Registry of abnormal karyotypes

An international registry of abnormal chromosomes has been set up by the Division of Medical Genetics of Johns Hopkins University. Dr D. S. Borgaonkar and Mr D. R. Rolling have been gathering data into a computer for the past eleven months and hope to continue to receive details of new and existing human chromosome abnormalities. They aim to establish a sufficiently comprehensive collection to provide information about the prevalence of human conditions, such as Down's syndrome, which are characterised by chromosome abnormality, and to give cytogeneticists a means of exchanging data which might otherwise be lost in their files.

The computer records the name of the person reporting the karyotype, the laboratory where the work was done, the date it was reported, and the arm, region and band of the chromosome on which the rearrangement responsible for the abnormality was found. The registry is being organised on a basis similar to that of Dr Borgaonkar's book *Chromosomal Variation in Man: A Catalog of Chromosomal Variants and Anomalies* (Johns Hopkins University Press, Baltimore, in the press). The book, which was compiled with help from the Institute of Medical Research at Camden, New Jersey, where there is a repository of abnormal karyotype cultures, and Dr F. Ruddle's laboratory at Yale University, consists chiefly of published information. The registry, on the other hand, is being compiled mostly from unpublished data. Print-outs are planned to appear two or three times a year and will be available at cost.

Dr Borgaonkar hopes that, using data in a similar way, it will be possible to catalogue break-points on the mammalian X chromosome of different species to reveal 'hot spots', where unusually large numbers of breaks are reported. He also foresees catalogues of chromosome variation for species such as the common mouse, *Mus musculus*, which has well defined chromosome regions.

The response to requests for data so far has been encouraging. Some regional centres have been set up already, for example in Greece, Belgium, Moscow and Madison, Wisconsin, where reports of new abnormal karyotypes are collated and sent on to Dr Borgaonkar and Mr Rolling.

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anisotropy, and that this will tend to lie parallel to an applied magnetic field.

The directions of the axes of anisotropy in both A and B phases are expected to be strongly influenced by the container walls. The reason for this is particularly easy to appreciate in the case of the A phase, for it is intuitively obvious that, unless the orbital plane of a Cooper pair is parallel to the wall, there is a danger of one of the atoms bumping into the wall and so breaking the pair. Pair-breaking requires energy, and so the liquid reduces its total energy if it orients its pairs to rotate about axes perpendicular to the walls. Although the B phase is more complicated, here, too, depairing effects determine that the axis of anisotropy must be perpendicular to the wall. In fact, of course, it is not possible, even by bending the axis, to arrange that it should meet every wall of a given container at right angles unless there exist one or more singularities at which the local anisotropy axis is undefined, and these will presumably position themselves in such a way as to minimise the total energy of the liquid, contributing to a texture which is dependent on the shape of the container.

When a magnetic field acts upon the liquid in a container of finite size, the texture must be even more complicated. One may, however, assume that the field, provided it is strong enough, will overcome the effect of the walls in determining the direction of the anisotropy axis at positions sufficiently far from the walls: there will be a characteristic distance r_c, dependent on field and temperature, within which the anisotropy direction moves from a wall-dominated to a field-dominated situation. Brinkman *et al.* calculated r_c for the B phase on the assumption of a Ballian–Werthamer state and found that for $T \ll T_c$ it should be about $10/B_0$ mm with the magnetic field B_0 in mT or, in other words, comparable with the typical dimensions of a pickup coil for low field NMR. This implies that over a significant region of the sample the anisotropy axis will not be exactly parallel to the magnetic field, which will have the consequence of locally raising the frequency at which resonance occurs. The net effect is therefore an asymmetric broadening of the NMR resonance line towards higher frequencies, a broadening which should have a strong negative dependence on the magnitude of the applied magnetic field.

A field-dependent broadening of the resonance is precisely what the Helsinki group has observed in the B phase, and although they have apparently not been able to check the detailed lineshape with that expected, the magnitude of the broadening seems to be in reasonable quantitative agreement with prediction. It was noted however, that the integrated NMR absorption was significantly lower than the calculated value. NMR measurements were also made on ^{3}He in the interstices of fine platinum powder, and it was observed that for small fields the signal broadened and disappeared rapidly as T was reduced below the transition temperature. This again is consistent with the picture of Brinkman *et al.*: the liquid in each void will have its anisotropy axis determined almost entirely by wall effects because the void dimensions are less than r_c, so that the liquid takes up a domain-like structure with each domain in a different orientation relative to the applied magnetic field. The resonant frequency for each domain is therefore different so that, for the system as a whole, no resonance is seen.

Taking account of the discrepant behaviour of the integrated NMR absorption, and also in view of some earlier measurements of the static magnetic susceptibility, some doubt must inevitably remain as to whether ^{3}He–B is really in the Ballian–Werthamer state. Further experiments, in particular measurement of the specific heat for $T \ll T_c$, will be required before the question can finally be settled. There seems little doubt, however, that both of the new liquid phases of ^{3}He enjoy the curious distinction of being anisotropic, magnetic superfluids which display textures when contained in finite vessels.

Earth wobble, day length and continental drift

from David W. Hughes

Two well known facts have recently been combined in a rather fascinating way. The first is the period of Chandler's wobble, the second the secular decrease in the Earth's rotation period. The combination has been carried out by Cannon of York University, Toronto, Canada in a recent edition of *Physics of the Earth and Planetary Interiors* (**9**, 83; 1974).

The Earth is usually thought of as rotating once a day about an axis which passes through the North and South Poles. The picture is not quite so simple because the Earth is not a perfect globe but an imperfect oblate spheroid with unequal principal moments of inertia. The axis of symmetry of this oblate spheroid possesses