protect and preserve such an asset for its scientific and aesthetic values, and for the benefit of future, and perhaps more appreciative, generations of Mankind.

F. Raymond Fosberg & Marie-Hélène Sachet
National Museum of Natural History
Smithsonian Institution
Washington
DC 20560, USA.

Some Evidence That Trees 'Communicate When in Trouble'

Preliminary findings indicate that trees which are being attacked by insects may communicate their predicament to other trees through airborne chemicals, according to a recent report to the National Science Foundation (NSF), of Washington, DC. The warning message may enable trees that have not yet been attacked to prepare defences against plant-eating insects.

If the above-mentioned findings are confirmed, they may well constitute the first demonstration that plants emit pheromones which are received and responded to by other plants, the report indicated. Pheromones are chemical substances which convey information to, and elicit responses in, other individuals. Well-known examples of this phenomenon are insect sex-attractants, but this new work could have far-reaching implications in integrated pest control programmes dealing with interactions between plants and animals.

Indications that trees communicate in this manner were reported by Professor Gordon H. Orians, Director of the Institute for Environmental Studies, University of Washington, and Dr David F. Rhoades, to the NSF's Ecology Programme which has financed their research. They informed the NSF that: 'We have gained preliminary evidence in field experiments that leaf damage of Sitka Willow *[Salix sitchensis]* by Western Tent Caterpillars *[Malacosoma californicum pluviale]* and Fall Webworms *[Hypantria cunea]* can lead to changes in nutritional quality, not only in leaves of the attacked trees, but also in those of near-by unattacked trees...This effect may be due to a defensive response in unattacked trees stimulated by volatile compounds emitted from attacked trees.'*

The general hypothesis that is being investigated in their ongoing research is that volatile chemicals, released by plants in response to damage of their leaves, can cause chemical changes in neighbouring, undamaged plants that render the undamaged plants less suitable as food for leaf-chewing insects. The research workers will use Sitka Willows in the laboratory phase of the investigation, and will try to induce changes in leaf quality of undamaged plants by confining them in chambers with damaged plants, isolating and identifying chemical emissions that may be responsible for any effects. They also will try to induce changes in leaf quality of plants, using fractions and pure compounds isolated from volatile plant emissions or obtained commercially.

'If the general hypothesis is correct', Drs Orians & Rhoades claimed, 'it is necessary that damaged plants emit volatiles which differ quantitatively or qualitatively from those emitted by undamaged plants.' Since 1979 they have been conducting field experiments designed to detect changes in the nutritional quality of trees to insects, that may have been induced by insect attack. In these experiments they placed colonies of tent caterpillars or webworms on trees and periodically monitored the biological and chemical quality of the leaves, observing lowered growth-rates and other features in trees that were being attacked by tent caterpillars as compared with unattacked control trees.

'However', they reported, 'several of our experiments gave results suggesting that both the test and unattacked control trees were changing their leaf quality in response to our placement of insects on the test trees...This implied that unattacked plants receive and respond to signals from near-by plants experiencing attack by insects. In each individual experiment the observed changes in leaf quality of control trees could have coincided with our manipulation by change, but an overall picture strongly suggestive of communication among plants gradually emerged.' They will now attempt to confirm their earlier evidence of 'plant communications'.

Ralph Kazarian
National Science Foundation
1800 G Street
Washington
DC 20550, USA.

Moratorium on Ocean Dumping of Radioactive Waste Agreed to in London

Whether or not *any* radioactive waste should be dumped into the ocean was the major focus of the seventh consultative meeting of the parties to the London Dumping Convention, held in London, 14–18 February 1983. Considerable discussion focused on two proposed amendments, one introduced by two Pacific island nations (Kiribatu and Nauru) which would place all radioactive waste immediately on the black-listed Annex 1, and a second resolution, introduced by the Nordic nations, which would allow for a phase-out period of such dumping until 1990. It was agreed to table both these resolutions, in order to allow a scientific and technical review to be conducted.

What was finally adopted, by 19 votes to 6 with 5 abstentions, was a fall-back resolution, introduced by Spain, which called upon all nations to cease dumping immediately. Voting against were Japan, the Netherlands, South Africa, Switzerland, UK, and US; abstaining were Brazil, France, Federal Republic of Germany, Greece, and USSR.

The resolution also requested that a scientific review of the proposed amendments and other considerations relevant to radioactive-waste dumping be reviewed during the next two years. At the ninth consultative meeting, to be held in 1985, the question of whether to amend the Convention and its annexes to prohibit radioactive-waste dumping will be considered. While not legally binding, the strong majority which supported the

* In writing to give us the scientific names of the above-mentioned organisms, Professor Orians added (*in litt.* June 1983): 'The experiments were designed and executed by Dr David Rhoades of my laboratory, and he is preparing the results for publication... At a somewhat later date, a more general survey of this and related research might appropriately find its way into your Journal.'—Ed.

resolution suggests that it should be considered morally binding. Of special note was the role that Greenpeace International played, which, as a nongovernmental observer, worked for the adoption of either an amendment or a moratorium resolution.

CLIFTON CURTIS
International Earthcare Center
Sierra Club
228 East 45 Street
New York
NY 10017, USA.

Contributions of Young People to Environmental Improvement

There is a growing recognition among environmentalists that the preservation of remote and beautiful habitats may depend on decisions taken in industrialized cities far from the threatened areas. As a result, much effort is going into involving communities in caring for their locality, and particularly into interesting young people in practical conservation work as both a leisure and an educational activity.

South Yorkshire is an industrialized part of Northern England which is characterized by mining, quarrying, and steel-making. These activities, operative over more than 200 years, have had a devastiting effect on the environment. Now, with the encouragement of local government, ordinary people are taking it into their own hands to clear up unsightly rubbish, and, by tree-planting and construction work, are making their surroundings more pleasant and attractive to wildlife than has been the case for a long time past.

Fig. 1. *A group of enthusiastic youngsters clearing blocked ditches near Doncaster.*

The recently published *South Yorkshire Schools Project Report 1982/83** illustrates the ways in which schoolchildren and youth groups have made practical contributions that are of benefit to the whole community. Within the County, which comprises mainly Barnsley, Doncaster, Rotherham, and Sheffield, 85 school- and youth-groups undertook 72 conservation projects, involving over 2,200 volunteer workdays. The opportunities available to interested teachers and youth leaders are illustrated by case-studies in the report, for example:

School Nature areas:—The creation of Nature-study areas within school grounds, designed to be bright and attractive to children and wildlife alike. Heavier work can be undertaken by parents, by people on job-creation schemes, and by local adult conservation volunteer groups.

The school in the community:—A number of schools have improved their standing with local residents by small projects in the neighbourhood; for instance, clearing rubbish from derelict sites, planting trees and shrubs, and providing benches, can soon create an informal community garden. Clearing blocked ditches can also help (Fig. 1).

Youth and the wider landscape:—The frequent overlaps between practical conservation work and other outdoor pursuits has enabled youth groups to tackle more ambitious projects—for instance for the Forestry Commission, and including weekend residential experiences.

Such activities have been stimulated by the British Trust for Conservation Volunteers (BTCV), which is a national charity of more than ten years' experience which aims to involve people of all ages and types in practical work of conservational benefit. The BTCV acts in an advisory capacity, teaching people how they can best implement their own practical project.

A series of benefits can result from this approach: e.g.

1) In terms of pure conservation, urban environments should not be underestimated, as (a) the rapid growth of cities has often resulted in the 'stranding' of now-relict habitats which, with sensitive management, can still be maintained as worth-while wildlife refuges, and in a way that can be enjoyed by local residents, and (b) the techniques for creating a rich and attractive Nature area on derelict wasteland are well understood and tested.

2) For the individuals who participate, there is considerable personal satisfaction in seeing improvements taking place, and in feeling that one is acquiring competence in a practical skill.

3) Happy urban communities chiefly exist where people feel a sense of belonging and commitment to an area, and also to their fellow residents. BTCV fosters this spirit, through regional offices covering the whole country. Further details may be obtained from: BTCV Headquarters, 36 St Mary's Street, Wallingford OX1 OEU, England, UK.

PATRICK LEONARD, *Regional Officer*
Conservation Volunteers Training Centre
Balby Road
Doncaster DN4 ORH
England, UK.

* Conservation Volunteers Training Centre, Balby Road, Doncaster, South Yorkshire DN4 ORH, England, UK: 42 pp., illustr. (mimeogr.), [1983].