Hybrid Cells and Gene Location

from a Correspondent

WHEN animal cells from two different species are mixed and grown in culture, a few hybrid cells are formed. By using parent cells with appropriate genetic markers, the hybrids can be selected for further study. These newly formed hybrids have a chromosome complement derived from both parents. The hybrids are not just bizarre novelties—one of their uses, as Weiss and Green show (*Proc. US Nat. Acad. Sci.*, **58**, 1104; 1967), can be to locate genes to particular chromosomes. These authors used as parents cells of mice deficient in thymidine kinase and resistant to 5-bromodeoxyuridine (BUdR) and human cells self-sufficient for the kinase. The hybrids were selected and they too are now self-sufficient for thymidine kinase because of the presence of human kinase genes. After about 20 generations, the hybrids still have all their mouse chromosomes, but have only 2–15 of the original 48 human chromosomes. If gene markers are also lost, can these be assigned to the lost chromosomes? Addition of BUdR kills these hybrid cells which are self-sufficient for thymidine kinase, while cells lacking the kinase survive. Chromosomal analysis of the hybrids has shown that human chromosomes of the group 6-12-*X* were rare in the BUdR-selected hybrids, but more frequent in cells susceptible to BUdR. Gene mutation at the kinase locus was ruled out and so the human gene(s) controlling thymidine kinase was concluded to lie on a 6-12-*X* group chromosome.

Analysis of cell surface antigens, cell morphology and chromosome complement of the hybrids has indicated that genes for surface antigens are widely distributed throughout the human genome, but genes for cell morphology are less widely so. Scaletta *et al.* (*Genetics*, **57**, 107; 1967), using hamster–mouse hybrids, show that a similar approach to gene mapping is feasible in other species. But in this hybrid the chromosomal changes, especially in the mouse genome, make it difficult to locate genes to chromosomes. This hybrid contains an enzyme (glucuronidase) of hybrid structure, so enzyme sub-units can be used as another genetic marker. Other hybrid enzymes have been found by Weiss and Ephrussi in rat × mouse hybrid cells.

An important feature of the mouse–human hybrid is the preferential loss of human chromosomes. The human cells were of a cell strain where cell death occurs naturally after about 50 generations, while the mouse cells were of an established cell line and are potentially capable of surviving independently. Although the hybrid seems to have cell line properties, the human complement has not had immortality conferred on it by its association with the mouse environment.

To extend work on mammalian genetics, many more marker genes are needed; also mutant cells must then be confidently isolated. Puck and Kao (*Proc. US Nat. Acad. Sci.*, **58**, 1227; 1967) show how the latter requirement can be very simply achieved with nutritional mutants. They use a technique by which the wild type cells are selectively killed off, leaving the mutants. But chromosomes must also be more specifically identified than is possible at present, especially in man and mouse. Moreover, if gene location is to be possible it will be necessary to recognize structural genes from their operators and regulators, and indeed to show that these latter exist in mammalian cells.

Viral Nomenclature

THE latest edition of *Progress in Medical Virology* (**9**, 476) describes how the International Committee on the Nomenclature of Viruses was set up. Until recently the nomenclature of viruses has been governed by a subcommittee of the International Committee on Bacteriological Nomenclature. This unsatisfactory state of affairs was brought to an end by the voluntary dissolution of the subcommittee and its replacement by a Provisional Committee on Nomenclature of Viruses which has now become the permanent ICNV responsible to the International Association of Microbiological Societies.

The committee was established by inviting each national microbiological society to nominate up to five delegates, who met for the first time in Moscow in July 1966. Under its president, Professor P. Wildy, the ICNV agreed to examine all true viruses, to define evident groups at the generic level and to suggest names for them. Four working subcommittees were established to deal with viruses of vertebrates, invertebrates, bacteria and plants; a fifth is concerned with the general utility and practicability of cryptograms in virology.

There is considerable disagreement within the ICNV; some favour an attempt at phytogenetic classification—despite the inevitable mistakes—and a binomial nomenclature, while others believe that the extent of knowledge about viruses is too small for this to do anything more than fossilize the mistakes. The subcommittees are also beset with difficulties of language—English must be used because Anglo-Saxons and Americans cannot express themselves in anything else, but this poses problems for abbreviation of names and their transliteration into Cyrillic and other scripts.

Despite difficulties and disagreements the subcommittees are working towards a tentative binomial nomenclature. They are studying criteria and suggesting definitions for species genera and subgenera. They are to select a type species for each genus and subgenus and to consider generic names. The cryptogram is also likely to be tried experimentally and the members of the subcommittee considering this are representatives of different branches of virology.

The ICNV has produced twelve rules so far. The code of bacterial nomenclature shall not be applied to viruses and the new code shall be international and universally applied to all viruses. An effort will be made to produce a latinized nomenclature, and where possible existing latinized names shall be retained. There will be no law of priority, no sigla shall be introduced, nor shall person's names or nonsense names. For pragmatic purposes the species is considered to be collections of viruses with like characters, and the genus is a group of species sharing certain common characters. Some orthographic rules have been approved. The ICNV is continuing its work towards a viral nomenclature.

Satellite Geodesy in Europe

from a Correspondent

FOR more than a year, laboratories in fourteen countries in western Europe have been collaborating in a programme of simultaneous observation of the Echo 1