Serology

The serological part of the workshop was based, as before, on an exchange of carefully selected sera among the participating laboratories. Each of the 73 laboratories, including one or more from every continent (except Antarctica) typed up to 250 cells with the same set of 178 sera. The populations of cells included the laboratories' own well-typed panels, some families, some 'exotic' population groups and also, in the United Kingdom as a convenient source of B lymphocytes, lymphoblastoid cell lines and cells from patients with chronic lymphocytic leukaemia (CLL).

The combined analysis of this large body of data, which was organised by Julia Bodmer of Oxford University with the help of Piazza and others, first of all clearly establishes the definition of five specificities of the *C* locus. Specificities of this locus, whose existence was first suggested by L. Sandberg of the University of Goeteborg and E. Thorsby and their collaborators in 1970 and which was later confirmed by A. Svejgaard, University of Copenhagen, and others, have so far been more difficult to define than those of the better known *A* and *B* loci. This is, in large part, because alleles of the *C* locus tend to be in strong linkage disequilibrium with those of the *B* locus and so easily confused with them. Eighteen antigens of the *A* locus and twenty-four of the *B* locus were recognised by the workshop sera. These included better definition of a number of previously suggested specificities, often 'splits' of already defined antigens. This splitting of antigens is a common phenomenon in HL-A serology mainly as a result of the existence of cross-reacting families of antigens which are seldom at first separated by the available antisera.

Ia-type specificities

A most important byproduct of the workshop was the simultaneous description by at least nine different laboratories of various approaches to the serological identification of *Ia*-type specificities. In the mouse the genetic region between the *H-2K* and *H-2D* loci (which correspond to *HL-A-B* and *HL-A-A* respectively) has been shown to contain, in addition to genes controlling immune response, further genes controlling a new set of serological specificities called *Ia* for immune associated. Unlike the K and D, or HL-A-A, B and C antigens, the Ia antigens have a tissue distribution that is relatively specific, including especially B, but excluding T lymphocytes. Similar antigens were first described in man by van Rood and coworkers using inhibition of the MLC reaction as a screen and then immunofluorescence of peripheral blood B lymphocytes. Other approaches to the identification of human Ia-type sera include in particular the use of B-derived lymphoblastoid cell lines and CLL cells, as well as partially purified peripheral blood B lymphocytes and immunisation between unrelated individuals identical at the *HL-A-A, B* and *C* loci. Ia-type antibodies are quite commonly found in the usual HL-A-A, B and C locus typing sera (which are mostly obtained from multiparous women who make these antibodies as a result of foetal–maternal stimulation) and were shown by W. F. Bodmer of the University of Oxford and H. Dick of the Glasgow Royal Infirmary and their collaborators to be present in just under one-third of the workshop sera. Several reports indicated, as might be expected, close association between Ia-type serological reactions and MLC determinants of the *D* locus. Clearly, serological Ia typing is much easier than MLC typing and so may become a powerful tool in disease association and other related studies. There is also the definite possibility that Ia specificities will be of greater direct importance for the problem of clinical transplantation than are the specificities of the *HL-A-A, B* and *C* loci.

This workshop was as exciting and

Hydrous minerals in meteorites

from David W. Hughes

THE water content of rocks, whether they be terrestrial or meteoritic, can provide an important clue to their place of origin. Meteoritic minerals are nearly always fresh and undecomposed —which contrasts with many of the water-containing products of weathering and erosion which occur in such profusion on Earth. By studying the chemical composition and paragenesis (the groupings of different types of minerals) of meteorites it is found that in the main they must have crystallised from a fiery melt which had an exceptionally low water content in contrast to the wet volcanic terrestrial melts which solidify to form igneous rocks. Only in type 1 and 2 carbonaceous chondrites is water reasonably abundant. These were formed at low temperatures and have not been subsequently heated above 350 °C. They are thought to have compositions very close to that of the primordal dust which coalesced to form the Solar System and they contain many primary volatile components. These meteorites are thought to be parental to other types which are formed by complicated thermal evolution processes and geochemical depletion reactions.

Ashworth and Hutchison in this issue of *Nature* (page 714) report having found hydrous minerals in the meteorite Nakhla, a diopside–olivine achondrite which fell in Egypt in 1911 and in the meteorite Weston (a chondrite which fell near Weston, Connecticut in 1807). Both are meteoritic types in which water is rare.

The water in Nakhla and Weston is in the form of iddingsite, a mixture of hydrothermal alteration products of olivine ($(Mg, Fe)_2 SiO_4$). The iddingsite is found as red-brown veins along cracks in the olivine. These veins were probably formed by shock deformation, and water present at this time percolated down the cracks and caused mineral alteration.

Ashworth and Hutchison conclude that magmatic water must have been present during the formation of this shocked olivine, and that the meteoritic mineral originated on a body in the Solar System that had a hydrous atmosphere. There is however still the possibility that the meteorites were 'dry' when they left the parent body and that they picked up the water later. The water could also have come from an admixture of some carbonaceous chondritic material in with the meteorite; this however has not been chemically identified. The interaction between solar wind ions and meteoritic minerals causing hydrogen implantation is discounted because lunar breccias, which have been exposed to the solar wind for aeons, are generally anhydrous. That leaves terrestrial weathering as the alternative source of water. Was the hydrous mineral produced by the hydrolysis of primary lawrencite ($FeCl_2$) by water vapour in the terrestrial atmosphere? As Weston contains an order of magnitude more water than Apollo 16 rocks this requires a very high initial content of chlorine. Both Nakhla and Weston were observed falls and were collected soon after hitting the Earth. However as Nininger (*Out of the Sky,* Dover, 1952) points out, we never see a truly unweathered meteorite, the atmosphere through which they fall being nearly saturated with water—to say nothing of the air in the vicinity of the museum shelf on which they have been sitting for over half a century.

So the mystery remains—did the meteorites come from a wet planet or have they picked up their water later? It would be heartening to think that Earth has not been the only wet place in the life of the Solar System.