news and views

Successor to Anger's gamma camera?

During the past fifteen years gamma cameras have been introduced into the regular hospital armoury of nuclear medicine. In the hands of a specialist this camera became a diagnostic tool of great importance, particularly for detecting and localisating cancer lesions. The generation of γ cameras in current use derives its pedigree from the concept of Hal Anger (*Rev. scient. Instrum.*, **29**, 27; 1956), who used lead collimators to produce an image of the radioisotope distribution in a scintillating crystal viewed by an array of photomultipliers. On page 132 of this issue of *Nature*, Todd, Nightingale and Everett propose a new principle of γ-ray imaging. Using arrays of position-sensitive detectors and selecting multiple interactions it becomes possible to calculate the position of the source of a γ ray from the formula for Compton scattering. In this way the use of collimators is completely avoided. The image formation in the proposed system is different from that in the Anger type of camera. Instead of building up the image from a dot pattern, the Compton γ camera produces families of ellipses with the common point corresponding to the source of radiation.

The method of implementation of the new concept is hardly mentioned in the communication. In fact, the success of the proposed system probably depends in a most crucial way on the nature of the radiation detectors and on efficient, very fast collection of data. Recent developments in the technology of solid state detectors and the availability of very fast mini-computers are making the proposals a practical possibility, but it is worth noting that to date no commercial γ cameras based on semiconductor detector technology are offered. The Southampton group is therefore attempting to improve the design of the gamma camera in more ways than one.

The main advantages of the proposed new system lie, first, in its ability to collect γ radiation over a larger solid angle than is possible through a system of collimating holes, with a corresponding reduction of the necessary patient dose, and, second, in the possibility of attaining higher positional resolution than the existing cameras. Modern, high performance Anger cameras have resolution indices of about half a centimetre. The authors' estimation of the resolution possible in their system is in the region of 1–2 mm. The ability of detecting smaller malignant lesions is always uppermost in the minds of clinical diagnosticians.

With a suitable fast data collecting system the high potential sensitivity of the Compton γ camera will make it the instrument of choice for fast dynamic studies with radioisotopes, for example, for the study of cardiac output and the blood circulation in limbs. Furthermore, as Todd *et al.* indicate, the computing system associated with the camera can select events originating at a certain depth in the body and can thus yield the tumographic information in any desired place.

It remains to be seen if the Southampton group, after presenting a new and exciting idea, will be able to break through the technological barrier and produce a working model of the camera that will make it possible to evaluate all the predictions and expectations of its performance.

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What makes a molecule odorous?

The olfactory quality of a molecule has always proved notoriously hard to predict, but another attempt has recently appeared (Schiffman, *Science*, **185**, 112; 1974). This work is mathematical in nature and applies multidimensional scaling to known data.

How much progress has been made since the confrontation between Amoore and Wright in the pages of *Nature* a few years ago (**233**, 231, 270; 1971 and **239**, 226; 1972)? In particular, can one yet distinguish between the theories of Amoore, Wright and Davies, preferably by a clear refutation of two of these theories?

The answers to these questions are complicated by the modifications that all three theories have undergone in recent years, and it seems also that the number of olfactory theories is growing, rather than diminishing. (A full account of the principal theories and results up to 1970 may be found in *Handbook of Sensory Physiology*, **4**, (Part 1, Olfaction), Springer-Verlag, 1971).

Schiffman uses measures of psychological similarity as the input for her multidimensional scaling: if two substances are judged by human subjects to have quite similar odour qualities, these two substances are placed near each other in multidimensional quality space. Of course this is not new in itself; but what is new is that the known similarity data are now re-analysed by a general non-metric multidimensional technique, which shows that only two dimensions are required to account for the known similarity relationships between many different compounds.

What new information emerges from such two-dimensional odour maps? First, it seems that there are no sharply defined areas which would correspond to possible 'primary odours'—the odour types all merge into one another, for example, from floral and fruity areas to areas of resinous (for example, turpentine-like) odours. Or, in Schiffman's words: "There are no clear psychological groups or classes of stimuli, merely trends". Unfortunately, she does not present any data on 'musky' compounds, usually regarded as constituting a well-defined group.

Second, can these psychological similarities be related to the usual molecular properties? Schiffman claims that Amoore's original (1952) theory that molecular shape

This is the last News and Views prepared by Sally Bunney who after nearly seven years with *Nature* is off to a post as medical librarian in Oman. She goes with the best wishes and affection not only of the staff but also of an army of correspondents. Mrs Gillian Boucher takes over Miss Bunney's position.