

The Australian National Wildlife Collection

Bird skeletons are kept in cardboard boxes.



Dr John Calaby examines kangaroo skins.



'To an ecologist, a museum resembles a library. These skeletons and skins — they are works of reference.'

One of the curators of the Australian National Wildlife Collection was surveying the many shelves making up just part of the Collection, which is housed in the headquarters of the CSIRO Division of Wildlife Research in Canberra.

The word 'collection' probably suggests to most people the product of many years' deliberate gathering — of records, perhaps, or postage stamps. But this Wildlife Collection simply grew as a necessary appendage to the Division's studies. In all biological research, scientists must know how many species they are looking at, and they must reach international agreement on the organisms' names. As the Division conducted an increasing number of fauna surveys and ecological projects, so the Collection, Topsy-like, 'just grew'.

Not all species display conveniently conspicuous characteristics to distinguish them from their close relatives. Until fairly recently, ornithologists called all ravens by the same name, *Corvus coronoides*.

In 1965, when Mr Ian Rowley of the Division was studying ravens, he attracted them by playing a recording of one of their calls. On one occasion his curiosity was roused by a nearby bird that ignored the recording while another raven flew in from the best part of a kilometre away. The 'obstinate' bird was collected and, on close examination, showed several small differences in plumage from *C. coronoides*. This discovery led in due

course to the recognition of another species of raven, *C. mellori*.

Far from being rare, the newly named bird had been right under everybody's noses all along, and bird-watchers — once they knew to look at the length of ravens' throat feathers and listen critically to the calls — succeeded in separating the two species quite readily in the field.

Economic importance

The separation and naming of species form part of the science of taxonomy, the traditional discipline of biology museum workers. Because they investigate the very processes by which species arise and maintain their individuality, modern taxonomists extend their interests into many branches of biology, particularly genetics, evolution, and ecology, and their findings may turn out to have economic importance.

For example, *Corvus coronoides* does occasionally kill new-born lambs — although less often than farmers used to suppose — but *C. mellori* does no damage.

The tanned skins of large mammals hang in tall cabinets, like so many fur coats in a shop.

Museum specimens therefore not only constitute a reference collection for zoologists; they may themselves stimulate new studies. Many people outside CSIRO use the National Wildlife Collection, most of them taxonomists in museums and universities both within Australia and overseas.

No single museum can ever offer a researcher all the material he needs for a complete study, and institutions continually borrow specimens from one another. Within Australia this poses no problems, but postal delays and permit requirements complicate international loans.

The Collection lends itself particularly well to studies of variation, as some species are represented by large series of specimens. During the Division's ecological studies on kangaroos, for example, large numbers of individuals were collected and examined and, as a by-product of this work, skins and skulls made their way into the permanent Collection, which now includes some 9000 skulls belonging to five kangaroo species.

Australia boasts a big fossil kangaroo fauna, and any paleontologists who wish to tell male specimens from females, and sort out which bones belonged to juveniles, can get their eye in by studying the large series of skulls from modern individuals of known age and sex in the Canberra Collection. Fossil 'digs' turn up large

numbers of jawbones, and an experienced scientist can sex some of these from the size of their teeth.

Skins and skulls

The Division's mammal section, which is managed by Dr John Calaby, contains about 16 000 specimens. The tanned skins of large species hang in tall cabinets, like so many fur coats in a shop.

On shelves lie skins of medium size, including a large collection from rock wallabies; some of these have come from the Division's field surveys, and the rest were given by Macquarie University, where the species are being studied.

A small skin — from a marsupial mouse, for example — is filled with cotton wool or with a polyester fibre, which is like cotton wool but springier, and a length of wire is inserted to stiffen the tail. These small specimens are stored in drawers.

Every mammal specimen carries a label giving all the details that future researchers are likely to need: species name; sex of the specimen; lengths of the head and body, tail, hind foot, and ear; the locality, habitat, and date of collection; and an identification number unique to that specimen.

Skulls or other bones on their own — which is how they are often found — can give an experienced zoologist a great deal of information. Ecological studies of wedge-tailed eagles and dingoes, for example, involve painstaking examination of bone fragments (and hair) to find out what the predators have been eating. In the Canberra Collection, mammal and bird skulls are separately boxed and labelled.

The collection of New Guinean birds is the most comprehensive in the Southern Hemisphere.

For first-class specimens, completely clean and undamaged, scientists have found that they cannot improve on nature. They put fresh specimens in the 'bug-house', where dermestid beetles (members of the family Dermestidae) gently feast on the soft parts. In the moist, warm, dark environment they favour, these scavengers pick a skull clean in as little as a fortnight.

Some bat specimens are stored with the other small mammals, dry and stuffed, but because the configuration of the soft tissues around the nose and ears plays an important role in the taxonomy of some bat genera, most specimens go into jars of alcohol, so that the entire animal is preserved.

Liquor store

These jars are kept in the 'spirit house'. In addition to bats, some birds find their way here, especially if taxonomists want to preserve soft parts, like wattles.

But reptiles (3300 specimens) and amphibians (1500 specimens) make up the great bulk of this part of the Wildlife Collection. They come under the care of Mr John Wombey. When he adds a new frog or reptile specimen to the Collection, Mr Wombey first fixes it in 10% formaldehyde, to precipitate proteins and pre-

vent any subsequent degeneration, and then immerses it in 70% ethyl alcohol for permanent storage.

Mr Wombey started collecting reptiles as a hobby while working with the Division in Western Australia and Darwin. With time, the Division's ecological surveys and gifts from the public have swollen the Collection to its present size. The smallest specimens reside in jars crowded on shelves among the taller glass cylinders into which snakes are folded. Turtles go into special vats.

Labelling spirit specimens presents a challenge. Mr Wombey imports from the United States of America a special paper that does not disintegrate in alcohol. Eventually he and the Collection's other curators would like to see all labelling information stored on computer.

Unfortunately, nobody has yet devised a way to prevent animal colours from fading in alcohol, and Mr Wombey is therefore compiling a set of photographic transparencies recording the animals' appearance in life.

Taxonomists are particularly well placed to appreciate how incomplete our knowledge of the Australian fauna remains. Occasionally a discovery will demonstrate this point exceptionally emphatically; for Mr Wombey such a moment came in 1972 when he collected live specimens of the small-scaled snake, now

Taxonomists distinguished these two similar birds less than 20 years ago. *Corvus mellori* (the little raven), pictured on the left, has a finer bill and shorter throat feathers than *C. coronoides* (the Australian raven), on the right.



known to scientists as *Oxyuranus microlepidotus*, in western Queensland.

This species, a large one with the most toxic venom of any known snake, had previously been confused with the taipan (see *Ecos* 24 for more details).

Bird preservation

The first birds entered the Collection during ecological studies by Divisional scientists in 1954. Later, in the 1960s, the present curator of the bird specimens, Dr Richard Schodde, found himself in New Guinea as a systematic botanist surveying plants for the Division of Land Use Research.

In his spare time he pursued his lifelong hobby of bird study. Now, after several expeditions, he has collected some 7000 specimens, compiling the most comprehensive collection of New Guinean birds in the Southern Hemisphere.

A study of rosellas in South Australia led to about 1000 specimens of these taxonomically intriguing parrots making their way to Canberra. In these and other ways the Collection has grown to about 23 000 specimens, of which 15 000 come from Australia and represent more than four-fifths of the species found here.

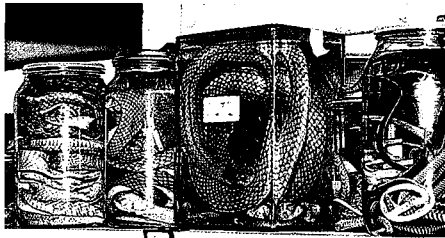
Being so new, the bird collection attracts many taxonomists. The specimens are fresh and equipped with all the information that a modern researcher needs and generally cannot obtain from older collections: not only the traditional items such as place and date of collection, the sex of the bird, and the colours of its soft parts (bill, eyes, and feet), but also the habitat in which it was found, its weight, and a number of observations that give valuable insight into the species' biology.

From the condition of the specimen's sex organs a zoologist can tell whether the bird was caught during or about its breeding season. If the roof of the skull is not completely ossified, the bird must be young and a researcher may be able to estimate its age, and hence deduce the time of year at which the species breeds.

Likewise, the amount of fat deposited under the skin and the stage of moult give important clues.

Considered together, all this information, which is recorded on labels, may enable a biologist to deduce a great deal about the breeding biology of a species, even though the original observer may only have been able to spend one or two weeks collecting in an area.

As some bird families, such as the fairy wrens (*Maluridae*), have a geographical



Part of the collection of snakes preserved in alcohol.



Mr John Wombey in the 'spirit house'.

distribution restricted to Australia and New Guinea, the New Guinean species complement the Australian part of the Collection usefully, enabling a taxonomist to see the full range of living species in a family.

Some bird specimens are kept in spirit and some have ended up in the osteological collection, but most have been preserved as dry skins, stored in drawers rather like the small mammals. The skins are first fumigated to destroy any destructive pests, then put into the drawers of cabinets with rubber seals that exclude dust. The temperature and humidity of the storage room are kept under control, and even the lights have to be specially selected.

Ultraviolet would fade the plumage colours whenever a drawer was opened, so the room is illuminated by lights that give off no ultraviolet radiation.

Modern and fossil bones

Dr Gerry van Tets looks after some 3500 bird skeletons — the second-largest such collection in Australia. Like the collection of mammal skins, this section origi-

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nally grew out of the Division's surveys and special projects such as the studies of three predators: the wedge-tailed eagle, dingo, and peregrine. Further material came through Dr van Tets' own interest in fossil birds.

The bird skeletons represent about four-fifths of Australia's species, and were obtained in various ways: found dead by roads or washed up on beaches, scavenged from the opening day of the duck-shooting season, or — in relatively few cases — deliberately collected.

Naturally, any collection tends to reflect its compiler's interests. Dr van Tets conducts research into water birds, and he has gathered skeletons of almost all the species of cormorants and penguins in the world for comparative study.

He also has a strong interest in the palaeontology of birds and, although most of the fossils he is studying have been lent from other collections, he is gradually extending the Canberra fossil collection, which already includes a particularly important series of specimens of extinct species from Lord Howe and Norfolk Islands.

Not only taxonomists consult Dr van Tets about bird skeletons. Members of the public sometimes bring him a bone to identify, and occasionally public health inspectors ask the same question, especially after somebody has complained that what a restaurant is serving does not appear to tally with the menu. 'They're usually wrong', Dr van Tets remarks. 'People don't realize how different are the skeletons of free-range and battery hens.'

The Division also maintains a collection of seeds, looked after by Mr Robin Barker. Biologists studying animals' diets often have to analyse stomach contents, and they can identify many seeds by reference to this collection.

In 1976 this assorted collection of collections became the Australian National Wildlife Collection. One day it may move into Canberra's proposed Museum of Australia or a similar institution. Until then — and that day seems a long way off — the CSIRO Division of Wildlife Research will continue as its custodians.

John Seymour