Photographs: David McClenaghan, CSIRO

Small wonders

Main picture: A tropical species of praying mantis of the genus Neomontis *collected on the expedition. Above left: This species of* Trapezostigma *(Libellulidae) was one of the many dragon flies found. Centre: Timing the trip to avoid the wet season, but arrive at a time when insect activity was still high was a masterpiece of planning. Right: Camouflage is a fascinating defence mechanism for many insects such as this praying mantis (Amorphoscelidae).*

Sharon Corey of CSIRO Entomology describes a journey to the little known.

A quarter of a million species of arthropods (insects, spiders, jointed-legged creatures) are thought to inhabit Australia, but only 60 000 of them have been formally described and named.

'Compared with animals and plants, the arthropod fauna of Australia is poorly known,' says Dr David Yeates, leader of the Biodiversity and Informatics project at CSIRO Entomology. 'As custodians of our biological heritage, future generations oblige us to understand and preserve our fauna and flora,' Yeates says. 'And we may be losing economically important species before we realise what role they play in maintaining our environment.

'Insects have been described as the little things that run the world. They play a kaleidoscope of roles in the environment, such as recycling nutrients, consuming other invertebrates and plants in various ways, forming symbiotic relationships with plants and animals, pollinating plants, and providing food for other animals.

'Together this complex web acts to maintain balanced and healthy ecosystems. If we are to manage these ecosystems wisely, it is important to understand their components and interactions.'

Top: Night collection of insects was mandatory. Insects were attracted to a sheet by a mercury vapour light source. Above left: Collecting insects is only half the battle. Tom Weir and Jo Cardale check notes as they start the process of pinning, recording and classifying the many insects found. Centre: Camping out – base camp in Gregory National Park. Right: Pinning insects and maintaining a record of where they were found is vital to success of expeditions.

With the same general theme, a group of visionaries and entrepreneurs in California have set up the All Species Foundation, with the aim of making the Earth's biodiversity known in 25 years.

Professor Evert Schlinger, an entomologist from the University of California, Berkley, demonstrated his support for the All Species Foundation in October 2000 with a US$1 million donation. Dr Schlinger's recognition of the importance of an inventory of our environment, combined with his love of exploration, led to discussions with the late Dr Ebbe Nielsen (former head of the Australian National Insect Collection) about funding a series of expeditions into northern Australia.

Their plans came to fruition In May-June 2001 with the mounting of a four-week trip to the Keep River and Gregory National Park region of the Northern Territory. These areas are generally poorly sampled as they are difficult to access, so potential for discovering new species was much increased.

Dr Yeates and Tom Weir of CSIRO Entomology led the Keep River / Gregory expedition, for which timing was of the utmost importance. The peak of insect activity is in the wet season, but the roads are impassable during the wet, so the expedition was timed for the end of the wet season when roads were starting to dry out, but insect activity would still be high: no mean feat under the circumstances.

Top left: One of the many grasshopper species (Acrididae) found during the Keep River/Gregory expedition. Top right: Egg sacks from a species of spider. Above: This brightly coloured species of shield bug Lampromicra senator *(Fabricius), family Scutelleridae, was encountered several times during the expedition. Left: A caterpillar of a cup moth (Limacodidae).*

Top: Kelly's Knob Sandstone, fascinating rock formations found in the Keep River region. Above: Spectacular pupa of the glasswing butterfly, Acraea andromacha *(Fabricius), family Nymphalidae. Right: An ancient Boab tree. These deciduous trees of north-western Australia are found in many grotesque shapes. The loss of leaves in the dry season reduces moisture loss and enhances drought tolerance.*

Two teams of researchers were organised, each to spend a period of two weeks at the Keep River site. As the region was fairly unexplored, it was unknown what to expect. For Schlinger, who was part of the second team, the trip did not yield any of his beloved rare species of fly that parasitise spiders, however many other unnamed species were found.

For those who participated in the Keep River / Gregory expedition it was a fabulous journey into unknown territory where the discovery of as yet unnamed species was both the purpose and the inspiration. Spectacular scenery surrounded the researchers every kilometre of the journey and the region teemed with wildlife of all shapes and sizes.

While sharing space with mosquitoes and other insects might be considered irksome to the less adventurous, to the researchers it was a journey of discovery that they will not soon forget. With gaps in our knowledge of Australian insects the size of 'black holes', the expedition was one step in the right direction towards completing our inventory of arthropodic life. What lies ahead is the task of curating all the specimens, cataloguing and databasing in as much detail as possible. Then the specimens will be passed on to other researchers to further describe them and to begin piecing together an understanding of their relationship to other species and their role in the ecosystem.

In the process of the stocktake of life, knowing what's there is the first step in piecing the puzzle together that will give us a more complete understanding of our ecosystems, what keeps them in balance, and what impacts can upset their future existence.