

## New Zealand Arthropod Collection (NZAC) / Ko te Aitanga Pepeke o Aotearoa

"Arthropod" means "jointed limbs", and includes animals such as insects, centipedes, millipedes, mites, and spiders.

### What is NZAC?

NZAC:

- is the largest collection of New Zealand insects and related terrestrial arthropods held anywhere in the world;
- has near complete coverage of New Zealand's 25000+ known species;
- contains about 1 million specimens preserved dry on pins;
- contains about another 6 million preserved in ethanol;
- has many specimens from other parts of the world, especially the Pacific region and Chile;
- is under the stewardship of Landcare Research at Tamaki Campus University of Auckland in Auckland.

### What is NZAC used for?

- Specimens in collections like NZAC are the basis of all knowledge and information about the natural world. They are essential for precise identification, which is in turn the key to effective study.
- Identified specimens are kept and documented in such a way that, together, they are a library of biological diversity.
- This accumulated diversity is irreplaceable, and is a national and international heritage which we hold in trust for all nations.
- NZAC's role in global science is very special, because of New Zealand's unique position in the biogeography of the world.
- Probably about 90% of our arthropod species occur nowhere else, but may be closely or more distantly related to groups which are found in other regions.
- Our indigenous arthropods are a vital piece in the jigsaw of knowledge about the Earth's fauna and flora, and how they evolved.
- The task of describing our arthropods is large, and specialists with NZAC (systematists) are helped in this work by specialists from many countries who either visit NZAC or borrow

specimens for study. This work adds steadily to knowledge of New Zealand's fauna, and hence to our understanding of planet Earth.

### What specialists at NZAC do

To make the best use of New Zealand's natural resources, we need to know our plants and animals, how they interact with the environment, and their place in the natural systems. The specialists at NZAC:

- carry out surveys to discover which insects and other invertebrates are present, particularly those of economic and conservation importance;
- identify insects and other arthropods;
- maintain and enhance the NZAC specimen library;
- publish research papers on the fauna, particularly in *the Fauna of New Zealand* series.

### Caring for (curating) NZAC

- Research work on individual groups of animals in the collection can only be as good as the material it is based on.
- A few battered specimens from a limited number of sites are less valuable than a truly representative sample of the species as it occurs in nature.
- Specimens do not outlive their usefulness as they become older: in fact, they become more valuable as:
  - reference specimens of completed studies;
  - representing populations from habitats that have been so altered that the species no longer exists there;
- A lot of time may be required, therefore, to curate (care for and work on) older specimens.

### Preparation

Preparing individual insects for study is a very exacting process, because it is essential to have all the important features visible. For instance, moths are usually pinned with the wings spread. This requires the specimen to be:

- relaxed (softened)
- carefully pinned out on a setting board
- labelled
- transferred to a storage container.

A competent insect preparator working with small moths could probably deal with only about 100 in a day.

The smallest insects:

- may be "double-mounted" on strips of plastazote foam using tiny pins;
- glued on card points;
- may be mounted on glass slides for study under the microscope, a lengthy process involving a sequence of chemical treatments and careful manipulation. Perhaps as few as 8-10 permanent slides can be prepared by one person in a working day.

Because insects in collections tend to deteriorate, they must be protected from anything that can reduce their scientific value.

Soft specimens and those in bulk storage are:

- "pickled" in 70% ethanol and thus prevented from decomposing;
- kept in a darkened room to reduce phytochemical changes.

For pinned specimens the environment is controlled:

- to prevent excessive humidity and temperature fluctuations (which leads to the growth of fungal mould);
- to reduce ultraviolet radiation (which causes photochemical changes, e.g., decolouration).

### **Sorting**

The second part of curation is sorting, or "systematics-in-the-tray".

Specialists:

- examine the specimens
- name them (usually on a new label)
- rearrange the specimens into systematic groups - usually by species, gender, and place of origin.

This process makes a vast store of information available on ecology, distribution, and geographic variation.

### **Postscript**

Many biological species cannot be identified just by studying dead specimens. Systematists must turn to other evidence and other disciplines to make valid decisions about species boundaries by considering:

- aspects of insect behaviour
- aspects of biochemistry
- differences in host plants.

However, the basis of biological systematics will long continue to be collections of well-documented specimens such as NZAC.

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