



# Using Rainforest Research

## Getting the *jump* on frog disease!!

May 2001

### Disease and Declining Frog Populations

There is no doubt that frogs generate intense interest in the Wet Tropics. While residents and visitors to the region gain great enjoyment from living in such close proximity to these delightful creatures, researchers, conservationists, veterinarians and micro-biologists grow increasingly concerned for their immediate and long-term future.

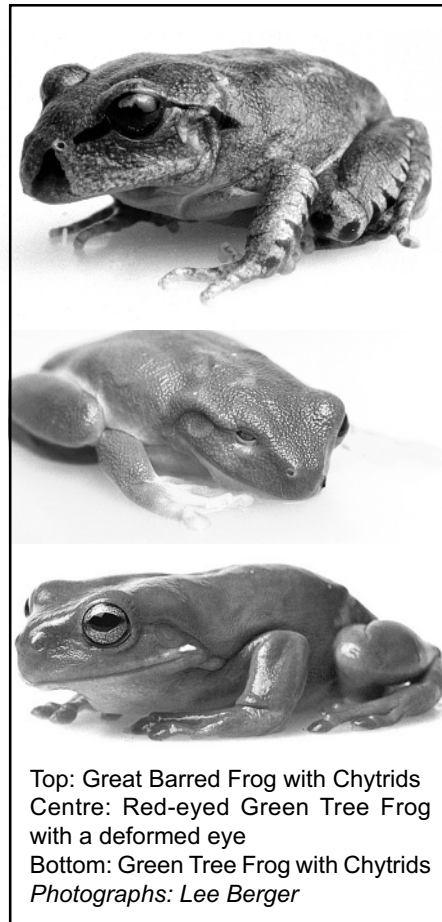
Such groups are acutely aware that amphibian populations have been steadily declining for more than a decade. Many species are now endangered, and some have disappeared completely. This disturbing trend applies not only in the Wet Tropics, but is occurring on a global scale.

A number of theories have been put forward to explain the phenomenon, including: habitat destruction, acid rain, fertilisers and pesticides, global warming and ozone depletion, the introduction of exotic predators and disease. It is clear however, that no one single causal factor can be isolated.

In a bioregion like the Wet Tropics, where humans and amphibians live in relatively close proximity and there is a high level of biodiversity among frogs, disease and the spread of infection among frog populations is a prime concern.

### Amphibian Disease Conference 2000

In order to address this particular issue, the Rainforest CRC organised an International Conference in Cairns in August 2000. A Workshop which followed was designed to develop strategies to lessen the impacts of known and emerging pathogens on wild amphibian populations. Specialists from the U.K., U.S.A., Spain, New Zealand, Germany, Uruguay, and



Top: Great Barred Frog with Chytrids  
Centre: Red-eyed Green Tree Frog with a deformed eye  
Bottom: Green Tree Frog with Chytrids  
Photographs: Lee Berger

Australia converged to consider options for effective control and management, and to devise strategies to minimise the risks of disease on wild amphibians at global, national, regional and local community levels. Delegates included policy-makers, laboratory and field scientists, veterinarians, commercial frog aquaculturalists, micro-biologists, representatives from frog interest groups, horticultural industries and the general public. The objectives of the conference were to:

- assemble experts with the most current information on amphibian pathogens and their effects, and
- promote and improve networking, information flow and exchange of ideas among people working on and with amphibian disease.

The aim of the Workshop was to develop a set of recommendations for government bodies, non-government organisations and individuals, which outlined actions that would lessen the risks of disease to wild amphibian populations.

### Which diseases cause the greatest concern?

Infectious diseases capable of causing declines of wild amphibians:

- are highly virulent
- affect more than one species
- affect the adult form only
- are associated with water, and
- persist once frogs have disappeared either in another host or in the environment itself.

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The Rainforest CRC is a research partnership involving the Commonwealth and Queensland State governments, the Wet Tropics Management Authority, the tourism industry, Aboriginal groups, CSIRO, James Cook University, Griffith University and The University of Queensland

During the Conference, two infectious agents fitting this profile were identified as being of greatest concern in relation to wild frog populations, particularly in Australia. These agents were the Chytridi fungus and Ranaviruses.

#### CHYTRIDIOMYCOSIS (The Frog Chytrid)

This disease is caused by the fungus *Batrachochytrium dendrobatidis* and is widespread in Australian frogs, cane toads and axolotyls. The spores of the fungus grow inside the outer layers of skin, resulting in a thickening of the epidermis and keratin. This pathogen is capable of causing high incidence of sickness and death in captive populations, and spores of the fungus are transmitted via water.

Obvious symptoms include:

- Abnormal posture - hind legs held out from flanks, animal does not right itself
- Abnormal behaviour - nocturnal animals in daylight, animal fails to flee or has seizure when handled
- Thickened epidermis, ulcerations on the skin and body swelling
- Death

Tadpoles do not display these symptoms, but carry the disease in their mouths when, during metamorphosis, the spores become redistributed to the skin of the body. This aspect is a great contributor to the spread of the disease.

#### RANAVIRUSES

Ranaviral disease in amphibians is caused by multiple species of closely related viruses of the *Ranavirus* genus. Some Ranaviral species can infect amphibians, reptiles and fish, but as yet there have been no documented epidemics in Australia. More obvious symptoms of raniviral disease in amphibians include:

**Tadpoles:** decreased activity, pinprick bleeding (*focal haemorrhages*), bloat (*ascites*) and death

**Metamorphs:** decreased activity, fluid buildup under the skin (*anasarca*), bloat (*ascites*) pinprick bleeding (*focal haemorrhages*) and death

**Adults:** decreased activity, ulcerations of the skin, pinprick bleeding (*focal haemorrhages*) and death.

**Strategies emerging from Workshop**  
Strategies which the Workshop identified to lessen the risks and control the impacts of disease included:

- Prevention of import of infected animals into disease free areas
- Limiting movement of all frogs between contaminated areas
- Implement protocols on handling wild amphibians
- Maintaining healthy frog environments
- Collection and preservation of genetic material

The complete draft recommendations are available on the web at:  
[www.jcu.edu.au/school/phtm/PHTM/frogs/adrec.htm](http://www.jcu.edu.au/school/phtm/PHTM/frogs/adrec.htm)

Within the Draft Recommendations proposals have been written to address the following issues:

- Movement of amphibians in farm produce - reduction at source and management at receiving end
- Movement of amphibians in other materials like soil and water
- Dealing with pathogens in the laboratory
- Decreasing the risk of disease in amphibian husbandry
- Reducing the spread of infection during field research

#### Community involvement imperative

The draft includes several suggestions that are designed to make the most of community interest and involvement, and to encourage and assist further community participation in:

- Disease surveillance - monitoring mortality levels, and collecting road kill samples
- Caring and nurturing - rehabilitation of frogs, repatriation, husbandry
- Population monitoring - densities, movements, reproductive activity and success
- Maintaining healthy amphibian habitats - protection, creation, environmentally friendly practices, surveillance for exotic amphibians
- Education - schools, public events and venues
- Support - moral, financial and political
- Promotion - media and other conservation groups

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