J. Taylor

Trapezostigma stenoloba.

Dragonflies — Desert Jewels

Tony Start

Three hundred million years ago, long before the age of dinosaurs, dragonflies with wingspans of 70 cm (over 2 ft) hunted in a primeval world. They are amongst the oldest flying animals, and they are the largest known insects.

Today's dragonflies may not be as large as some of their ancestors, but they make up for size with brilliant colours, spectacular flight and fascinating habits. On bright sunny days they are active and pugnacious. Most are easy to identify in the wild, and it is understandable that they have been called the bird watcher's insects.

Dragonflies make up one Suborder of the Order Odonata. The other Suborder contains the damselflies. Although damselflies are frequently referred to, mistakenly, as dragonflies, the two groups are easily distinguished (See Table).

Odonatans are usually diurnal (daytime) predators which rely on eyesight. They feed on other insects which they capture on the wing. Some species cruise continuously in search of prey or mates. Others spend much of their time at rest, watching for passing victims. After mating many species continue to fly in 'tandem' as the female lays eggs either inserted into aquatic vegetation or dropped freely onto water.

We usually associate dragonflies with water. In Australia their larvae always live in fresh water, where they are voracious predators of other aquatic animals. Predictably, the greatest diversity of Australia's 300 odd species is in the warmer, wetter parts of the continent: the top end and the eastern seaboard of Queensland.

The arid Pilbara would seem an unlikely place to find these aquatic insects. It is, at first, astonishing to find bright red dragonflies on the tops of spinifex-clad hills and huge emperor dragonflies in mining town suburbs. Nevertheless, 33 species (22 dragonflies and 11 damselflies) occur in the Pilbara. Ten of them are endemic to the region and many have appropriate names e.g. *Nososticta pilbara*, *Nannophlebia injibandi* (for the Aboriginal people who lived near Millstream), and *Eurysticta coolawanyah* for Coolawanyah Station.

Their larvae have evolved to make use of all the potential habitats that are available. Some species that are able to complete a life cycle in a few weeks take advantage of temporary pools filled by thunderstorms. Many others take a year (some need several years) to mature. They need permanent water, usually deep pools, but a few of them

J. Taylor

One of the few species with a common name is the emperor dragonfly (*Hemianax papuensis*).

A male *Agriocnemis kunjina*.

J. Taylor

DRAGONFLY, DAMSELFLY OR ANTLION?

The only insects that look superficially like adult dragonflies or damselflies are adult antlions which belong to another insect order: the Neuroptera.

- **DRAGONFLIES**
  Are relatively large and powerful insects.
  Hold their wings out horizontally when at rest.
  Have huge eyes that occupy most of their head.
  Have minute whisker-like antennae.

- **DAMSELFLIES**
  Are small, delicate insects.
  Fold their wings over their backs like butterflies when at rest.
  Have smaller eyes that are widely separated.
  Have microscopic, whisker-like antennae.

- **ANTLIONS**
  Are small-to-medium sized insects.
  Fold their wings to their sides, like moths, when at rest.
  Have smaller, widely separated eyes.
  Have prominent clubbed antennae.

can only live in flowing streams.

Just as the larvae of different species occupy different habitats, the adults have divided their environment into many niches.

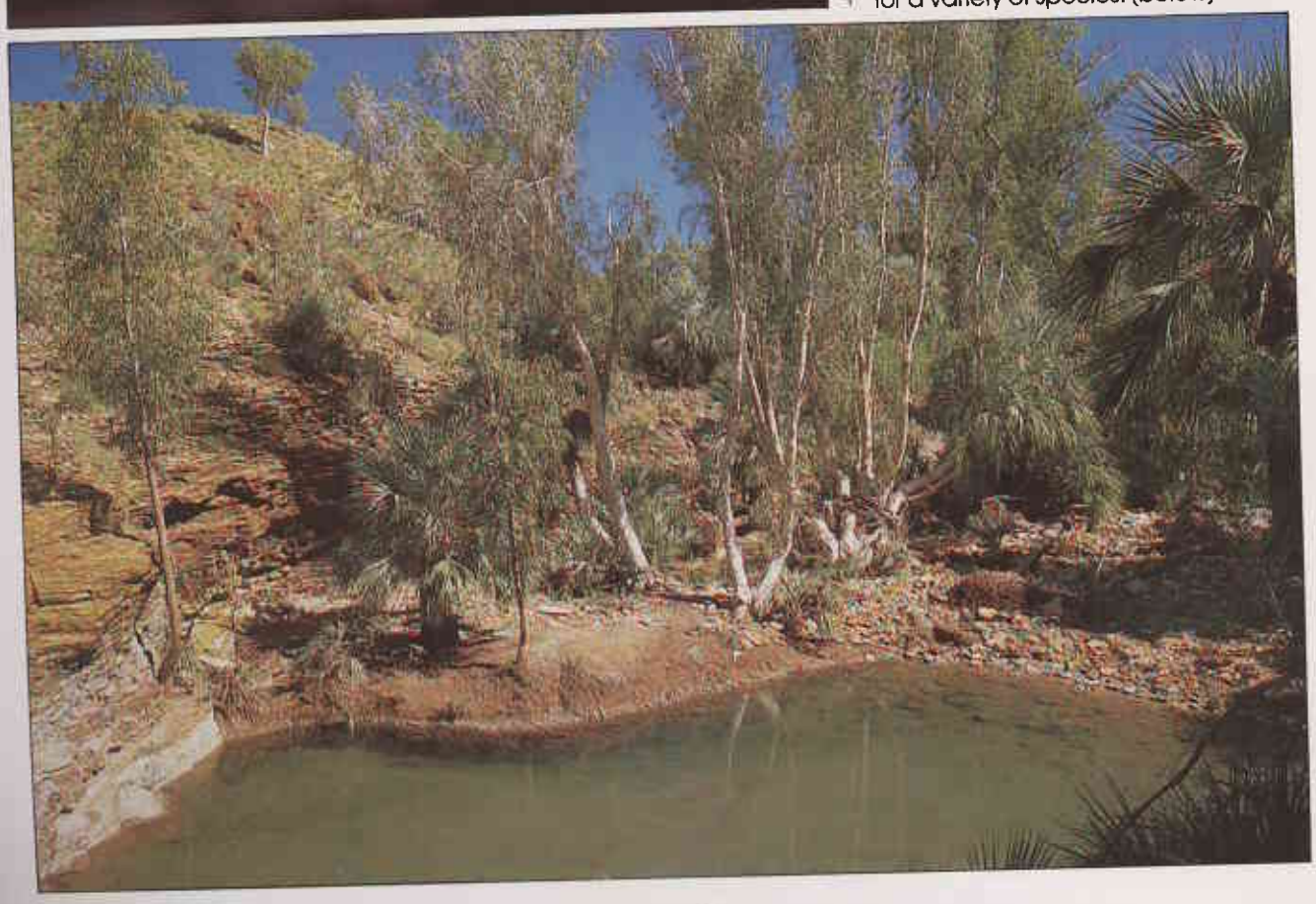
Because the delicate damselflies are relatively weak fliers, they seldom fly high or travel far. Tiny, white *Agriocnemis kunjina* (named for Kunjina spring, near Millstream) and orange, black and blue *Ischnura aurora* weave their way through dense beds of grass and other fine vegetation, often less than 5 cm from the water surface. The former live near small streams; the latter like still water, even thriving around very shallow, almost stagnant soaks. In contrast *Pseudagrion aureofrons*, a brilliant pale blue insect with a golden head and thorax, skims fast over the surface of larger, permanent pools while its near relative *P. microcephalum*, a bright blue species, patrols the margins of the larger pools, often settling on thick bullrushes. There is always an exception to the rule; on still days *N. pilbara* will hover amongst the cajeputs up to 8 m above the streams in which they breed.

Dragonflies can exploit a much greater variety of habitats because they are such powerful fliers. There are, of course, many species that seldom venture far from their breeding grounds, but some are highly nomadic,

Ischnura aurora.

J. Taylor

Millstream National Park, a haven for a variety of species. (below)



exploiting ephemeral pools and even the vast dry plains and mountain ranges. For example, within one day of the first storm in nearly a year, I found eight species of dragonflies patrolling a creek in the hills behind Karratha. The stream had flowed for a few hours, leaving a series of pools which lasted no more than ten days.

On another occasion, Charlie Nicholson of the Department of Conservation and Environment encountered hundreds of dragonflies of three species along about three kilometres of the N.W. Coastal Highway between Whim Creek and Port Hedland. The insects were flying back and forth over spinifex growing on flat, dry, red, sandy plains.

At least in the Pilbara, there are close links between habitat requirements of larvae and the distribution of adults. Three groups can be recognised.

- Species with larvae that can live in temporary pools. Many of them are very common. They include some of the nomads which are found on hill tops and out in the spinifex.
- Species with larvae that need permanent water. They are usually found near pools that are suitable breeding sites. Being so restricted, they are vulnerable to changes of water quality and of adjacent vegetation.
- Species with larvae that only live in permanent running water. The adults never venture far from their breeding streams. Permanent streams are rare in the Pilbara, and all the dragonflies and damselflies in this group are endemic and rare.

Millstream

Millstream is unique. Here in the arid Pilbara is an extensive system of pools, springs, streams and dry creeks.

All of the Pilbara's 33 Odonatans are found at Millstream, and several of those that depend on running water are found nowhere else.

J. Taylor

This *Zyxomma elgneri* is elegantly camouflaged against the bark. This species flies only at dusk. (above)

C. Winfield

A female *Agriocnemis kunjina* posing as part of the vegetation. (right)

Xanthagrion erythroneurum. (below)

J. Taylor

Until last year, however, Millstream was the only source of the West Pilbara water supply (to Dampier, Karratha, Wickham, Pt. Samson and Cape Lambert). Pumping through a series of dry years from the aquifer at Millstream reduced the water level sufficiently to seriously deplete spring flows, threatening the habitat of the rarest of these insects and other inhabitants of the wetlands (many of which have not yet been studied).

C. Winfield

To ensure that these beautiful and rare insects are able to thrive, Conservation and Land Management Department officers, with the assistance of Dr Jan Taylor, have established a program to monitor the dragonflies and damselflies at Millstream, and the Water Authority of W.A. has installed bores and pumps to supplement the natural springs.

Last year the Harding Dam held water for the first time. Whenever possible, the dam will supply the water requirements of the coastal towns. This will help to take the pressure off Millstream, assuring the dragonflies a more secure future. It will also mean that there is a new, huge, permanent body of water. Early indications suggest that the dragonflies and damselflies are making full use of this new opportunity.

C. Winfield

Pseudagrion microcephalum. (top)

Orthetrum migratum. (left)

This *Crocothemis nigrifrons* looks like it would be at home on one of Monet's impressionistic lily ponds. (below)

C. Winfield

Landscope

Volume 2 No. 2
Summer Edition 1986/87

Contents **Page**

Published by the Department of Conservation and Land Management, 50 Hayman Road, Como, WA, 6152.

Executive Editor: Sweton Stewart
Editor: Liana Christensen
Designer: Trish Ryder

All Maps by Department of Conservation and Land Management Mapping Section.

Offset plates by Photolitho-PM

Printed in Western Australia by the Department of Services, State Printing Division, ISSN 0815-4465.

COVER PHOTO
A tender moment between human and whale shows the care which was a feature of the highly successful Augusta whale rescue.
Photo courtesy of the Western Mail.

A Conflict of Interests

Why are there so many conflicts when it comes to our natural environment? There is conflict among industrial groups exploiting natural resources; environmentalists advocating preservation of wildlife; government agencies; and recreation groups.

In an ideal world we would have a total understanding about ecosystems and natural resources, and of the long term needs of the community. But this is not an ideal world, and much of the conflict stems from a lack of agreement about environmental impact and human needs.

Take whale strandings for instance. From the time whales beach, tissue damage occurs due to a rise in body temperature and the sheer weight of the mammal. We don't know how long they have to lie there and how hot they have to get before the chances of survival are next to nil. Strandings may be part of a natural culling process or accidents caused by human impact on the environment. And, what about the people who turn out in large numbers under often adverse conditions, and become so emotionally caught up in saving these creatures? What weight do we put on their need?

It is not an ideal world. We are a long way from knowing the answers to too many important questions.

There is a need for more investigation, better communication and a broader understanding of environmental processes and human needs.

This brings us to *Landscope* and its purpose. Its prime objective is to achieve an understanding about conservation of ecosystems and management of natural resources.

Landscope's aim is to provide expert information on the major conservation issues, latest developments, research in progress and general features of the State's wildlife, national and marine parks, nature reserves and forests.

It will give a balanced representation of viewpoints and will not shy from contentious issues.

Landscope will inform readers about the natural wonders of our environment, the management considerations involved and the lifestyle of its inhabitants. It will not provide all the answers, but it will present the facts and therefore a basis for sound argument.

Landscope is Western Australia's own conservation and wildlife magazine.

Wetlands

The theme for this year's World Environment Day has been 'Wetlands — Not just for the Birds'. In this issue of *Landscope* we feature the ecological importance of wetlands.