NEWS AND VIEWS

Of Mice and Men

As the number of research workers setting their sights on the discovery of human tumour viruses increases—as it seems certain to do, especially in the United States where money for cancer research is becoming so easy to come by and money for anything else commensurately difficult to find—it can confidently be anticipated that there will be numerous repetitions of the sequel of events which has followed the report by Priori, Dmochowski and their colleagues (*Nature New Biology*, **232**, 61 ; 1971) that a cell line from a child with Burkitt's lymphoma produces a C-type RNA virus and which has culminated in the report by Gilden, Parks, Huebner and Todaro (see page 102 of this issue of *Nature*) that this is probably a mouse virus, presumably a contaminant.

Dividing cells, whether in an animal or maintained *in vitro* in cultures, provide an ideal environment for the replication of all sorts of viruses which have nothing whatsoever to do with malignancy. Any virus which by chance reaches a population of such cells is likely to become permanently established in it. And those biologists who are now turning to tumour virology, if only to keep themselves in a job, would do well to remember that whenever they find a virus in a fresh biopsy of tissue from a tumour or in a population of tumour cells in culture, the first priority is not to call a press conference but to recognize that the virus is probably a contaminant. As recent events seem to have shown, even such old hands in the game as Priori and Dmochowski can be tripped over by contamination, and their story is salutary.

Priori *et al.* established a monolayer cell culture from the pleural effusion of an American child with Burkitt's lymphoma. During the tenth passage of these cells they were found to bud typical C-type particles with all the morphological characteristics of the avian and animal RNA tumour viruses. Well aware of the problem of contamination, they apparently sent samples of their virus to Dr Old's group at the Sloan–Kettering Institute to have them classified by serological tests. The crucial question was simply does this virus have the group-specific antigen, which indicates species specificity, of any of the known animal sarcoma and leukaemia viruses or does it have a unique group-specific antigen which would strongly suggest that it is indeed a human C-type virus? Although Priori *et al.* gave few details of the tests performed in Old's laboratory they reported that their virus seemed to have a group-specific antigen different from any of the antigens of the known animal leukaemia viruses. Not surprisingly this result encouraged them to believe that they might well have isolated a human C-type virus, but both this result and its interpretation have now been seriously challenged by Gilden *et al.*

Gilden *et al.* obtained from Priori and Dmochowski some of the virus producing cells at their forty-first passage and taking every precaution to prevent any contamination of the cells in their two laboratories, they performed three sorts of immunochemical tests to see whether the virus was related to any of the known animal C-type viruses. The results of both complement fixation and radioimmunoprecipitin inhibition tests strongly suggested that something in the human, virus-producing cells carried the group-specific antigens of the mouse leukaemia viruses. Pursuing this lead, they then performed immunodiffusion tests with sera specific for the mouse virus group-specific antigen and sure enough found a precipitin line of identity between highly purified murine group-specific antigen and concentrates containing the virus liberated by the human cells. In short, these results must mean either that the virus being produced by Priori and Dmochowski's cells is murine leukaemia virus, which presumably somehow contaminated the cultures, or mouse and human C-type viruses have group-specific antigens which cannot be differentiated by these tests. This second alternative seems to be most unlikely and, if the results of Gilden *et al.* can be independently confirmed, it will be hard to avoid the conclusion that the virus Priori *et al.* have isolated is anything other than a contaminant and a red herring.

But as one putative human cancer virus is eliminated, others are turned up. The two virus-like particles from cultures of cells from patients with Hodgkin's disease, which Kingsley Sanders's group describe on page 104 of this issue of *Nature*, for example, must be suspect until they have been further characterized. Perhaps stimulated by the fascinating epidemiological study of a rash of Hodgkin's disease cases among the 1954 graduating class of a New York State high school, which lead Vianna, Greenwald and Davie (*Lancet*, i, 1209 ; 1971) to conclude that Hodgkin's may well be an infective disease with a long incubation period and a carrier state, Kingsley Sanders and his colleagues established a number of long-term cell cultures from lymph node material of Hodgkin's patients and searched for virus particles. The cells in the cultures underwent some bizarre changes including a "blastoid transformation" during which "practically every reticular cell could be seen to have one or more round cells within it", but they also began producing two sorts of virus-like particles. One of these is apparently a DNA containing particle which under the electron microscope resembles a herpes virus and there is evidence that the cells after the blastoid transformation have herpes virus antigens. The second particle which has so far defied all but the most preliminary characterization apparently contains RNA but under the electron microscope nothing with the characteristic morphology of a virus has yet been seen.

Obviously these observations are extremely preliminary; whether or not these cells are producing an RNA virus remains to be seen and the significance of the herpes virus is at present anybody's guess. Nevertheless, the findings of Vianna *et al.* strongly suggest that a virus which plays a part in the aetiology of Hodgkin's disease awaits discovery and it can be certain that Kingsley Sanders and his colleagues will soon find themselves in a crowded field, for if so many workers are set on searching for human cancer viruses they may as well concentrate on one of the extremely few forms of human cancer for which there is at least some epidemiological evidence to suggest the existence of a virus. And it scarcely needs adding that a more extended investigation of the epidemiology of Hodgkin's disease would not come amiss.