

Tales from the tomb

Alastair Sarre tiptoes through the Australian National Wildlife Collection.

The bird specimen room at the Australian National Wildlife Collection is as cold as a tomb. The heavy smell of naphthalene hangs in the air; filters shade the fluorescent lights. On hundreds of trays inside dozens of sombre cabinets, birds lie on their backs with unseeing eyes.

We have entered one of science's most sacred places and can only marvel at these creatures, beautiful in death as they were in life. There's the zebra finch, no bigger than a man's little finger, its bill a deep orange, with a tuft of chestnut feathers on its cheeks and a striped breast of grey and black. There's its close relative, the Gouldian finch, with lavender breast, yellow belly, green back, plum face, blue collar – colours no less vivid now than they were in life. There's the pied butcher bird, the break o' day boy, which we can see has a meanly hooked beak, yet when living has perhaps the most exquisite dawn song on earth. And there's the King of Saxony, one of New Guinea's birds of paradise. It has two extraordinary feathers that extend some 30 cm down its back and beyond, each decorated along its length by pale blue squares that flutter from the main rib of the feather like prayer flags from a pole.

Spending time in this room can be a profound experience for the casual visitor, but workers at the ANWC are less in awe; after all, they use the collection every day. Nevertheless, the care they take to preserve the specimens is impressive.

'Ultra violet light and insects are the enemies here,' ANWC collection manager, John Wombey, says as he opens another cabinet. That explains the filters and the smell of mothballs. The low temperature is another deterrent to insects, and also

reduces the movement of fat in the skins. The rooms themselves are sealed; no light and little dust intrudes from the world beyond.

But why compile this massive collection in the first place? There are some 50 000 bird specimens in this room; elsewhere in the building there are 25 000 mammal specimens, 6000 reptile specimens, 2500 amphibians and about 17 000 deep-frozen samples of bird tissue for genetic studies. These numbers don't make the ANWC the largest of its kind, but for birds at least it is widely regarded as the finest and most useful of all the great Australian wildlife collections. It may seem paradoxical, but these dead animals hold answers to some of conservation's most critical questions.

A quality collection

There are two main reasons for this: the geographic spread of the specimens and the quality of the data associated with them. Located at the headquarters of CSIRO Wildlife and Ecology in Canberra, the collection has been amassed largely by CSIRO scientists from all parts of the continent as they have gone about the task of learning the biology and ecology of Australia's wildlife. For each specimen, data on the location, date, age, weight, sex and habitat are recorded. For birds, moult has also been collected where available, while recent donations from private collectors mean that the ANWC 'nest' now contains arguably the world's finest collection of bird eggs of the Australian region.

Dr David Ride, a former director of the Western Australian Museum and founding director of the Australian Biological Resources Study, believes the ANWC is priceless.

'I've used the collection myself; it's a superb collection and it really is a national



treasure,' he says. 'In fact, it's probably the best documented collection of Australian wildlife in existence.'

He says that while the great 19th century collections, many of which are housed in museums in Britain, Europe and North America, are interesting for their antiquity, the ANWC is more useful for scientific purposes. This is because it has been compiled largely by CSIRO scientists who are 'meticulous in their record keeping': specimens are 'accompanied by first-class ecological information which throws light on the way in which these animals exist'.



Main picture: The home of the Australian National Wildlife Collection, one of our finest references of Australia's wildlife heritage.

Top: Ian Mason and Dick Schodde painstakingly record data from specimens in the rosella collection. **Above right:** A tiny part of the Ragless Egg Collection (which consists of some 5000 clutches covering about 90% of bird species that breed in Australia) being sorted before storage. **The world-class collection was donated by amateur collector Gordon Ragless. Left:** John Wombey shows guests through the ANWC. The collection is not open to the public, but tours are frequently given.

Conservation role

It's sometimes hard for the outsider to understand the role that dead animals can play in conservation, but it is a crucial role nevertheless. Consider, for example, the mapping of biodiversity: we need to know what we have so that we can adopt suitable management plans and design an appropriate reserve system.

But what should we be mapping? When most of us think of biodiversity we think of 'species', a classification unit usually defined by the ability of individuals to interbreed. Yet according to ANWC curator-in-charge, Dr Dick Schodde, this unit can be too crude to capture a large part of the biodiversity: different regional populations that may be able to interbreed successfully where they overlap can often be quite distinct genetically. He cites the case of the eastern rosella, which is redheaded in the south and whiteheaded in the north. 'And if you go to the

Queensland border, you will find a big hybrid swarm which is every colour under the sun,' he says.

Such variation commonly arises when there is limited contact between populations of a species, often imposed by some geographical barrier. Over time, the populations develop unique characteristics – such as different colour markings in birds – reflecting their different environments.

'We know that regional bird populations which are different morphologically are also different genetically,' Schodde says. 'Biodiversity conservation ultimately comes down to the conservation of genetic diversity, so it is at the regional level that we need to be planning our conservation efforts.'

To help spread the message, Schodde has even invented a word – ultrataxon – to replace terms such as regional form, population, race and subspecies.

'The species just isn't doing its job in conservation,' he says. 'Taxonomists can and do argue about the definition of a species. But academic questions such as "is it a species or is it not?" are not of much practical use for basic fauna inventory or conservation. We call our units "ultrataxa" because it's a neutral term, so it doesn't get caught up in all the definitional dogma.'

In 1996, Schodde and his colleague Ian Mason commenced the task of mapping the distribution of ultrataxa, based on the birds housed within the ANWC. Thanks to their work, Australia's assemblage of 700-odd bird species is now known to comprise between 1200 and 1400 ultrataxa, including at least 50 new to science.

The first volume of *The Directory of Australian Birds*, which consists of the passerines, or songbirds, will be published in November; when the second volume

appears in late 2000, the directory will form the first atlas of the diversity of Australian birds at the ultraxon level.

New biodiversity hotspots

The work has produced a number of surprises. Several regions are now known to be more diverse and richer in endemics than previously thought. The bird fauna



on Kangaroo Island, for example, was once considered to be little different from that on the mainland, with just two or three endemic ultrataxa. Now, Schodde and Mason report 13 endemic ultrataxa from the island. The Otway and Strzelecki Ranges in southern Victoria have also been identified as ultrataxa 'hotspots', thanks to their periodic separation from the Great Dividing Range by the Bassian Plain. And the north Queensland rainforest, once thought to be fairly homogenous, is now known to be split in two by a low saddle in the ranges between Mossman and Cairns, with distinct ultrataxa in birds, reptiles and mammals on either side.

Schodde believes that publication of the directory has important implications for conservation.

'It shows that while some taxonomic units are widespread, others are unexpectedly rare or localised,' he says. 'Agencies will realise that they really ought to be doing something about conserving the rarer populations and their habitats, and our information will help them prioritise their efforts.'

Other conservation specialists share this view.

Left: Dick Schodde returns a specimen of an echidna to the mammal collection.

Below: Dr Don Driscoll uses the ANWC's cold storage facilities to store frozen lizard tails. Genetic analysis of the lizard tails will allow scientists to determine how far lizards travel in remnant vegetation.



'I think it is very important for the States to see this work because they will then be in a better position to assess the conservation status of their own constituent birds,' says Dr Jean Just, director of the Australian Biological Resources Study.

Dr Stephen Garnett, senior principal conservation officer for the Queensland Environment Protection Agency, prepared the first Action Plan for Australian Birds in 1992. He's now planning a revised edition to take account of the new work on ultrataxa; already, he says, he has been able to identify a number of threatened populations that were not previously known to be distinct entities.

But for at least one ultrataxon in Adelaide's Mount Lofty Ranges – a form of the Spotted Quail-thrush identified by the work of Schodde and Mason – the new information may have arrived too late. Garnett says that if this ultrataxon had been known about in 1992, it might have been relocated and protected.

'But no one has seen it since, so we might have lost it,' he says.

Mysteries remain

Of all Australia's vertebrate fauna, birds are best documented. Even so, there remain significant gaps. One of these is Cape York.

'The west coast of Cape York Peninsula is virtually unexplored ornithologically,' Schodde says. 'What is the connection, for example, between the bird fauna of Arnhem Land and that of the peninsula? We don't know.'

The little kingfisher – a mangrove-dwelling bird only 5–10 centimetres long – is one species that might hold the key.

'The Arnhem Land form is a beautiful azure blue, while the east Queensland form is a darker purplish blue,' he says. 'On the west coast of Cape York Peninsula they seem variable, but since we only have two or three specimens we can't say whether they are intergrades or members of a distinct ultrataxon.'

Other questions arise on the eastern side of the peninsula. For example, many of the birds there have more in common with birds of the lowland New Guinea rainforest than with those of the montane rainforest further south around Cairns. But isolated pockets of rainforest on the ranges near Princess Charlotte Bay intrigue Schodde.

'In those ranges, the Cape York lowland New Guinea bird fauna comes up against the montane and subtropical rainforest bird fauna of the rest of eastern Australia,' he says. 'What happens to the ultrataxa there? Do they hybridise? We don't know. There are virtually no collections whatsoever from this region. Yet these questions beg its exploration.'

Another diversity 'hotspot' where our knowledge of the bird fauna is inadequate is the Pilbara, a series of rugged ranges in the central northwest of Australia. It has been isolated from other parts of the continent by the sandy deserts to the north and east and by low-lying arid country to the south. According to Schodde, it is this isolation that makes the region so fascinating.

'Historically, it has served as a refuge for many plants and animals that through the course of evolution might have now diverged from their relatives elsewhere,' he says. 'The region therefore becomes a prime site for the exploration and the discovery of new forms, and for determining the range limits of the species and regional forms that are already known there.'

Schodde hopes to solve several mysteries associated with birds found in the Pilbara mangrove system, which is separated from the Kimberley mangroves by the Great Sandy Desert and the 80 Mile Beach between Port Hedland and Broome.

'Because of this historic isolation, it's likely that the Pilbara populations of mangrove birds – such as the collared kingfisher, striated heron and white-bellied whistler – are rather different from their more northerly relatives. But while we have a few clues that they might be, the collections are not extensive enough for us to get a real handle on it yet.'

These days, the collecting of vertebrate fauna is controversial, yet most conservation biologists say that it remains necessary for conservation efforts. Dr Les Christidis, director of the Science Program at the Museum of Victoria, believes that collecting now will help circumvent problems that might arise down the track.

'We tend to go for knee-jerk reactions in conservation,' he says. 'We say "let's wait until a species is threatened and then do something about it". What we really need to do is say "OK, let's go out and see what we've actually got on the continent. What sort of geographic and genetic variation occurs, even in widespread species?"'

Schodde says that many Australian bird ultrataxa are under threat, with land clearing the biggest culprit. 'Bird populations are declining right across Australia, and the clearing of habitat is at the guts of the problem,' he says.

'There's still widespread clearance going on in this country, and that's the most destructive force by far,' agrees Jamie Matthew, a scientist working for Birds Australia, a non-government conservation and research organisation. He believes that the best way to advance the cause of conservation is through improving our knowledge.

'Getting up a tree to protest is not going to achieve much in the long term,' he says. 'We have to approach conservation pragmatically and scientifically.'

With better knowledge will come solutions that everyone can live with.

'There will always be development,' he says. 'It's a question of how we can develop our resources and maintain the diversity we have. Finding out what we've got is the first step.'

Back at the crypt . . .

John Wombey shuts the door of a cabinet and we leave the bird specimen room. The birds are silent, of course; their colours are still bright but they sing and squawk no more. They lie in state in one of the best-maintained environments on the continent, reminding us – perhaps for centuries – of our responsibility to the living. If Matthew is right, they won't have died in vain.

Right: Part of the ANWC's colourful bird-of-paradise collection.

Above right: Dr Denis Saunders with one of his black cockatoo bird recordings lodged in the Sound Library. The shelves next to Saunders are lined with more than 25 000 wildlife recordings.



Abstract: The bird collection at CSIRO's Australian National Wildlife Collection is widely regarded as the finest and most useful in Australia. This is due to the broad geographic spread of the specimens and the meticulous ecological data recorded with them. The collection provides a basis for biodiversity mapping, an important step in the prioritisation of conservation efforts. The term 'ultrataxon' is used in cataloguing the collection to replace terms such as regional form, population, race and subspecies. This approach has enabled identification a number of threatened populations not previously known to be distinct entities. It has also shed light on new geographical patterns of taxonomic units, showing that while some are widespread, others are unexpectedly rare or localised. The ANWC also contains arguably the world's finest collection of bird eggs of the Australian region.

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