

migratory birds, will help in the formulation and testing of possible sensory mechanisms. The influence of magnetic fields on orientation was further documented by C. Walcott (State University of New York, Stony Brook), who reported on the persistent disorientation of pigeons released near natural magnetic anomalies. The extent to which many of these sensory capabilities are made use of in navigation is unknown, although hypotheses abound.

The role of wind-carried odours in pigeon homing was discussed by F. Papi and S. Benvenuti (Università di Pisa), K. Schmidt-Koenig and J. Kiepenheuer (Universität Tübingen), and R. F. Hartwick (James Cook University, Queensland). Most investigators acknowledged that in some circumstances odours could provide directional cues; however, most data do not support a central role for odours in pigeon homing. In a later discussion, W. T. Keeton (Cornell) reasoned that just as a hierarchy of redundant cues seems to supply compass information, a similar hierarchy is probably used to obtain map information. Therefore, research should not aim to uncover 'the' navigational scheme, because several schemes are likely to be used in different conditions.

Odours, however, clearly occupy a central role in the spawning of salmon. A. D. Hasler and A. Scholz (University of Wisconsin, Madison) described a remarkable experiment in which hatchery-raised salmon were exposed to chemically scented water for 1 month before their release into Lake Michigan. During the subsequent spawning season, small streams were artificially scented with the same compounds. Imprinted salmon were then recovered in large numbers from the appropriately scented stream.

The sensitivity of marine sharks, skates, and rays to voltage gradients on the order of $0.01 \mu\text{V cm}^{-1}$ was described by A. J. Kalmijn (Woods Hole Oceanographic Institute). In the laboratory, these fish oriented to magnetic fields, presumably by responding to local electric fields induced by swimming through the magnetic field. Theoretically, fish could monitor natural voltage gradients found within ocean currents to obtain compass information and determine the direction of water flow.

In experiments with hatchling sea turtles, M. Mrosovsky (University of Toronto) demonstrated that movement from the nest to the water's edge is governed by a phototropic response to an integrative right-left balancing of retinal and tectal stimulation. L. C. Ireland (Oakland University, Rochester) used ultrasonic transmitters to track hatchling turtles on the initial portion of their maiden ocean voyage.

As yearlings, the turtles reach distant feeding grounds. He concluded that the initial directional stimulus was simply 'away from land', which perhaps represented an extension of nest-to-water movement.

Whether migratory birds are capable of true bicoordinate navigation or predominantly utilise only simpler forms of compass orientation remains controversial. T. C. and J. M. Williams (Swarthmore College) reported that successful migrants moving between North and South America seem to maintain a Southeast heading during their entire autumn migration, and would therefore not require a bicoordinate system. S. A. Gauthreaux (Clemson University, South Carolina) observed inland daytime flights of nocturnal migrants which are felt to correct for night-time drift. These flights suggest that some nocturnal migrants may actually navigate during the early daylight hours. A new release and tracking procedure for migratory birds using balloons and radar was developed by S. T. Emlen and N. J. Demong (Cornell). Although complex, this technique combines experimental control with near-natural flight conditions. Initial experiments showed that sparrows were able to select meaningful headings when released under cloud layers that obscured celestial cues. □



A hundred years ago

Bees killed by *Tritoma*

IN a friend's garden here where there are quantities of *Tritomas* or "red-hot-pokers," hundreds of bees have been this year destroyed by them. The honey produced by the flower is very abundant, and the bees enter the tube of the corolla to get at it; but the tube, which is only just large enough at the mouth, tapers gradually, and so the bee gets wedged in and cannot extricate itself. I saw numbers so caught, some in the fresh flower, while others remained in the completely withered and decaying blossoms. Perhaps it may be due to the fine warm days we have had this autumn, inducing the bees to work too late after our native honey-producing flowers have been destroyed by the wet and frosts; or is it a regular thing which happens every year? If so bee-keepers should discourage the *Tritoma*, or set to work to select varieties with flowers large enough not to kill their bees.

ALFRED R. WALLACE

From *Nature* 17, 15 November, 45; 1877.

Plasma lipoprotein structure

from Angelo M. Scanu

A workshop on Lipoprotein Structure was held at the University of Chicago on 8-9 October, 1977.

DURING the past 10 years, many studies have been carried out on the structure of circulating lipoproteins, relying primarily on physical and chemical techniques. The workshop provided an assessment of the current state of knowledge on the subject.

The discussion on small-angle X-ray scattering was focused mainly on the low-density lipoproteins (LDL), where controversy still exists on the state of organisation of their surface components. The recent studies by V. Luzzati *et al.* (Gif-sur-Yvette, France) have led investigators to postulate the existence of 'bumps' or 'spikes', which were attributed to protein units protruding from the surface of the particles. The investigations of P. Laggner *et al.* (Graz, Austria), in turn, although yielding essentially similar X-ray results, were interpreted as being compatible with a surface having no convolutions. The organisation of the LDL core also came under sharp scrutiny. There was agreement on the presence, in this core, of cholesteryl esters and triglycerides in varying proportions; the concentric smectic lamellar organisation of the cholesteryl esters suggested by the studies of D. Atkinson and G. Shipley (Boston), was disputed, however, by Luzzati, who proposed an alternative organised micellar structure without, however, giving details. Agreement seems to exist on the notion that triglycerides influence the core organisation of cholesteryl esters; this view appears well documented by the results of studies on the LDL of animals with hyperlipidemias secondary to the administration of cholesterol-supplemented dietary fats.

Contrary to the rather extensive studies performed with small-angle X-ray scattering, the work on plasma lipoproteins carried out by neutron diffraction (H. B. Stuhmann, FRG) has been comparatively modest. The validity of the method was recognised, however, and further applications were anticipated with suitable replacement of some of the LDL constituents by their deuterated counterparts. An elegant study of the naturally occurring quasi-crystalline egg yolk lipoprotein system was presented by L. Banaszak (St. Louis University, St. Louis), who has reconstructed a two-fold symmetry model from electron micrographs of negatively-stained preparations.