Differential scanning calorimetry is proving its usefulness in the study of plasma lipoproteins. A systematic study of the thermal behaviour of LDL, HDL, and related systems was reported by D. Small (Boston), who obtained information on the phase behaviour of cholesteryl esters in the core of LDL particles. He also investigated the thermal stability of HDL, particularly that of its major protein, apolipoprotein A-I. R. Biltonen (University of Virginia, Charlottesville), using differential scanning calorimetry, estimated the statistical distribution of cluster sizes in phospholipid bilayers, and H. Pownall (University of Texas, Houston) applied microcalorimetric techniques to examine the association between apolipoproteins and lipid vesicles. Fluorescence spectroscopy was used by A. Jonas (University of Illinois, Urbana) in a study of lipoproteins and apoprotein–phospholipid–cholesterol recombinants; she proposed a bilayer structural model conceptually similar to that derived from X-ray and thermocalorimetric data. Pownall described the kinetics and mechanisms of lipid–amphiphile association, whereas Smith discussed an interesting application of an extrinsic fluorescence probe (pyrene), to the study of cholesterol exchange between lipoproteins using stopped flow kinetics.

The current status of ^{13}C-NMR spectroscopy as applied to studies of the structure of plasma lipoproteins was summarised by E. Cordes (Indiana University, Bloomington). The results presented indicated that this technique is valuable in the study of the dynamics and phase transitions of surface and core lipids, particularly in combination with the analysis of model systems. J. Morrisett (Houston) reported results of his ^{13}C and ^{31}P-NMR spectroscopic studies on lipoprotein-X, an abnormal lipoprotein found in cholestasis. T. Glonek (University of Chicago) discussed the use of a chelated manganese paramagnetic ion to probe the accessibilty and surface distribution of the phospholipids in both LDL and HDL.

One session was devoted to an examination of the mechanism of phospholipase A_2 action and its use as a probe of the lipoprotein surface. F. Kézdy and colleagues (Chicago) found that the kinetic behaviour of this enzyme is similar for all of the major lipoprotein classes investigated; he therefore suggested that all of the phospholipase A_2-hydrolysable phospholipids represent a single pool at the surface of these particles. M. Wells (University of Arizona, Tucson) presented evidence that the physical state of the substrate influences the specificity of phospholipase A_2 and pointed at the limited information available at present on the mechanism of action of the enzyme. L. Smith (Houston) discussed the mode of activation of a purified milk lipoprotein lipase preparation by fragments of apolipoprotein C-II, the specific activator of the enzyme, and identified regions considered to be specific for activation. He discussed a similar approach with lecithin-cholesterol acyl transferase, in which he used fragments of apolipoprotein C-I, one of the activators of the enzyme.

With regard to apolipoproteins, W. Fitch (University of Wisconsin, Madison) presented an elaborate study on structural predictions based on primary sequence data. The findings led to the recognition of striking internal homologies in apolipoprotein A-I, considered to originate from duplication and crossing over of an ancestral gene coding for an 11-residue repeat. A computer search for amphipathic helices in apolipoprotein was discussed by J. Segrest (University of Alabama, Birmingham), whose results support the hypothesis that these segments might be responsible for lipid binding. G. Fasman (Brandeis University, Waltham) provided a lucid analysis of the role of β-turns in protein structure and of the experimental methods used for their detection. The importance of β-turns in apolipoprotein structure emerged from work by investigators at the University of Chicago, who presented the first full-scale space-filling model of human HDL_3, based on available experimental data and on work in progress on the properties of the A apolipoproteins at the air-water interface. One major conclusion from these investigations was that all of the predicted structures (α-helix, random coil, and β-turns) in apolipoprotein A-I and A-II are amphipathic, and that this unique property enables them to occupy predictable areas at the HDL surface. □

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Red hot sea

from Peter J. Smith

It is as certain as anything can ever be in the Earth sciences that the Red Sea is a region of very young seafloor spreading. Some of the evidence for this view comes from geothermal studies, which is only to be expected, although it comes as a surprise to be reminded by Girdler and Evans (*Geophys. J.* **51**, 245; 1977) that as recently as 1970 there were no more than 17 heat flow values available, 5 of which were only estimates from borehole temperature measurements. Since 1970, however, the quantity of data has increased fivefold, and Girdler and Evans have now been able to draw a much better, though still far from complete, picture of Red Sea geothermal characteristics.

The average heat flow for measurements made within 5 km of the Red Sea's deep water axis is 467 $mW\,m^{-2}$, or about eight times the world average of 59 $mW\,m^{-2}$, although individual values rise to more than 56 times the world average. Over the next 5-km interval the average then drops dramatically to 89 $mW\,m^{-2}$, presumably because of hydrothermal circulation; but it rises to 140 $mW\,m^{-2}$ and 165 $mW\,m^{-2}$ over succeeding 20 km intervals, settling to about 111 $mW\,m^{-2}$ (still about twice the world mean) at distances of 50–170 km.

Thus heat flow is high not only in the axial zone but throughout the whole of the Red Sea. Indeed, both heat flow and temperatures (100 °C at depths of less than 2 km) are so high along the edges of the sea that Girdler and Evans see geothermal heat as a potential source of power for coastal towns. But only 7 of the 86 individual heat flow values published by the end of 1975 lie below the world average; and as all come from the vicinity of the deep axial trough where heat flow is typically high, they would seem to reflect only transient thermal effects such as sediment slumping, or perhaps their positions above the downgoing limbs of hydrothermal circuits.

Sedimentary movement and hydrothermal circulation in the axial zone probably also explain the high variability of heat flow near the centre of the Red Sea. According to Girdler and Styles (*Nature*, **247**, 7; 1974) there have been at least two phases of seafloor spreading, the lithosphere produced by the second intruding and heating the older lithosphere and overlying evaporites; and although some people would dispute this precise interpretation, there seems every reason to suppose that evaporite movement has resulted from very recent spreading. Such complexity makes detailed interpretation of heat flow data difficult; but the general geothermal picture is evidently entirely consistent with the Red Sea as a young spreading zone. □

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