we are only now discovering what else is there and what's being caught as bycatch,' collection technician Spikey Riddoch says.

Riddoch has put together a guide to the Macquarie Island fish identified so far, which is being used by Patagonian toothfish fishermen to accurately record bycatch species. This information will be used to assess the sustainability of the toothfish industry.

The ANFC group has also coordinated the production of various publications (see box), including the *Australian seafood handbook: an identification guide to domestic species.* They provided descriptive information on each fish and images from their Photographic Index of Australian Fishes – a collection of more than 40 000 colour transparencies of some 2500 fish species.

The ANFC acts as a focal point for much national and international collaboration as well. Scientists from the Philippines, Borneo and Indonesia are currently comparing the biodiversity of sharks and rays in their region, with that in Australia. Taxonomic information and specimens are regularly exchanged with museums around the world.

These sorts of collaborations will continue to provide researchers and fishermen with accurate information and, for the rest of us, a rich source of stories about just how big, strange, ugly or beautiful our ichthyological heritage is.

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*Wendy Pyper*

## Volumes on fish

THANKS to the patient and meticulous efforts of CSIRO taxonomists, several guides to various Australian and Indo-Pacific fishes have been produced. These provide useful references for both researchers and fishers.

The collection begins with *The marine and freshwater fishes of Ceylon*, completed by ANFC founder, Ian Munro in 1955. Between 1956 and 1961, Munro published a series of papers that together formed the *Handbook of Australian fishes*. He followed these up with *The fishes of the New Guinea region* in 1958, and *The fishes of New Guinea* in 1967.

More recently, CSIRO Marine Research scientists have authored *Sharks and rays of Australia* (1994), *South East Fishery quota species: an identification guide* (1997), *Australian seafood handbook: an identification guide to domestic species* (1999 and reprinted 2001) and *Field guide to Australian sharks and rays* (2002).

**The prickly anglerfish (*Himantolophus cf albinares*). Anglerfish get their name from the 'fishing rod-like' structure that grows out from their forehead. At the tip of this 'rod' is a fringed or bulbous 'lure', sometimes containing luminous bacteria, which is used to attract prey.**