



Termites on the telephone

In the ecology of various places and climates termites play a quiet role, but one that — we are now realising — is probably more important than we had first thought. (For example, see *Ecos 54* for more on the work of termites in the dry inland of northern Queensland.)

To understand fully some of the relations between termites and other components of the ecosystem, we need to know more about termites under field conditions. To do this, we require information on the 'microclimate' within which these small labourers live, because temperature, humidity, and the like can all affect levels of activity and types of behaviour.

Thus, more effective pest control can result if we monitor the conditions in houses with termite problems. Some scientists have even recorded temperatures within termite mounds or infested trees, although this has always necessitated a dedicated researcher remaining at the site to take readings at regular intervals.

But now these lonely and time-wasting vigils propped up in front of a mound can end, thanks to some relatively simple technology and its

artful application. Instead, all you have to do is stay in the lab and simply dial-a-mound!

Dr John French of the CSIRO Division of Forestry and Forest Products in Melbourne has devised a data-logging system that can transmit information via telephone lines and a modem into a laboratory computer. (A modem is computer jargon for modulator-demodulator — simply an adaptor for sending computer information via a telephone.)

With the help of Mr Richard Donaldson, formerly of the Division of Building Research, and Mr Don Ewart, an entomologist from La Trobe University, he tested the system using a mound of the termite *Coptotermes lacteus* in the Boola Boola State Forest in Victoria. Of course, your termites cannot be too remote, as Telecom Australia must be able to lay a line to them from a relatively nearby junction box, but this is quite possible in many country locations.

Dr French and his assistants dug a shallow pit about 3 metres south of the mound, and into it put a 12-volt battery, the modem, and a programmable electronic data-logger housed in protective waterproof cases, for which the scientists used steel ammunition boxes! The battery powers the modem and the data-logger, and can be recharged on the spot every 3



From mound to modem: signals about temperature in the forest termite mound are relayed by telephone through the modem and in to the laboratory computer.

weeks. Telecom, charging the usual 'country rate', laid an underground line from the pit to their nearest junction box, about 200 m away.

Then the scientists positioned their sensors — 23 temperature-sensitive thermocouples. They arrayed these in various parts of the mound, within two nearby trees, and at three different depths within the soil. They also put one in the air 20 cm above ground to record the ambient temperature. To stop the termites' active jaws from destroying these instruments, they put the end of each thermocouple in nylon tubing and sealed it into place with epoxy resin.

Meanwhile, back at the CSIRO laboratory in suburban Melbourne, another modem was connected to a telephone and to the lab's computer network.

Thus, Dr French could dial up the mound on the telephone. When he sent simple commands down the telephone from a micro-computer in the lab, the data-logger in the field recorded and stored temperature readings from all the thermocouples. Another command sent the information back, and the data could then be displayed immediately on the computer screen in the lab, or printed out as a permanent record.

Now, when Dr French did

his little experiment, he actually needed to dial the mound manually and request the data-logger to collect the information, but there's no reason why the computer could not be programmed to do all of this (including the dialling) automatically at pre-set time intervals. And if you really wanted to study termites in a very remote location, a solar-powered radio transmitter connected to the data-logger in the field would be the next step!

Dr French thinks that you could use his system to study other features, such as gas emissions within mounds, by simply replacing the thermocouples with other detectors and keeping the data-logger and modem intact.

And if you're wondering what Dr French found out from his thermocouples, his data showed that, in the middle of a Melbourne winter, a cosy place to be is the nursery within a termite mound. At 9 o'clock on a July morning, when the air temperature was 6.9°C, the nursery in the centre of the mound was a balmy 18.9°C!

Roger Beckmann

Electronic monitoring of temperatures in air, a termite mound, trees and soil. J.R.J. French, R. Donaldson, and D.M. Ewart. *Australian Forestry Research*, 1987, 17, 79-82.