corpuscles—normally biconcave disks—are distorted into sickle-shaped cells. These cells clump together and block the lumen of the smallest blood vessels, impeding the flow of blood. The reduced oxygen supply leads to necrosis of the tissue, which most commonly occurs in the small vessels of the spleen where it causes severe abdominal pain.

Green *et al.* describe seven patients who suffered sickling crises during flight—one of whom was only a carrier of the disease but flew in an unpressurized aircraft at high altitude. The others were all homozygous for the disorder, but three of them aged between 22 and 48 had suffered no previous symptoms and were unaware that they had the disease. One interesting case involved a 15-year-old Jamaican girl known to have sickle cell disease of the haemoglobin C variety who first encountered the symptoms during a flight to Mexico City. Her symptoms persisted for five days until she moved to sea level at Acapulco.

Oddly enough, negroes with severe sickle cell anaemia may have fewer problems in flying than those with mild forms. This possibility arises because sufferers from the severe form of the disease have had so many similar episodes arising from minor provocations—such as respiratory infections—during childhood that much of the spleen has already been infarcted. This means that the flow through the small vessels of the spleen has already been largely cut out. A further factor in such patients is that they are anaemic from the constant destruction of red blood corpuscles by sickling so that their blood flow is less viscous and less likely to become blocked. The most severe effects during flight are seen in those sufferers with haemoglobin C who are normally asymptomatic and not anaemic, and whose blood is of comparatively high viscosity.

Should there therefore be a revision of the 1961 recommendations of the Aerospace Medical Association which say that travellers with severe sickle cell anaemia or with haemoglobin C should not fly? In one sense these recommendations seem draconian in that sufferers from severe sickle cell disease may face little risk, and the recommendations may be an unnecessary obstacle to these negro travellers. In view of the findings of Green *et al.*, however, the recommendation with respect to haemoglobin C seems fully justified.

The problem is that of ensuring that travellers do not have the asymptomatic form of the disease. Hospitals already carry out screening procedures on patients of negro origin who are to be given anaesthetics, for severe sickling can occur if the oxygen tension is allowed to fall under anaesthesia. When the possibility of sickling is anticipated, it can be prevented by giving high oxygen concentrations and intravenous sodium bicarbonate. The screening technique involves the microscopic examination of blood films under reduced oxygen pressure. If the characteristic sickling is seen, the exact type of disorder can be determined by electrophoresis. It may be that all prospective negro travellers should be screened in this way—certainly screening is essential for all aircrews.

AQUATIC BIOLOGY

New Unit

A NEW Unit of Aquatic Pathobiology has been established at the University of Stirling with the help of a grant of £76,000 from the Nuffield Foundation. The director will be Dr R. J. Roberts, who is at present at the University of Glasgow. The university has on its campus a twenty-four-acre loch, an aquarium, and is close to the Forth estuary, so that the unit will be ideally situated for research on fish pathology, a field in which there is at present a need for far more research, particularly in connexion with the growing industry of fish culture. There is also a shortage of veterinary and scientific staff qualified in the field, and in this regard the new unit will have a programme of teaching at both the undergraduate and postgraduate level.

CELL TRANSFORMATION

Surfaces Involved

from our Cell Biology Correspondent

TUMOUR virologists are, of course, always on the lookout for new parameters which they can measure and thereby decide whether a cell is transformed or untransformed. The classical parameter, the continued division of transformed cells in environments which severely restrict or totally inhibit the

Distinguishing Atlantic Cherts

ONE of the many unexpected results to emerge from the JOIDES Deep Sea Drilling Project has been the discovery of cherts in drill cores over a wide area of the north Atlantic. But what exactly are cherts? In general terms they are highly siliceous rocks comprising microcrystalline quartz and/or chalcedony—the chalcedony serving to distinguish them from other forms of sedimentary silica. On the other hand, Rex (in *Initial Reports Deep Sea Drilling Project*, Vols. 1 and 2; 1969 and 1970), in his preliminary report of Legs 1 and 2 of the JOIDES Project, included within the term chert rocks composed of cristobalite, a rather different form of SiO_2. Thus although there is no doubt about the general definition of chert, the overall term covers differences in petrological detail.

Definitions as such are perhaps not too important except in so far as differences in petrological detail may conceal significant differences in origin. The upper Jurassic to middle Miocene cherts discovered in the Atlantic during Legs 1 and 2 of the JOIDES Project, for example, are widespread and occur in a wide variety of sediments including radiolarian oozes, nannoplanktonic chalks, zeolitic clays and foraminiferal silts. For these reasons alone, therefore, they are clearly important; and petrological differences are likely to imply differences in formation which could be significant. The recognition of such differences is thus critical, not least because the cherts have sometimes been correlated with seismic horizon A.

In next Monday's *Nature Physical Science* Calvert reports further on this theme. He confirms that the two forms of chert are clearly in evidence in the Atlantic but prefers to limit the term chert to the quartz-containing variety. The true cherts are thus the pre-upper Cretaceous samples whereas the younger "cherts" are, on the evidence of X-ray diffraction and infrared absorption data presented by Calvert, composed largely of disordered α-cristobalite.

It further emerges that the infrared absorption and X-ray diffraction spectra from the north Atlantic "cherts" are identical with those reported from siliceous concretions in Tertiary volcanic sequences, porcelanites from the Miocene Monterey Formation and certain common opals. In short, such silica structures are quite common in younger geological formations, are distinguishable from true cherts and, in Calvert's view, are better referred to as porcelanites. The origin of these porcelanites is not yet clear, however.

The classic definition of chert includes the possibilities of both organic and precipitate origin—and this may be relevant here too. For example, Ernst and Calvert (*Amer. J. Sci.*, **267A**, 114; 1969) regard the Monterey porcelanites as "an intermediate phase in the diagenetic modification of biogenous silica (diatomite) to chert, a phase which is not preserved in older (pre-Cenozoic) formations". The north Atlantic porcelanites may be similar; but they could equally well be alteration products of volcanic debris.