"There is no doubt that had it not been, in the providence of God, for the labours of Paul in the face of Judaistic antagonisms, Christianity would have been strangled at birth" (p. 148);

"And here again, in human terms, can be seen the greatness of the Apostle Paul in that, while his own race were persecuting him, he was able to say, 'I could wish myself accursed from Christ for my brethren, my kinsmen according to the flesh . . . who are Israelites . . . And of whom, as concerning the flesh Christ came', but who, in judging themselves unworthy of everlasting life, were making him turn all the more to the Gentiles".

Brother Mitchell is to be thanked for his faithful labours. His book is highly recommended to all who wish to be able to say, like the Apostle Paul, "I have fought a good fight, I have finished my course, I have kept the faith", because they love the appearing of their Lord, the righteous judge (2 Tim. 4:7,8).

"Go to the ant . . . consider her ways"!

David Burges

THE WAYS of the creatures of the insect kingdom are an endless source of fascination and wonder, long ago noticed by that proficient naturalist, Solomon.[1] His words of exhortation concerning the ant anticipate in a remarkable way modern scientific understanding of ants' behaviour and social organisation:

"Go to the ant, you sluggard!
Consider her ways and be wise,
Which, having no captain,
Overseer or ruler,
Provides her supplies in the summer,
And gathers her food in the harvest"
(Prov. 6:6-8, NKJV).

The fungus gardeners

One fascinating group of these creatures is the leafcutter ants, which are social insects found in the tropical forests of Central and South America and the southern states of the USA. They live in huge underground colonies made up of hundreds of different chambers. Each colony is generated by a single queen and may contain as many as eight million ants. Recent research has revealed some of the extraordinary and complex behaviours the ants use to cultivate their food, a unique fungus, and to protect it from disease and moulds.[2]

The worker ants travel in long lines far into the forest in search of leaves, leaving a scent trail so they can find their way back to the nest. They use their sharp mandibles to cut half-moon-shaped sections of leaves from plants, and then carry them over their backs. A leafcutter ant can carry almost ten times its own weight, an extraordinary feat of strength. The ants consume up to a fifth of all forest vegetation in the areas where they are found, and can be a serious pest.

The leaf pieces are carried back to the underground nests, where the leaves are chewed into a pulp. The ants do not eat the leaves; instead they make compost heaps in order to grow a particular type of fungus, which is unique to leafcutter ant nests. The ants then eat the fungus, and feed it to their young. The fungus is grown in football-sized chambers inside the nest. There can be 300 or more of these chambers within the nest, and all of the earthworks to build them might involve the removal of several tons of earth during the lifetime of the nest.

A complex society

There are several different types of leafcutter ants within the colony, each of which has a specialised role in its successful operation. Solomon noted that the ants are female ("Consider *her* ways"[3]), and indeed, all of the worker ants which grow and maintain the gardens are sterile females. The much smaller numbers of winged males and queens swarm in summer in order to mate, and the fertilised queens seek sites to found new colonies.

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1. "He [Solomon] described plant life, from the cedar of Lebanon to the hyssop that grows out of walls. He also taught about animals and birds, reptiles and fish" (1 Kgs. 4:33, NIV).
2. "Why ants make great gardeners", BBC On-line News, 18 Mar. 2004; http://news.bbc.co.uk/1/hi/sci/tech/3499842.stm .
3. The Hebrew noun *nemalah*, 'ant', is feminine in gender.

Leafcutter ants
(© iStockphoto.com/Michael Silverman)

The workers are divided into four groups, or castes,[4] based mostly upon size, which perform different functions:

- The smallest workers (known as minims) tend to the growing brood or care for the fungus gardens. Head width is less than one millimetre.
- Slightly larger workers (minors) are present in large numbers in and around foraging columns. These ants are the first line of defence and continuously patrol the surrounding terrain. They vigorously attack any enemies that threaten the foraging lines. Head width is around 1.8 to 2.2 millimetres.
- The principal foraging ants (mediae), of intermediate size, cut and transport the leaf sections back to the nest.
- The largest ants are the soldiers (or majors), which defend the nest from intruders. There is recent evidence that they also participate in other activities, such as clearing the main foraging trails of large debris and carrying bulky items back to the nest. The largest soldiers may have body lengths up to sixteen millimetres and head widths of seven millimetres.

But even among these groups there are different specialised roles that are allocated to ensure the safety of the colony. Since the garden is a monoculture, with only a single species of fungus, it is extremely vulnerable to attack from disease or pests. Consequently the ants use various techniques to protect their precious food supply. The first is weeding, in which infected parts are removed to a dump, and a second is 'fungus grooming', in which the fungus is actually cleaned by the ants.

Researchers found that when they deliberately sprayed infective micro-organisms into nests, the ants became extremely active, and within seventy-two hours almost all traces of the infection had been removed. Amazingly, the ants also culture a bacterium on their bodies that produces natural antibiotics to suppress the micro-organisms that can infect the fungus garden. As a further precaution, leaves from any one tree are only taken to part of the nest, rather than being distributed throughout the nest. This prevents a widespread disaster if the leaves turn out to be infected, or toxic to the fungus.

All waste material removed from the garden, including dead ants and degraded fungus, is taken to a special chamber located nearby, where worker ants constantly turn it over to degrade the material as fast as possible. These ants are themselves a source of possible infection for the colony, and so are not allowed back into the nest, and are attacked if they try to enter it. Scientists are impressed by the high standards of hygiene and cleanliness that are maintained in the nest in order to guard against infections, which could potentially destroy the entire colony.

"Having no . . . overseer"

Amazingly, as Solomon observed, the ants have no overseer or director of operations to detail the various groups of ants to their particular tasks. Every ant seems to know instinctively what its function is, and fulfils that function vigorously

4. Wikipedia entry at http://en.wikipedia.org/wiki/Leafcutter_ant.

without being policed. No doubt an array of chemical messengers (known as 'pheromones') are at work to stimulate the appropriate behaviours, but it still remains well nigh miraculous that such a complex society can function without continuous supervision.

Some scientists have speculated that understanding the social organisation of such creatures as the leafcutter ant could have valuable lessons for organising complex human activities such as factory production systems. In fact, of course, the ultimate supervisor of the ants is the Creator Who designed and made their complex, interconnected life systems, and all humans would undoubtedly benefit from imitating their unswerving adherence to His laws, as proclaimed in His Word:

"There are four things which are little
on the earth,
But they are exceedingly wise:
The ants are a people not strong,
Yet they prepare their food in the
summer . . ." (Prov. 30:24,25 NKJV).

More on Mars and microbes*

Malcolm Edwards

IF NASA'S PLANS work out, a spacecraft named *Phoenix* will touch down on the northern pole cap of the planet Mars in May 2008. The two major objectives of this particular landing will be to study the water history of the planet and to search once again for evidence of microbial life. To assist in this research, the spacecraft will have a robotic arm that can excavate Martian soil to a depth of half a metre and extend outwards to as much as two metres. The timing of the landing will be late in the Martian spring, to allow maximum time for the exploration before the winter arrives and the spacecraft becomes encased in ice.

One suspects that it is always the lure of discovering life on the planet that provides the funding for these explorations; thus the possibilities, however faint, will always be exaggerated in reports. Two earlier rovers, *Spirit* and *Opportunity*, still active on the surface of the planet, have, after about three and a half years of searching, found nothing to confirm theories about life on Mars. Yet evolutionists in particular will eagerly await reports of the new initiative. If primitive life is found to exist or to have existed elsewhere than on Planet Earth, especially in the barren Martian landscape, they would claim that the theory of spontaneous generation of life is proven and Intelligent Creation refuted.

Finding existing life anywhere in space, however, does not and cannot prove how it originated, and most certainly does not prove it originated from any so-called prebiotic soup. In fact such theories are not directly related to evolution; it has been rightly said that Darwin's book *The Origin of Species* is actually not about the *origin* of life.

Microbiologists today know full well that what has been termed 'primitive life' is nothing of the kind when viewed through a high-powered microscope. At any level it is highly complex and remarkably organised.

In his book, *Evolution: A Theory in Crisis,* microbiologist Dr Michael Denton comments on this subject:

> "Considering the way the prebiotic soup is referred to in so many discussions of the origin of life as an already established reality, it comes as something of a shock to realize that there is absolutely no positive evidence for its existence".

Again:

> "The most difficult aspect of the origin of life problem lies not in the origin of the soup but in the stages leading from the soup to the cell. Between the basic building blocks, amino acids, sugars and other simple organic compounds used in the construction of the cell, and the simplest known types of living systems there is an immense discontinuity".

Denton quotes Professor Frances Crick, one of the first scientists to propose that life came from outer space, as saying in his book *Life Itself:*

> "An honest man, armed with all the knowledge available to us now, could only state that in some sense, the origin of life appears at the moment to be almost a miracle, so many are the conditions which would have had to have been satisfied to get it going".

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* See "Man's quest for life on Mars", Malcolm Edwards, Apr. 2004, p. 125.