ported results of experiments with multispectral scanners and the identification of various terrain features, including rocks, soils, crops and types of vegetation. Several speakers described some of the factors affecting the spectral signature and methods of recognizing and minimizing the effect of these factors.

The section on instrumentation covered both passive and active sensors. Drs Yu. I. Rabinovich, G. G. Shchukin and V. V. Melentyev (The Institute of Space Methods for Earth Sciences, Institute of Physics, Leningrad) described the determination of the water content of clouds and surface water temperatures using a microwave radiometer mounted in an IL-18 aircraft and operating at wavelengths of 0.80, 1.35, 1.60, 3.2, and 8.5. cm; by comparing microwave and infrared measurements, it is possible to estimate errors in the determination of water temperature.

Drs L. Silva, R. Hoffer and J. Cipra (Purdue University) described a new extended wavelength field spectroradiometer. This instrument uses four detectors (Si, PbS, InSb and HgCdTe) and covers the spectrum from 0.37 μm to 14.2 μm; scan time is adjustable from 0.5 to 30 seconds. Reliable spectral measurements in the field, as distinct from the laboratory measurements of small samples, can now be made. Several speakers described new uses for radar ; Dr E. L. Frost (US Army Electronics Command, Fort Monmouth, New Jersey) reported the monitoring of mosquito movements over short distances. "Dot angels" observed by the radar operator are compared with truck and helicopter trappings and the correlation is good.

Various methods for the monitoring of oil slicks, including radar, photography and the multispectral scanner, were reported. Drs J. C. Munday and M. F. Penney (Virginia Institute of Marine Science, Gloucester Point) reported that various oils at thicknesses less than 1 μm are easily imaged on film and that film density varies with the thickness; good slick detection is provided by colour infrared film.

There are now several instruments and methods for analysing film imagery as well as conventional densitometric methods. Drs E. Ranz and S. Schneider (Institut für Landeskunde, Bad Godesberg, Germany) described the use of the black-and-white equidensity film 'Agfacontour' for the identification of lineaments and other geological features.

The symposium was characterized by enthusiasm for and optimism about the newer techniques of remote sensing and it seemed that there was insufficient awareness that they are tools to supplement and enhance but not necessarily replace existing methods of scientific investigation.

TASTE

Sweet Sensitivity

from our Membrane Correspondent

BECAUSE the funding of research in olfaction and taste is almost non-existent, it remains an area of science where a little work generates a large amount of speculation. Dastoli's work on the isolation, from bovine tongue epithelium, of proteins which apparently showed a specific binding of sweet substances led to the attractive theory that these proteins were "receptor sites" involved in the mechanism of response of the taste buds. Those physiologists who did not find Dastoli's evidence very convincing will have their prejudices strengthened by a recent report by Kayama and Kurihara (*J. Gen. Physiol.*, **57**, 297 ; 1971).

By carefully dissecting out the papillae and carrying out polyacrylamide gel electrophoresis on protein extracts from different parts of the tongue epithelium, these workers have shown that Dastoli's "sweet-sensitive" protein is found not only in the papillae but also to an equal extent in the surrounding epithelium which is devoid of taste buds. Furthermore, they could detect no protein band which was found only in the papillae extracts. These results indicate that the receptor site, if indeed a protein, is present in relatively small amounts, probably as some firmly bound membrane constituent. Alternatively, if Dastoli's protein is still to be considered as the receptor site, an explanation is needed as to why it is present in such large quantities where it has no receptor function.

Cooperation in the Immune Response

COOPERATION in the immune response is presently the vogue word among cellular immunologists. Semantic variants are "helper" effects and synergism. In all instances it is envisaged that at least two cells are involved in the production of humoral antibodies of various kinds.

The first real indications of cooperation emerged from some experiments of Claman and his colleagues (Claman, H. N., and Chaperon, E. A., *Transpl. Rev.*, **1**, 92 ; 1969), which showed that neither thymocytes nor bone marrow cells injected into irradiated mice along with sheep red blood cells were capable of initiating a substantial immune response. When the two cell populations were combined the immune response far exceeded the sum of the responses of the individual cell populations. Since these experiments it has become fashionable to regard the potentiated response as between B and T cells which are broadly to be thought of, in mice, as of bone marrow and thymic origin respectively ; the cell from the bone marrow is supposed to produce the antibody and the T cell is thought to help in some unspecified manner.

The best guess about the function of the T cell has emerged from immunologists at the National Institute for Medical Research, London, who have, almost collectively, suggested that the T cell is an antigen-handling device. Now the story is beginning to acquire complexity, part of which may be real, part based on false assumptions. The problem is whether T and B cells are heterogeneous. This heterogeneity could be in a variety of ways ; each category could include cells of differing degrees of differentiational maturity ; the B and T cells found in different places in the lymphoid system (that is, lymph nodes and spleen) could be cell populations of which the behavioural pattern may in some way reflect their immediate anatomic origins ; but, overall, either or both B and T cells may have heterogeneity in relation to the specificity of the receptor molecules they are supposed to carry. An article by Playfair and Purves in the next issue of *Nature New Biology* hints at some of these possibilities.

Playfair and Purves have found that in Claman-type cooperation experiments in which the number of spleen or bone marrow cells (both used as a source of B cells) has been varied independently but always with a standard large number of thymocytes (as a source of T cells) the curves for cell number/antibody response for the two cell species are not the same. They suggest that the B cells in spleen and bone marrow are different—more specifically there may be two kinds of B cells, B1 and B2, which differ in the ratios in which they are to be found in spleen and bone marrow. B1 cells are said to be less exacting in relation to their requirement for cooperation than are B2. The number of B1 cells in spleen and marrow is said to be roughly equal but the spleen contains more B2 cells than the marrow.

The interpretation offered for these ingenious experiments ignores the possibility that the effects seen could result from the existence of two different kinds of T cells which might also be of differing frequency in spleen and marrow. If B1, B2 and T1 and T2 have to be accommodated as four lymphocyte conditions before receptor specificities, are considered, then indeed cellular immunologists are in for a bewildering time.