NEWS AND VIEWS

Controlling Chromosome Loss

IN the past two years the study of human genetics has undergone a remarkable change. Establishing human gene linkage groups and assigning genes to particular chromosomes used exclusively to be a matter of tracing the familial inheritance of a particular trait, an abnormal enzyme or some rare genetic disease for example, and coupling the data obtained with cytogenetic analyses of the individuals concerned. But all that has changed. What used to be a subject curtailed by the inherent restrictions of purely observational science, compounded by the problems of working with people, has now become an experimental science as well. For the development of the technique of inducing cell fusion with inactivated Sendai virus, together with the observation that mouse–human hybrids preferentially shed their human chromosomes, has meant that human genes specifying proteins distinguishable from their murine counterparts can be assigned to particular human chromosomes by analysing the enzymatic and chromosomal constitution of mouse–human hybrids. Leaving aside complications that can arise from processes such as translocation, a mouse–human hybrid cell should only contain a particular human enzyme so long as the hybrid retains the human chromosome that specifies that enzyme. And of course human linkage groups can be established or excluded by experiments of this type. In short, human geneticists now have two quite distinct ways of answering the questions they wish to ask: the classical approach and the experimental approach.

But the use of hybrid cells suffers from restrictions. For one thing, only mouse–human and Chinese hamster–human hybrids preferentially shed their human chromosomes; hybrids involving human cells and the cells of other species are not so obliging and shed chromosomes of both parents in unpredictable patterns. And for another, many human proteins cannot readily be distinguished from their murine or Chinese hamster counterparts. What somatic cell geneticists need, of course, is a general method which allows them to dictate which parental set of chromosomes shall be shed from any interspecific or intraspecific hybrid. On page 367 of this issue of *Nature*, Pontecorvo describes some preliminary experiments which suggest it may be possible to do just that by irradiating cells before making hybrids with them.

Remembering that some thirty years ago, while working with *Drosophila*, he had solved an analogous problem by X-irradiating cells, Pontecorvo produced hybrids by fusing irradiated Chinese hamster cells with mouse cells. Normally hybrids of these two species of cells do not preferentially shed either set of chromosomes. But hybrids including the irradiated Chinese hamster cells preferentially shed Chinese hamster chromosomes. Apparently the breaks induced by irradiation in the Chinese hamster chromosomes result in their elimination from the hybrids. As an alternative to irradiation, Pontecorvo also allowed Chinese hamster cells to incorporate bromodeoxyuridine into their DNA, then he exposed the cells to visible light, which induces breaks in DNA strands at the sites of the bromodeoxyuridine residues, and then he fused the cells with untreated murine cells. This procedure also resulted in the preferential loss of the Chinese hamster chromosomes from the hybrids. Although preliminary, this result is particularly interesting because it holds out the possibility of selectively eliminating individual chromosomes from hybrids. It might be possible to synchronize pulses of bromodeoxyuridine with the time of duplication of the DNA of a particular chromosome which would, as a result, be selectively sensitized to visible light and subsequently to elimination from a hybrid.

Lunar Origin Theories blow Hot and Cold

THE direct analysis of lunar dust and rocks in the laboratory has failed to resolve conclusively the question of whether the Moon has a hot or cold origin, although the theory which is currently favoured is that the presence of a large amount of crystalline igneous material must certainly imply a history of thermal activity. The samples from Apollo 12, in particular, also show that substantial fractionation of the primary lunar material has taken place, although there is also clear evidence that the surface layer itself is debris resulting from intense meteoritic bombardment, that some craters at least are the result of meteor impacts.

But in the study of lunar magnetism there is less background of speculation and half theory to cloud the interpretation of new results. It was only in 1967, with the flight of Explorer 35 (a Moon orbiting satellite carrying a magnetometer), that direct observations of the magnetic field near the Moon and its interaction with the solar wind were first obtained. Following this success, a magnetometer experiment set up by the crew of Apollo 12 and provided by the same team from the Ames Research Center in California reported an intense local field of 350 microgauss—this could not represent an overall lunar field like that of the Earth, because such a field would register on the still operational Explorer 35 magnetometer, and is probably caused by a large mass of magnetized rock in the vicinity of the Apollo 12 landing site. This concept of areas of "fossil" magnetization fits well with the discovery of magnetized rocks in the samples returned to Earth, and raises interesting questions concerning the early history of the Moon.

The most exciting results from the Apollo 12 experiment concerned variations in this lunar surface field. Last year, Professor C. P. Sonett presented to the NATO Advanced Study Institute at the University of Newcastle upon Tyne a preliminary interpretation of these variations, which are associated with the variations of the solar wind, and suggested the presence of a stratification in the deep Moon and the existence of a conductive layer at a depth of a few hundred kilometres. Sonett and his colleagues now report in this issue of *Nature* (page 359) a detailed analysis which confirms the existence of a