



EXTINCTION IN PARADISE



The story of the Lord Howe Island
Stick Insect

By Patrick Honan

Every now and then an extraordinary insect happens along that reflects both the best and the worst of human influence. One such example is the Lord Howe Island Stick Insect (*Dryococelus australis*), perhaps the rarest insect in the world.

Lord Howe Island is a small island (9mi²) and World Heritage Area, halfway between Australia and New Zealand in the South Pacific. It has two mountains tall enough to be topped with cloud forest, whilst the rest of the island is covered with rainforest and palms. Lord Howe Island stick insects (LHISI), endemic to the island, grow to six inches long and are one of the world's heaviest stick insects. Both sexes are nocturnal and flightless, shiny and reddish-brown to black, and the males are armed with strong spines on the hind legs that give them a prehistoric appearance. They were once common on Lord Howe Island and belong to an ancient group that has given them the nickname "Jurassic insects."

TO EXTINCTION AND BACK

Settlers coexisted with LHISI on the island until 1918 when a supply ship ran aground and rats were released on Lord Howe Island. Within a few years the rats cleaned up not only the stick insects, but nearly a dozen species and subspecies of seabirds endemic to the island. At this stage the stick insect was declared 'presumed extinct,' but due to their large size, spectacular appearance and evolutionary significance, there was ongoing interest in the species and the hope that they may have survived somewhere.

In 2001, more than 80 years after they were last seen, the species was rediscovered surviving in the most precarious of situations on Ball's Pyramid.

BALL'S PYRAMID

Balls Pyramid, rising to a height of more than half a kilometre from the sea, is the largest sea stack in the world. Lying 14 miles away from Lord Howe Island, it has always been a Mecca for rock climbers from around the world. There is nowhere to land a boat on the pyramid and getting on and off can take up to two weeks either way, depending on the weather and sea conditions. There is no vegetation to speak of on the pyramid, except small groundcover plants and a small group of Melaleuca bushes. It is surrounded by very deep water, home to thousands of Galapagos sharks.

The pyramid had been scoured several times in the past for LHISIs. Dead specimens have turned up on two previous occasions in the 1960s, but their origin was unknown. They may have been transported from Lord Howe Island to be incorporated into nests by the thousands of seabirds that live on the pyramid.

In February 2001, the New South Wales National Park and Wildlife Service undertook an expedition to search for the stick insects and, to their surprise, they found three specimens living on a small group of Melaleucas on the side of a cliff. There is almost no soil on the pyramid and no water, and the bushes were growing in a very tenuous location on top of the only known water soak. It seemed possible that a severe storm could send the entire world's population of LHISIs off the cliff and into the sea.

INTO CAPTIVITY

In 2003, staff from Melbourne Zoo travelled to Ball's Pyramid to collect a pair of LHISIs for captive breeding. Rangers from the

Lord Howe Island Board climbed the cliffs at night in treacherous conditions. Seventeen stick insects were found on a few Melaleuca bushes. After descending the pyramid the next morning, two stick insects travelled to Melbourne, and by the same evening were set up in their new homes.

A few days after establishing itself in the facilities provided at Melbourne Zoo, the female, named Eve, began laying eggs, then went into a spiral of declining health and stopped feeding. Attempts were made to restore her health but over several days she deteriorated further. Nothing was known of the species' life history, so physical intervention was avoided because of the possibility of unforeseen side effects from any direct interference. X-rays and other diagnostic investigations were undertaken but nothing was obviously wrong.

She continued to decline and Melbourne Zoo vets launched a worldwide literature search and an appeal to professionals from around the world with experience treating sick stick insects. None was forthcoming and, as she appeared to be knocking on death's door, a liquid concoction of glucose, calcium and Melaleuca leaves was fed to her under a microscope, drop by drop, over several hours during the night. Within an hour after feeding she was up and walking around, apparently back to full health.

THE REBIRTH

On 7 September 2003, the first LHISI egg hatched into a small green nymph. This was the first time in at least 80 years that nymphs had been observed and the first time that their appearance and behaviour had been recorded.

LHISIs at Melbourne Zoo are being kept under temperature and humidity regimes as close as possible to those of Lord Howe Island where they feed on Melaleuca, tree lucerne, bramble and evergreen alder. The original pair were intensively studied for the first month after arrival but, as the species is nocturnal, observations are now largely limited to health checks and inferences of behaviour. The eggs are buried in sand by the female and the nymphs emerge after six to nine months. In order to collect as much data as possible, each egg is removed from the sand, weighed, measured and placed in a range of incubation media, under different moisture regimes.

In addition to their importance for conservation, LHISIs are

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a fascinating and challenging species to study. They are highly active and appear to be very aware of their environment. Their behaviour and locomotion is more similar to that of cockroaches than to other stick insect species. Males appear to be particularly aware of the presence and location of the females at all times, and demonstrate strong guarding behaviour when resting during the day. Behaviour varies significantly between adult pairs but intra-specific behaviour within pairs is remarkably consistent over time. Developmentally, first and second instar nymphs are bright green and diurnal, becoming darker brown then black, and nocturnal, as they mature.

THE GOOD NEWS

The population in captivity has increased over the last four years, despite numerous setbacks, and we had just passed the 700 mark. Many of them are now roaming freely in their own glasshouse at Melbourne Zoo, mixing genes and testing out new plant species.

They will remain in captivity until the rats can be eradicated from Lord Howe Island, and we are now in a position to pass live specimens on to other institutions to keep the population robust. Please contact us (invertebrates@zoo.org.au) if you are interested in receiving some, and we can forward you the husbandry manual. But be warned: they are not an easy species to keep; those that keep them will require considerable husbandry experience, particularly

with stick insects; they are strictly nocturnal as adults; and their range of food plants is limited. This species has also shown signs of inbreeding in captivity, so recipients must be willing to keep track of their lineage. As they are listed as critically endangered by the IUCN, private breeders are unable to receive them and an Ambassador Agreement is required between Melbourne Zoo, the Australian Government and the receiving zoo. However this, and the USDA permits, are fairly straightforward.

On Lord Howe Island, the New South Wales Department of Environment and Climate Change, in conjunction with the Lord Howe Island Board, is conducting studies to eradicate the rats. In August 2007, they administered 33,000 pounds of non-toxic, dye-laced baits to the island's rats, a test run for one of the world's most ambitious pest control programs. The full operation is scheduled for 2010.

It is pleasing to see an invertebrate species leading the way in a threat abatement program for the benefit of both the invertebrate and vertebrate species that have been affected by rats. Hopefully, in the next few years, the stick insects will be back on Lord Howe Island where they belong.

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