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# OBSERVATIONS ON SPECIES DIVERSITY AND HABITAT COMPARTMENTALIZATION OF THE FROGS OF MT. LEWIS RAINFORESTS, NORTH QUEENSLAND

Paper for presentation at the Workshop and Open Forum on the Past, Present and Future of Australian Rainforests, School of Australian Environmental Studies, Griffith University, Nathan, Queensland.

- Andrew Dennis and Michael Trenerry

## Abstract

Observations on species diversity, habitat partitioning and general ecology of a diverse anuran fauna of a high altitude tropical rainforest at Mt. Lewis are discussed. Fifteen species of frogs from three families (HYLIDAE, MYOBATRACHIDAE and MICHROHYLIDAE) occur in the study area along with the exotic Bufonid - Bufo marinus. A new unnamed Cophixalus spp. appears to be endemic to Mt. Lewis. Two other frogs, C. concinnus and Taudactylus rheophilus have been found only on Mr. Lewis and Thorntons Peak. Ten of the fifteen frogs found there are restricted to North Queensland. The native anurans exhibit a substantial degree of habit compartmentalization, a feature characterizing structurally diverse rainforest communities. Implications of such observations for the prediction of the effects of human disturbance on the frog fauna of Mt. Lewis are briefly considered.

## INTRODUCTION

Knowledge of the frog fauna of North Queensland rainforests is very recent and scant. New species are presently being described; it is probable that many others are yet to be discovered and little is known of the ecologies of those already named. Tropical rainforest ecosystems are complex, and this and other similar regions support anuran communities, which include a large number of endemics (Cogger 1979; Tyler 1979).

Related organisms which are sympatric are frequently observed to compartmentalize their wider habitat or behave differently within it so as to ensure some degree of segregation which prevents Gaussian exclusion (Gause 1934; MacArthur 1969; Lack 1971). While this is of intrinsic biological interest it constitutes an important framework which might be applied to an understanding of individual species and community conservation status. Observations of anuran behaviour and general biology in high altitude tropical rainforest, North Queensland, are discussed below within such a framework. These provide the basis for some suggestions regarding the conservation status and likely changes within the anuran communities with disturbance of their rainforest habitat. Mt. Lewis is one of the many areas of rainforest which are in the process of being extensively modified for timber production and other uses. While the observations discussed here are descriptive and qualitative, little else exists on which to base an understanding of such communities and the habitat which they share with often similarly obscure groups.

## The Study Area

Mt. Lewis is a part of the Great Dividing Range in North Queensland. It lies south of the Windsor Tableland and north of Mt. Frazer at south latitude 16°35' and east longitude 145°17', it is 65 kilometres north-west of Cairns. The forest type is classified by Webb and Tracey as Simple Notophyll Evergreen Vine Forest and Araucarian Notophyll Vine Forest. Among the major canopy and emergent trees are Alphitonia whitei, Araucaria bidwillii, Balanops australiana, Beilschmiedia bancroftii, Ceratopetalum succirrubrum and Endriana introrsa. The forest is structurally complex with conspicuous understoreys near stream lines and where the canopy is partly open, lianes and a great variety of epiphytes are present.

Mt. Lewis and the rainforest surrounding it is classified as state forest and is presently being logged for timber production. The logging operations have brought about changes in the environment which are detrimental to the anurans of the mountain.

Species Diversity

Twenty species of anurans are recorded for Mt. Lewis (excluding the exotic Bufo marinus). This includes representatives from all four native families of frogs. Most of them are present above 1000m altitude. Some such as Limnodynastes convexiusculus, Sphenophryne pluvialus, Rana daemeli, Litoria caerulea and L. fallax occur on the lower slopes of the mountain and are not found above 1000m. This elevation limit excludes one family and five species of frogs from the study area. The fifteen remaining which occur in the study area are listed in Table 1.

Eleven of the species listed are found only in North Queensland (Cogger 1983) and three of these have very limited distributions. These are Taudactylus rheophilus which is known only from its type locality and other creeks on Mt. Lewis and has recently been found on Thorntons Peak (McDonald pers. comm.), Cophixalus concinnus which was first found on Thorntons Peak but also occurs on Mt. Lewis, and an undescribed species of Cophixalus so far found only on Mr. Lewis. The two Cophixalus spp. seem to be sympatric and occur alongside each other within a small range above 1000m. Within this range they seem to displace C. ornatus to a great extent and only rare individuals will be found where C. concinnus and Cophixalus sp. nov. occur. They are found under rocks, logs and leaf litter and also make use of old cricket burrows and cracks in soil embankments. Cophixalus concinnus is a larger frog than the undescribed Cophixalus and his call is a short rattle whereas the other has a slow tapping call which starts off soft and very slow and increases in volume and speed before tapering off and stopping.

Habitat Partitioning

Because of the large number of different species of frog sharing this rainforest area the niches occupied by each species appear to overlap. On close observation, however, habitat occupation can be seen to vary. The species can be immediately divided into two main groups on the basis of habitat utilization.

Broadly these groups are:- Group (1) frogs which are associated with flowing water and always occur close by or within streams; and Group (2) which comprises frogs which inhabit the forest floor and trees away from creeks.

Group (1) includes Litoria nannotus, L. rheocolus, L. serrata, Taudactylus acutirostris and T. rheophilus.

Group (2) consists of the Micrhylids, Litoria chloris, L. infrafrenata, L. lesueri, L. nasuta, Limnodynastes peroni and Mixophyes shevilli. Although the frogs from group (2) may occasionally be found in or near creeks they are usually located away from flowing water.

The habitat compartments occupied by different species of frogs are illustrated in Figure 1 and Table 2. Although some overlaps occur one species is usually dominant in a particular compartment, however some exceptions have been recorded.

The adult frogs appear to minimise interspecific competition by a recognizable suite of behavioural and habitat utilization traits. Besides the obvious microhabitat differences some degree of dietary segregation may also exist. This cannot be discussed further as no stomach contents were examined in the present study.

Habitat segregation may also be noted in the larval stage. The frogs can be subdivided once more on the basis of breeding ecology. Three major groups can be discerned. These are:-

(A) permanent or flowing water breeders,
(B) temporary pond breeders and
(C) terrestrial breeders.

The frogs in Group (A) are Litoria nannotis, L. rheocolus, L. serrata, Taudactylus acutirostrus, T. rheophilus and Mixophyes schevilli. These are all frogs from Group (1) with the exception of Mixophyes schevilli (Group 2). Although not

present in the creek ecosystem M. schevilli are the dominant tadpoles observed in the creeks. The eggs of M. schevilli are laid on root masses overhanging the water. Single eggs of 6-7mm in diameter are found cemented in batches to the fine hairlike roots above water. Presumably, as with other members of the genus (Barker and Grigg 1977), the eggs remain in position until washed into the water by heavy rain. The tadpoles are large (110mm) and congregate in the deeper water holes and from here forage into the shallower areas.

Litoria nannotus possesses a morphology and behaviour specifically adapted to fast flowing water and waterfalls. Eggs and spawning habits are as yet unknown. Their tadpoles are well adapted for clinging to rocks in fast flowing water with flattened bodies, muscular tails and an oral disc covering approximately half the ventral surface.

The Taudactylus spp. lay their eggs in a relatively large jelly mass on the underside of rocks in flowing creeks, occasionally leaving half the clump exposed above the water surface. Their tadpoles share the shallows and other areas of slow moving water with the tadpoles of Litoria serrata and L. rheocolus. Litoria rheocolus is more actively breeding during and towards the end of winter (July, August, September) while the other frogs are still relatively inactive. This probably assists in the reduction of tadpole competition by temporal partitions of critical breeding habitat.

Temporary pond breeders seem to operate in a free-for-all type system. This is probably due to the transient but occasionally abundant nature of these breeding sites. The temporary ponds constitute the breeding habitat of Limnodynastes peroni, Litoria chloris, L. lesueuri, L. nasuta and L. infrafrenata.

The breeding habits of the microhylids are somewhat different and more obscure. These frogs lay their eggs on land and the froglets hatch having passed through the tadpole stage in the egg. There are four microhylids known to be present in tnis area. These are Sphenophryne fryi, Cophixalus ornatus, C. concinnus and Cophixalus sp. nov. Eggs are laid under rocks, logs and other fallen debris on moist soil. The species of Cophixalus, which have greater climbing ability, have been observed to lay eggs in abandoned cricket burrows on steep soil embankments. One female Sphenophryne fryi who had been observed for three years under the same rock was first found with a clutch of eleven eggs. Disturbance invoked a conspicuous protective response whereby the female straddled the eggs and remained motionless. A subsequent check some two months later revealed the female present but without any trace of the clutch. A thorough search was made of the surrounding area and among leaf litter but no young frogs were observed.

Consideration of the Effects of Human Disturbance.

The area extending from the western and northern edge of Mt. Danbulla across to the coast on the northern edge of Black Mountain, north along the coast to Alexandra Bay, west on the southern side of the Daintree river and south including the entire Windsor Tablelands, Carbine Tablelands, Mt.Lewis and Mt. Frazer is listed as Area 5 of the Department of Forestries Crown Sawlog Supply Areas North Queensland. This area is serviced by the unrestricted sawmill licence number 76 stationed at Mt. Molloy, south of Mts Frazer. Logging prior to 1981 had been concentrated in Areas 1, 2, 3 and 4 of the Crown Sawlog Supply Areas which run south along the Great Divide to Halifax Bay north-west of Townsville. These areas have been logged extensively and it is no longer economically sound to continue logging them (Department of Forestry Queensland 1981). This has brought pressure to bear on remaining areas. Forestry activities on the Mt. Lewis area are presently being intensified. Old logging roads are being reopened and cement causeways are being built throughout the area.

Any form of clearing and opening of the canopy changes the light availability which allows animals previously excluded from rainforests to penetrate and live successfully within them. These invaders which include various snakes such as Pseudechis australia and Oxyuranus scutelatus (Heinsohn and Valentine 1981) and the exotic cane toad Bufo marinus move into rainforests from the surrounding sclerophyll forest thus intensifying predatory and competitive pressure on the anuran community. Although these changes in forest structure may favour some species such as Litoria

nasuta and Limnodynastes peroni which are very successful and widespread frogs, the majority will be disadvantaged. The frogs belonging to Group (1) will also suffer a greater loss of tadpole numbers due to the disruption of creeks. The building of snigging tracks and subsequent erosion of these and heavily logged areas causes a great deal of siltation of the creeks. This kills off algal growth and reduces available food for tadpoles.

The endemic species and others with very limited distributions are the most threatened. Because of their limited distributions any amount of habitat destruction, modification or increased predation will put them under threat of extinction. Certainly numbers will decline as Bufo marinus establishes itself.

Taking into consideration the general observations it seems a good policy to conduct further and more detailed studies on the area and stop destructive operations such as logging at least until more information can be gathered regarding the poorly known anuran communities of such rainforests.

ACKNOWLEDGEMENTS

We would like to thank Garry Werren for his assistance and editing of this paper.

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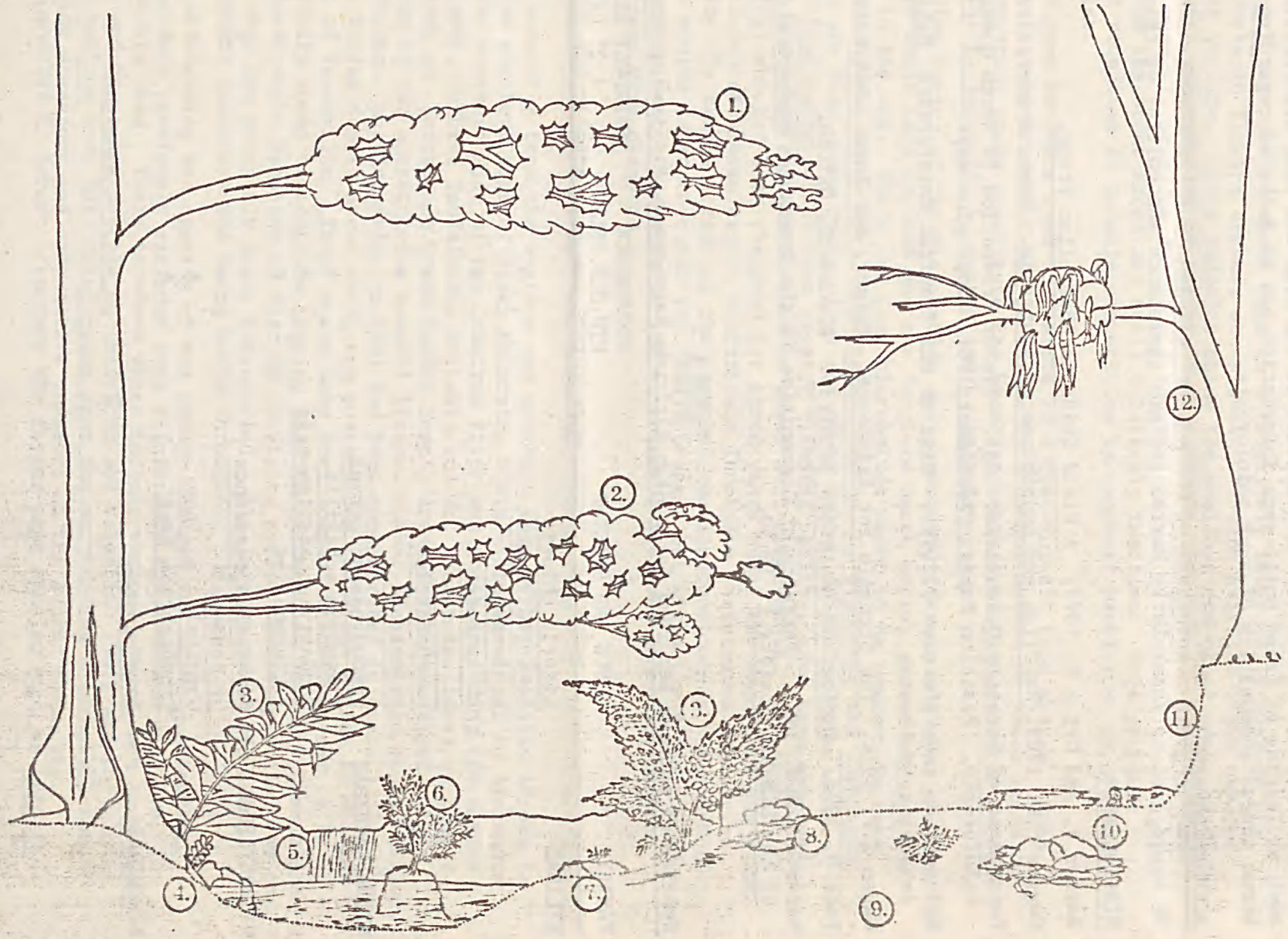
TABLE 1

Species of Anurans Recorded for a High Altitude Rainforest, Mt. Lewis, Nth. Q'land

| FAMILY | GENUS AND SPECIES | OCCURRENCE NTH.QLD.ONLY | NARROWLY RESTRICTED ( 2° LAT) |
|---|---|---|---|
| HYLIDAE | Litoria chloris | | |
| | L. infrafrenata | * | |
| | L. lesueuri | | |
| | L. nannotus | * | |
| | L. nasuta | | |
| | L. rheocholus | * | |
| | L. serrata | * | |
| MYOBATRACHIDAE | Limnodynastes peroni | | |
| | Mixophyes schevilli | * | |
| | Taudactylus acutirostris | * | |
| | T. rheophilus | * | * |
| MICROHYLIDAE | Cophixalus concinnus | * | * |
| | C. ornatus | * | |
| | Cophixalus sp. nov. | * | * |
| | Sphenophryne fryi | * | * |
| BUFONIDAE | Bufo marinus | | |

(Over)

Figure 1.
Habitat Compartments.
(To be read in conjunction with Table 2.)




Key

1. Lower storey canopy branches above five metres
2. Low branches and saplings overhanging the creek two-three metres
3. Creekside vegetation 1-2 metres high.
4. Jumbled moss covered rocks near waters edge or centrally located in creek.
5. Fast flowing water and waterfalls.
6. Layer of low ferns and other plants overhanging water.
7. Sandy banks strewn with branches and rocks.
8. Rocks and logs in or near seepage lines usually near main creek.
9. Open leaf litter.
10. Rocks and logs on forest floor.
11. Abandoned cricket holes and similar holes in steep soil embankments.
12. Cracks in bark and branch joints low on trees and shrubs.

TABLE 2

Habitat Compartmentalization of Anurans in a High Altitude Rainforest Study Area, Mt. Lewis, North Queensland
(Refers to Figure 1)

| No. | Habitat Compartment Description | Species | Occurrence in Compartment | Other Observations/Comments |
|---|---|---|---|---|
| 1. | Lower storey canopy branches above five metres | *Litoria chloris* | sparse | This habitat compartment is shared by *L. chloris* and *L. infrafrenata*. |
| | | *Litoria infrafrenata* | sparse | *L. chloris* would probably remain at lower levels and travel shorter distances than *L. infrafrenata*. |
| 2. | Low branches and saplings over-hanging creek, two-three metres. | *Litoria serrata* | Abundant | Used by *L.serrata* for calling feeding and sleeping. |
| | | *Litoria reocholus* | Rare | *L.reocholus* is only found in these areas on rare occasions as its main area of activity is closer to the watercourse. |
| 3. | Creekside vegetation one - two metres high. | *Litoria serrata* | Abundant | This and area 2. constitute the main habitat compartment used by *L.serrata* This species is rarely seen elsewhere. |
| | | *Litoria reocholus* | Occasional | *L.reocholus* can be found in this area occasionally and is usually in the lower parts closest to the water whereas *L.serrata* remains further back at higher levels. |
| | | *Litoria nannotus* | Rare | If infact *L.nannotus* does occur here it is invariably close to fast flowing water. |
| 4. | Jumbled moss covered rocks near waters edge or centrally located in creek. | *Taudactylus acutirostrus* | Abundant | *T.acutirostrus* is most common in this habitat compartment.This genus is diurnal. |
| | | *Taudactylus reophylus* | Moderate | *T.reophylus* is also moderately common here but remains slightly more hidden and less bold. |
| | | *Litoria reocholus* | Moderate (Sleeping only) | This is where *L.reocholus* usually spends its daylight hours half or fully submerged among these rocks. |

Table 2 (cont.)

| No. | Habitat Compartment Description | Species | Occurance in Compartment | Other Observations/ Comments |
|---|---|---|---|---|
| 5. | Fast flowing water and waterfalls | *Litoria nannotus* | Abundant | *L.nannotus* has the monopoly on this area and is active here by night as well as taking refuge in rock crevices under waterfalls or beside them. |
| 6. | Layer of low ferns and other plants overhanging water. | *Litoria reocholus* | Abundant | This is a *L.reocholus* stronghold and is shared only by the occasional *L.serrata* and a few sleeping *Taudactylus acutirostis*. |
| | | *Litoria serrata* | Rare | |
| | | *Taudactylus acutirostris* | Moderate (sleeping only) | |
| 7. | Sandy banks stewn with branches logs. | *Taudactylus acutirostris* | Moderate | The two *Taudactylus* spp may be found foraging in these areas and *T.reophilus* can be found sleeping under the vegetation detritus by night. |
| | | *Taudactylus reophilus* | Moderate | |
| | | *Litoria reocholus* | Occasional (sleeping only) | *Litoria reocholus* may be observed sleeping in this area by day. |
| 8. | Rocks and logs in or near seepage lines usually near main creek. | *Taudactylus reophilus* | Abundant | This is were *T.reophilus* is commonly located. |
| | | *Taudactylus acutirostris* | Rare | Only few *T.acutirostris* stray into these areas. |
| | | *Litoria reocholus* | Rare | *Litoria reocholus* is occasionally found sleeping here. |
| 9. | Open leaf litter. | *Mixophyes schevilli* | Abundant | *Mixophyes schevilli* is the dominant inhabitant of this compartment and is usually fairly near creeks.This species quite often calls from an underground position 2.5 to 5 cm under. |

Table 2 (cont.)

| No. | Habitat Compartment Description | Species | Occurrence in Compartment | Other Observations/Comments |
|---|---|---|---|---|
| 9. cont. | Open leaf litter | *Litoria lesueuri* | Moderate | *Litoria lesueuri* and *L.nasuta* share this habitat too. *Litoria lesueuri* remains further from creeks and is less abundant than |
| | | *Litoria nasuta* | Occasional | *Litoria nasuta* usually innabit the more open areas - e.g. canopy gaps, roadsides and clearings. |
| | | *Limnodynastes peroni* | Rare | *Limnodynastes peroni* is only occasionally found on the mountain at this altitude and when it is it is usually near ponds on open leaf litter. |
| 10. | Rocks and logs on forest floor. | *Sphenophryne fryi* | Moderate | *Sphenophryne fryi* establishes itself under a rock or log and seldom leaves a favoured position. One female *S. fryi* was observed for three years living under the same rock in the same cavity. |
| | | *Cophixalus* sp.nov.<br>*Cophixalus Concinnus* | Moderate<br>Moderate | *Cophixalus* sp.nov. and *C. concinnus* have similar habits to *Sphenophryne fryi* and also use compartment 11. |
| | | *Cophixalus ornatus* | Occasional | *C.ornatus* prefers area 11, but uses this one as well. |
| 11. | Abandoned cricket holes and similar holes in steep soil embankments. | *Cophixalus ornatus* | Moderate | This compartment is used regularly by *C.ornatus* and is probably where it is most often found on Mt. Lewis. |
| | | *Cophixalus* sp.nov.<br>*Cophixalus Concinnus* | Occasional<br>Occasional | *Cophixalus* sp.nov. and *C. concinnus* also use these holes but to a lesser degree. |
| 12. | Cracks in bark or branch joints low on trees and shrubs. | *Cophixalus ornatus* | Occasional | *Cophixalus ornatus* is occasionally found calling from this position and probably makes use of elkhorns and other epiphytes. |

# THE SPIDER AND THE ANT

by Alan Williamson

Australia has thourands of species of spiders. Although many of these have been recorded by science, some aspects of their life cycle and habits remain a mystery. Over a period of eight months I recorded this account of two species of spiders which have the superficial appearance of the Northern Green Tree Ant Cacophylla virescens, the insect upon which they also feed.

The first species Amyciaea albomaculata belongs to the family THOMASIDAE. This group of spiders do not make webs but rely on ambush and camouflage to capture their prey. To find these tiny creatures, an adult measuring a mere 1cm in length, I simply went out into my own back yard.

During the hours of darkness this spider can be observed literally hanging around from the underside of the branches and leaves of shrubs and trees. It has been generally accepted that the ant is lured to this hanging spider then attempts to climb down the strands of web by which the spider is hanging and, in doing so, becomes a meal.

Observations at night revealed some spiders feeding on ants while others were simply hanging about apparently waiting for an ant to come along. The belief that the spider without a meal would eventually attract one was never substantiated during the eight months of constant observations. However, other interesting facts came to light.

One spicer taken into captivity produced an egg sack. By curling over the two edges of a leaf a tunnel was formed and the spider remained in there for about twenty-one days after which some young came forth. The small size of the young led to other questions such as, what did they feed on, for the green ant is a formidable foe whose jaws are an awesome weapon to any creature about its own size. Many a gardener can vouch for this also.

During the daylight hours the spider generally hides under leaves or sits quietly a branch. Late afternoon observations were to finally reveal the method this spider used to capture its prey. Some spiders it was noted seemed to be in a hyperactive mood, moving along the branches in short dashes, stopping regularly about every 30mm and waving their first pair of legs above their heads, giving the general appearance of the antennae of the ant. Also, approaching this spider from the rear reveals two black dots on the abdomen which look like ant's eyes.

The spider trails a drag line wherever it goes, using it for emergency exits from the branch in times of danger when too many ants are too close for comfort. However by moving cautiously it can generally avoid all but a fleeting contact with the numerous ants. As each ant approaches from either direction the spider side-steps letting the ant pass. Completely unaware of the spider's true identity, the ant fails to recognise the potential danger. Like an African leopard selecting its prey, the spider moves in for the kill, attacking the unsuspecting ant from behind. Pouncing upon its back the spider's fangs bite deep. Immediately the spider springs back from its victim avoiding the ant's jaws. The venom of the spider takes effect almost instantaneously, rendering the ant apparently lifeless. With no time to waste for fear of other ants, the spider immediately seizes its victim and drags it to the edge of the branch or leaf and, with the setting of the sun and approach of darkness, takes up a safe hanging position beneath.

A photograph taken of a spider feeding led to the discovery of tiny flies

feeding on the carcase of the unfortunate ant as it hung from the jaws of the spider. Further observations have revealed that this is in fact a common occurrence and that at least two species of flies are involved. When the spider makes its kill, like tiny vultures the flies queue up for the opportunity of a free feed. When the flies become too forward the spider uses its front legs to literally brush them off the prey. The flies are very persistent as flies usually are, and eventually get their fill.

Juvenile spiders were often observed hanging around at night, but only those half grown to the full adult size were ever found with an ant. The smaller ones apparently ate nothing. Eventually with the aid of a magnifying glass the puzzle was solved. The juvenile spider was found to be feeding on a tiny ant of the Formicidae family, so small that the adult would barely measure 1mm. This tiny ant is significant for without its presence the juvenile spider would be unable to reach the size necessary to take on the larger green ant.

Having repeatedly documented the antics described, attention was turned to a second species of spider. Although known to science this spider is still an undescribed species of the Theridiidae family. With dots on its abdomen looking like eyes and a similar colour to the green ant, it is often observed busily at work constructing a strange arrangement of webbing which is in fact a spring-loaded trap. It would zoom in and place a strand of silk at one position on a branch or leaf then move right away in the opposite direction to find another anchor point.

Eventually several strands of silk are placed within a small circle of about 1cm, radiating out in several directions with other threads criss-crossing in any direction that an anchor point could be located. At the point where several strands of silk are placed in a small circle, the spider returns to bind them together to form a large blob. The spider often sets up this arrangement in clear view of green ants as they stream along a branch and it is not too long before an audience is gathered at the construction site. Sometimes the spider is forced to postpone the completion of her trap due to the congestion of green ants at that spot. The ants appear to be intimidated by the spider intruding on their territory and take up the strands of web in their jaws.

At this point, if the web has reached the completion stage, the ant holding the blob of silk is literally catapulted out to the waiting spider sitting in the constructed catchment area. The spider cautiously approaches the bewildered ant as it hangs there still holding the blob of silk in its jaws, and begins to wrap its victim more securely.

Having captured its prey the spider sometimes has to defend itself against another of its own species attempting to steal its meal. On one occasion an adult specimen was seen to steal the prey from a smaller juvenile by driving off the smaller spider, then scooping up the ant with one rear leg and towing it away.

Sometimes this spider places her egg sac, which is a sphere, only a few centimetres from a green ants' nest. When the young are born they are an orange colour and their mother stays with them for a day or two. After this time they all disperse and the occasional small orange spider is found feeding on a much larger ant which has been ensnared by its web.

As individuals these two species of spiders do not seemingly have much impact on the ant population as they would only take, at most, one ant per night. However, collectively, along with other species they help to provide a balance inconceived by most of us

----oOo----

## RED-WINGED PARROT ON THE COAST NEAR CAIRNS

by Ian and Robyn Cowan

On Sunday 12th February 1984 a pair of red-winged parrots Aprosmictus erythropterus were observed feeding in a Grevillea banksii at the rear of our home in suburban Yorkeys Knob. The male was noticed first at about 11.00 a.m. and was joined a few minutes later by the female. Both then remained in the shrub for about thirty minutes before being disturbed by a neighbour starting a lawnmower. During this time we had good views of both birds, had written down a description of each and consulted the illustration in Forshaw and Cooper's "Parrots of the World".

On Monday 21st February 1984 at about 6.30 a.m. a male bird was again seen in the same shrub for several minutes. The female did not appear but could be heard calling to her mate from a nearby tree.

Whilst the species is relatively common in the drier country to the north and west of Cairns, this is my first record for the wet coast and, from speaking to other local bird watchers, it would appear that coastal records are rare for this species. The reappearance after nine days indicates that the pair may have been resident in the area, at least in the short term.

----oOo----

## EDEN

Where people may be startled by
a dazzling flash of blue -
no peacock, but Ulysses flapping by
on butterfly-bright wings!

Where quaint and individualistic
flowers from arid places
blend their charm with local natives
like the "cocky apple" tree,
whose fragile powder puffs drift down
from dancing branches;

Where petite and inconspicuous
honeyeaters work like bees
to feed their young, hung high in swaying nests;

Where melaleuca blooms, like incense,
hypnotize the lorikeets - and people, too!

Where water birds and waders spend dry-season months;
a coastal holiday for inland dwellers.
Like icing flowers piped on a wedding cake,
the lake is decorated with large, regal blooms;
and water-lily leaves are landing pads
where dragonflies may rest;

Where peace envelops me and troubles vaporize -
this is EDEN - the Cairns Centerary Lakes!

- Sybil Kimmins.

NOTES - Will those members whose subscriptions due last September are still outstanding please rectify the oversight. Fees are shown on the front cover.

Our Club welcomes small scientific papers and members' original observations for inclusion in this Journal.

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