

according to specifications presented by Moses, and trained the artificers and volunteers whom God endowed to do the work. Nothing was left to chance, and nothing was skimped, to make a sanctuary worthy of the worship of the God of heaven by His chosen people on earth. The details and the significance of it all would make a study in themselves beyond the scope of this series. Suffice it to say here that the work was completed in less than six working months, and the tabernacle was ready to be assembled on the first day of the first month of the second year of the Exodus from Egypt.

All in all, the tabernacle represented a magnificent concerted effort to the glory of God, both in the liberality of the offerings that were more than enough for the work that had to be done, and in the specialist skills that were needed. Under Bezaleel, the inspired craftsman, the major works, from the casting of the brazen laver made from the copper mirrors supplied by the women (and what a number of them that required!) to the carpentry overlaid with gold that both men and women had contributed from their ornaments, were fashioned to perfection beneath the watchful eye of Moses

as he faithfully carried out Yahweh's instructions. "The Israelites had done all the work just as the LORD had commanded Moses", and when Moses inspected it, he "blessed them" (Ex. 39:42,43).

So, when the great day arrived for setting up the tabernacle ready for the ministrations to begin, it was Moses again who, under the guidance of God, arranged it all, with every item in its prescribed and proper place. Although the occasion must undoubtedly have filled this humble man with great satisfaction, especially after all the tribulation his people had brought upon him in the preceding days, he quietly withdrew when the work was finished, and watched while the cloud of Yahweh's presence covered the tent of meeting and the glory of the Lord filled the tabernacle. That cloud and that glory were to guide the children of Israel in all their journeys: "whenever the cloud lifted from above the tabernacle, they would set out; but if the cloud did not lift, they did not set out—until the day it lifted. So the cloud of the LORD was over the tabernacle by day, and fire was in the cloud by night, in the sight of all the house of Israel during all their travels" (40:36-38).

(To be continued)

# The cunning hunters of the rainforest

David Burges

**T**HE GREAT CREATOR has exercised His design skills to fill every type of habitat on earth with a range of living things that form an interconnected web of life. Thus many plants growing in the poor soils of the world's rainforests employ unique strategies to supplement their supply of nutrients by trapping and digesting insects. Among these are around 100 species of *Nepenthes* pitcher plants, which employ fluid-filled cavities as insect traps. Many naturalists in the eighteenth century were unwilling to believe that carnivorous plants could even exist, but now we are probably all familiar with such insect-eating plants as the venus flytrap and the sundew with their sophisticated mechanisms for ensnaring their prey. Pitcher plants, in contrast, until recently were considered to have only the

crude method of drowning their unsuspecting visitors in a passive pitfall trap.

## Unsuspected complexities

Pitcher plants have been studied for many years, but mostly with herbarium specimens or plants in greenhouses. New research in the forests of Borneo, using high-speed video cameras, has demonstrated that the plants are far more active and devious in capturing and digesting their prey than anyone suspected.<sup>1</sup>

In *Nepenthes*, the pitchers are borne at the end of tendrils that extend from the midrib of

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1. Stephanie Pain, "Gotcha!", *New Scientist*, 7 Jun. 2008, p. 34.



**Pitcher plant in the Tropical House,  
Birmingham Botanic Gardens.**

an otherwise normal leaf. The plants themselves are often climbers, although others are epiphytes, growing on trees. The pitchers vary greatly in size and shape, from finger-sized tubes to three-litre jugs, but all share a common pattern (see [diagram](#) opposite). Nectar-producing glands beneath the lid and the inner edge of the rim are designed to lure insects inside. The upper walls of the receptacle are smooth and waxy, whilst further down, the surface is studded with glands that secrete digestive enzymes, which help break down the bodies of the trapped insects.

Laboratory studies have shown that insects are unable to grip the waxy surface because of minute crystals that break off on contact. Neither ants nor flies can cross the zone, and they fall into the fluid below. However, some insects fall without reaching this layer, and scientists from the University of Cambridge suspected that other factors were involved, hence the new field studies in Borneo. They had little success in observing insects falling into the traps until, fortuitously returning to the plants after a tropical downpour, they were astonished to see every ant that stepped onto the pitcher's rim slide helplessly into the pitfall. The rim appeared to be glossy and wet, in contrast to

normal plant surfaces, which repel water so that it forms beads that roll off. Close examination has revealed microscopic ridges running across the rim, which increase its wettability. The plant thus has two complementary mechanisms for delivering prey to the trap.

But that is not the end of the pitcher plant's secrets. French scientists have been investigating the nature of the fluid in the trap itself, again in wild specimens in the rainforest. They noticed that it was slimy to the touch and formed stringy filaments when rubbed between the fingers. Insects which fell onto the fluid did not float, as they can do on water, but quickly became wet and sank. Careful observation of high-speed video footage showed that, whereas flies and ants can easily escape from water, not a single insect could escape the pitcher fluid. Its behaviour was like that of complex liquids containing long-chain polymers, which become stickier the more they are agitated. The more the insects struggle the tighter they are held by the elastic forces of the fluid. And the fluid retains its effect even when highly diluted by rain, which is another significant advantage in the forest habitat.

### **Subtle strategies**

What was initially thought to be simply a passive pitfall has turned out to be part of a subtle and sophisticated trapping mechanism, with several complementary components. And the latest research has shown another level of sophistication. Round-the-clock monitoring of plants in the rainforest has shown that there is a daily cycle of the wetness of the rim, regardless of rainfall, with the most effective trapping period being from late evening to early morning. This has been found to correspond to the maximum release of nectar, and the nectar has now been shown to be hygroscopic, attracting moisture from the air. Thus *Nepenthes* is able to regulate the degree of wetting by adjusting its secretion of nectar, a novel function for nectar.

It now seems that the trapping system works only intermittently, and this may well take advantage of the habits of ants, the main prey species. These send out scouts to find sources of nectar. A lone scout finding a wet pitcher would die, but one finding a dry rim could return later bringing many worker ants, potentially providing a feast for the pitcher plant!

Naturally the scientists attribute all of these features to evolution, without explaining how all of these remarkable mechanisms, particularly

the biochemical complexity of the nectar and enzyme-producing glands, actually arose in order to all work together. The pitcher structure, with its wettable rim, the nectar glands, the waxy walls, the elastic fluid, the enzyme-producing glands and the timing cycle all contribute to the overall success of the trapping mechanism. Is there not here clear evidence of conscious planning and design by the Creator? It is quite possible that naturally occurring variations have led to the variety of sizes and colours within the *Nepenthes* genus, but the consistent design features testify to the wisdom and forethought of God Himself. "Then God said, 'Let the earth bring forth grass, the herb that yields seed, and the fruit tree that yields fruit according to its kind . . .'; and it was so" (Gen. 1:11, NKJV).



**Lid:** Nectar glands attract prey

**Pitcher:** Develops at tip of leaf and hangs from long leaf stalk

**Rim:** Nectar glands on inner edge lure prey in

**Waxy zone:** denies insects a foothold to escape

**Digestive fluid:** entraps struggling insects; enzymes break down soft tissues

**Intermittent action:** gives element of surprise

## The census of Luke 2

Philip Russell

*The accuracy of Luke's reference to the census which brought about the birth of Jesus in Bethlehem has been called into question, but careful investigation shows it to be consistent with secular history and the situation of those times.*

**T**HE OPENING chapters of Luke's Gospel provide us with a lot of information about the birth of our Lord and what authority Luke had. In his skilfully constructed record he provides unique details.

Neither Mark nor John mentions where Jesus was born. Mark 1:9 says: "Jesus came from Nazareth of Galilee, and was baptized of John in Jordan". In John 1:45 Philip speaks of him as "Jesus of Nazareth, the son of Joseph", and in Acts 10:38 Peter refers to "Jesus of Nazareth". These expressions obviously do not imply that Mark, John, or the author of Acts, considered Nazareth

to be the place of Jesus' birth. They merely show that Nazareth was universally considered to be the abode of his parents, the place which had been his home, coming from which he had appeared before the world. Similarly, the expression "son of Joseph" used

by Philip in John 1:45 cannot be taken as indicating John's own opinion, but merely as showing the current belief.

Now Matthew and Luke agree that Jesus was born in Bethlehem. Matthew 2:6 points out that his birth in this place was the fulfilment of the prophecy that the ruler of Israel was to be born there. Yet they are also fully aware that Jesus was considered by the world to be a native of Nazareth, and that he had been brought up from infancy in that city; in fact, Matthew 2:23 presents the upbringing at Nazareth as the fulfilment of another prophecy.