

# Building an insect data bank

To entomologists, Australia is one of the most interesting parts of the world. We have a lot of insects—probably well over 100 000 species—and many are unique to this country. Like our marsupials and native plants, they have evolved over millions of years in virtual isolation from the rest of the world.

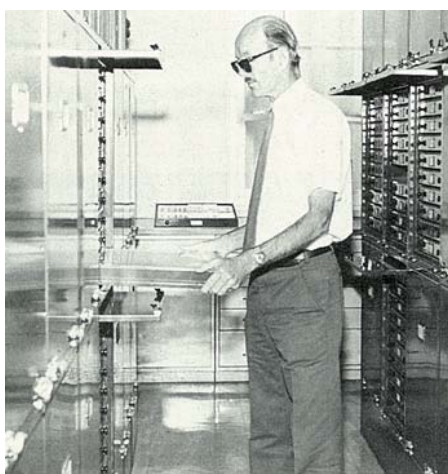
Getting to know our insects and the place of each in the Australian web of life is a slow and painstaking task. But it is an important and fascinating one. Testimony to its allure is the fact that much of the early collecting and classifying was carried out by amateurs, many of whom built up very large private collections. For example, one Brisbane medical doctor found time to collect and describe about 4000 species.

Some of these collections are now included in the Australian National Insect Collection (ANIC), housed at the CSIRO Division of Entomology's headquarters in Canberra. Built up since the early 1930s, this has become by far the largest collection of Australian insects. Literally millions of specimens, covering all stages of insects' development, are preserved there.

One purpose of the ANIC is to facilitate accurate identification of insects. The CSIRO taxonomists who maintain it receive many request from departments of agriculture, universities, and elsewhere to identify insects—often ones that have been found damaging trees or crops. Correct identification is essential; without it, existing information about the species can't be retrieved and new information can't be usefully recorded.

Sometimes an insect submitted for identification belongs to a species not yet described. With the help of the data contained in the Collection, the taxonomists can often show what species it is related to—information that may help the inquirers. They can also set about the task of classifying, describing, and naming it.

The other main purpose of the Collection is to provide material for research on the origins, evolution, distribution, and ecological roles of Australia's insects.



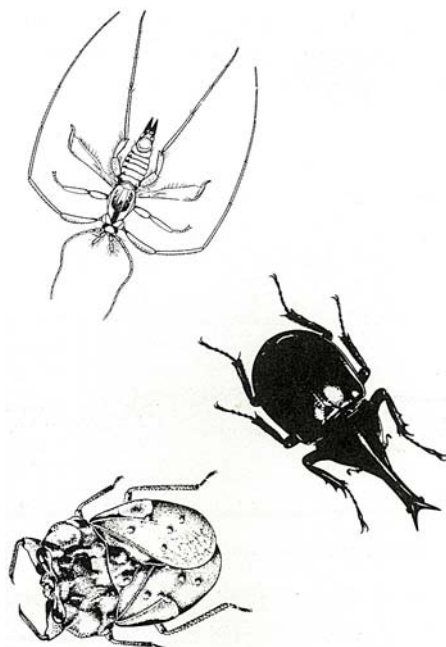
The Chief Curator, Dr Ian Common, takes out a drawer of pinned specimens.

## Describing species

So far, about 54 000 species of insect have been named. The ANIC contains another 20 000 or so unnamed species, and the process of describing and naming them is progressing slowly.

The Division's staff includes specialist curators for five major orders—the Lepidoptera (moths and butterflies), Coleoptera (beetles), Hymenoptera (wasps and bees), Diptera (two-winged flies), and Orthoptera (grasshoppers). Other Divisional specialists and visiting scientists also participate in the taxonomic work, and insects from the Collection are lent to people working elsewhere. At present, about 300 loans are out, totalling something like 40 000 specimens.

The actual specimen described when a species is named is called the 'type specimen', and, as much of the early naming of Australian insects was done in Britain and Europe, many of these are in overseas museums—notably the British Museum.



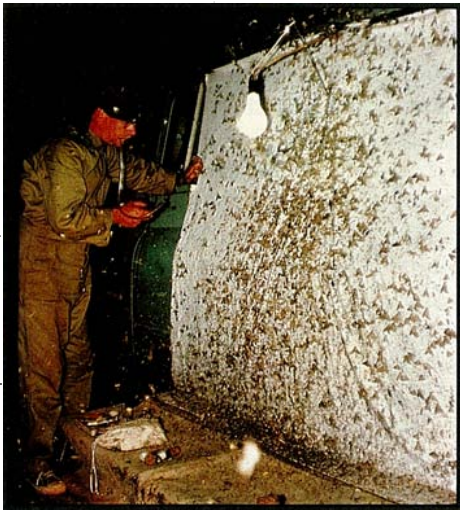
CSIRO scientists making systematic revisions of groups of insects—to work out species relationships and describe new species—have to borrow the type specimens or visit the overseas museums. Photographs and detailed descriptions of these specimens are made and added to the increasing amount of documentation of our insects in the ANIC.

Included in the Collection are thousands of microscope slides of dissected parts of insects that are important for identification. The ANIC also holds large collections of the immature stages—larvae and pupae—of many insects; these are stored in liquid in glass tubes, as are the ants, termites, and other soft-bodied specimens. The bulk of the Collection comprises dry-preserved insects mounted on pins in glass-topped drawers. These are stored in 1000 steel cabinets.

Each specimen is individually labelled with a record of the date and place where it was collected, and the collector's name. Observations of such things as its habitat and the species of plant that it was eating when caught are also recorded.



Some soft-bodied specimens, stored in liquid.



Collecting at night — the lighted sheet attracts the insects and the collector can choose the ones he wants.

### The search

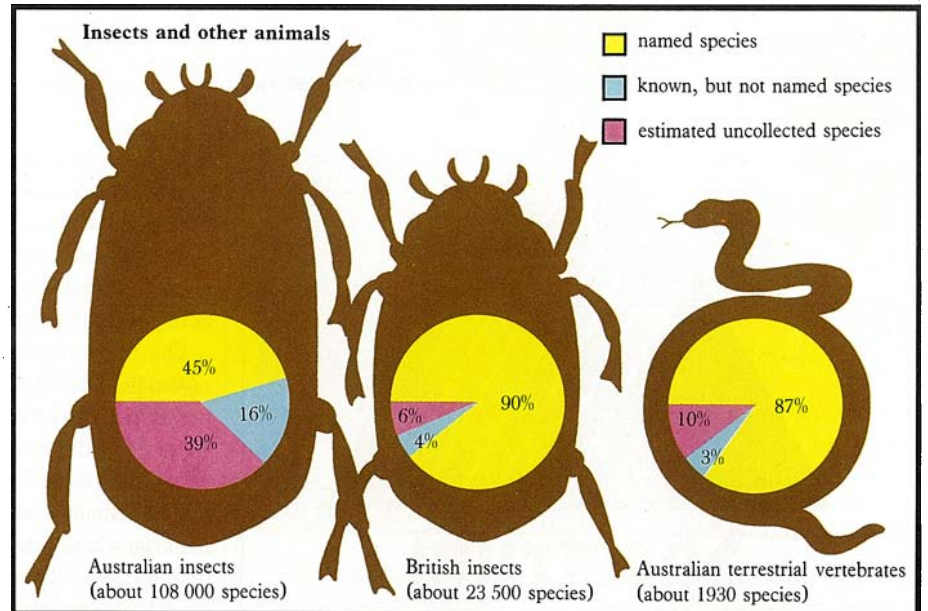
Insects come to the ANIC from collectors around Australia. But most of the collecting is now done by the Division's taxonomists.

Sometimes, teams from the Division mount major collecting expeditions to remote parts of Australia, with the aim of finding out as much as possible about the area's insects. For instance, in 1973, as part of the Alligator Rivers Region Environmental Fact-finding Study, a 12-man team collected about 65 000 specimens in a 19 000-sq-km portion of the 'top end' of the Northern Territory. This collection included more than 4500 species.

On a smaller scale, in 1975 two scientists from the Division surveyed the insects of the Drysdale River National Park in Western Australia's Kimberleys. This study was part of a biological survey of the area organized by the Wildlife Centre of the Western Australian Department of Fisheries and Wildlife and the Western Australian Museum. In 3 weeks the scientists collected more than 14 000 specimens, representing nearly 2500 species.

Surveys in these remote areas show that much remains to be learnt about our insects. Previously known species usually account for only about 40% of the insects collected.

On the basis of that figure, and other data, taxonomists estimate that the 54 000 species named so far represent about half of Australia's total. Collecting, naming, and describing the rest will be a harder job than



cataloguing the first 54 000 has been, because the ones that remain will tend to be the smaller and rarer species.

Most of the specimens in the ANIC are collected by the specialist taxonomists during their own field work in areas of specific interest to them, and related to their current work on particular groups of insects.

### Night and day

Collectors have devised many ingenious ways to catch insects. One is based on the fact, which most of us observe on summer evenings, that insects are attracted to light. Collectors make use of this in designing light traps, or simply by hanging a white sheet in the bush after dark and suspending a lamp in front of it. Insects land on the sheet, and the collectors take the ones they want.

Nets are used for daytime collecting. But many insects are found only by diligent searching, using knowledge gained from experience to choose the right place to look for them.

Habitat preservation is the only way to ensure the conservation of many of Australia's insects. The changes in landscape that have come with 200 years of European settlement—particularly clearing of woodlands and forests—have inevitably had an enormous impact on the insect life and may well have eliminated many species. Pastures and croplands support much less diverse insect populations than the complex plant communities that they replace.

Some species, of course, have prospered mightily under the new conditions and become pests. These are a small minority though; probably only about 600 species,

**Australia has a very diverse insect population, as the comparison with Britain indicates.**

**Insect species vastly outnumber the terrestrial vertebrates.**

fewer than 1% of the total, cause us any problems.

Some insects have a useful role to play in monitoring the effects of development. For example, populations of some fresh-water species are very sensitive indicators of pollution in rivers and streams.

### More about the topic

'The Insects of Australia', ed. I. M. Mackerras. (Melbourne University Press: Melbourne, 1970.)

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The large moths preserved in this drawer are pests of ripening tropical and sub-tropical fruits.