type X chromosome was activated).

These frequencies should have been determined by the clonal compositions of the cells which provide the immediate progenitors for the coat, that is they depend on the formula $(p'+q')^{n'}$, and so provide experimental values for the frequencies of the fractions $(p')^{n'}$ and $(p')^{n'-1}.q'$. To relate these values to the initial clonal compositions at the time of X activation (that is to p, q and n) requires knowledge of n'. Given a value for n', it is then possible to test various combinations of p, q and n to see which values would generate cell populations from which animals monoclonal for the coat would be produced at the observed frequency. This involves summing several possible situations, since, for example, a monoclonal coat may arise not only whenever the original embryo was monoclonal but also whenever the progenitor cells of the coat by chance were descended only from cells with an active 0^{hv} X chromosome; when the number of immediate progenitor cells is sufficiently large, the entirely mutant adult phenotype should occur only in individuals which started their development with very one sided clonal compositions.

The *Blo* mutation is therefore particularly well suited to such analysis, for the development of the cells in which it is expressed has previously been studied in some detail. *Blo* acts in mesodermal cells of somite origin, thought to result from the reproduction of 35 pairs of somite clones distributed along both sides of the vertebral column (Lyon, *Phil. Trans. Roy. Soc.*, **B259,** 41; 1970), suggesting a value for n' of 70. Animals with coats entirely of the *Blo* phenotype are too rare to measure in appreciable frequency, so Ohno *et al.* measured the frequency of occurrence of animals with a coat one half of which (corresponding to one side of the vertebral column) shows the *Blo* phenotype. This frequency, 41 in 2400 or 1.7×10^{-2}, provides an estimate of the frequency of the class p'^{35}; the square of this frequency, 2.9×10^{-4}, can thus be taken as an estimate for p'^{70}.

This total frequency might be produced by several combinations of p, q, n. To decide upon the most likely, Ohno *et al.* utilised their estimate of the frequency of occurrence of the class $p'^{69}q'$, that is the proportion of animals with only one wild type clone apparent in the coat; this was 3 in 2,400 or 1.25×10^{-3}. Although the accuracy of this estimate is not great, because of the small number of animals involved, this value can usefully be compared with the estimate for p'^{70}. Taking both values into account, Ohno *et al.* were able to show that a close fit to the data would be produced by $p=0.8$, $n=60$. In other words, the 0^{hv} allele confers an 80% probability that its chromosome will be activated; and the number of cells in the embryo at the time of decision may be close to 60.

How accurate is this estimate and what further tests may be made of it? One assumption upon which these experiments rely is, of course, that all 35 pairs of somite cells arise independently from some undifferentiated pool and not from a smaller pool of cells which then multiply upto 70. It would be useful if this point could be confirmed in future. Given the comparatively small numbers of animals which can be examined under the experimental conditions imposed by this system, the measured frequencies must clearly be taken as approximations and not precise values; but the value for n of 60 cells is consistent with the previous suggestion that the time of decision is soon after the blastocyst stage. It is therefore likely that 0^{hv} influences only the decision on activation and does not change the time at which it is made. Increased accuracy for these estimates would obviously be lent by determining clonal compositions and thus values for p, q and n from some other adult phenotype. But these qualifications do not detract from the importance of this seminal study, whose sophisticated manipulation of the mouse system has provided a useful estimate for the cell number in a mammal when the decision is taken on X activation.

B.L.

More about Mercury

by our Cosmology Correspondent

MARINER 10 has done more than just send back some impressive pictures of Mercury, looking so very much like the Moon that one radio astronomer remarked recently that for all he knew they were in fact previously unreleased Lunar Orbiter photographs. The six non-imaging experiments on board the spacecraft have provided a new insight into the nature of the closest planet to the Sun, and this shows clearly how Mercury fits into the overall picture of the Solar System.

The photographs have, of course, contributed to this. The front cover illustration this week shows a region very similar to the terrain of the Moon, with a large, flat bottomed crater about 100 km in diameter (about the same size as the lunar crater Copernicus), linear grooves probably produced by crater ejecta, and so on. Together with pictures of Mars obtained by the Mariner series of spacecraft and by Soviet spacecraft, the latest NASA achievement emphasises the broad similarities between the inner planets of the Solar System. It now seems almost beyond doubt that Venus too will be found to be cratered and scarred by impacts and volcanic activity, although the evidence there may have been largely eroded away.

If the overwhelming impression of the visual evidence is that the inner Solar System forms a family of related planets, the non-visual data confirm this and indicate the way in which the distance of each planet from the Sun determines its individual characteristics within the family. Mercury turns out to be rather more massive than was expected, with a density of 8 g cm^{-3} implying that as much as two-thirds of it is composed of iron or iron group elements. The presence of a clearcut gradient in the densities of the planets in sequence outwards from the Sun obviously ties in neatly with the idea that more volatile elements condensed further out in the collapsing proto Solar System. And a large amount of iron could also explain the unexpectedly large magnetic field of Mercury. At some 200 to 300 gammas for the extrapolated strength of the field at the planet's surface, this is about 1% of the Earth's field; the favoured view at present is that this is a permanent field, and is not induced by a dynamo effect.

Among the other surprises already arousing interest is the discovery of a tenuous atmosphere around Mercury. This discovery will delight amateur astronomers, since reports that such an

Littorinid group

LITTORINIDS are present on the rock shores of all continents and present some intriguing taxonomic problems. The first symposium restricted to this family of the prosobranch Gastropoda was held at the Royal Scottish Museum, Edinburgh on March 19 under the chairmanship of Sir Maurice Yonge. Of the talks on taxonomic trends in the Littorinidae, perhaps the most noteworthy contribution was the evidence of J. Heller (University of Liverpool) that the polymorphic species *Littorina saxatilis* (Olivi) should be regarded as containing at least four separate species.

The meeting unanimously endorsed the suggestion that an informal littorinid group should be formed, with an international membership, as far as possible comprising all workers actively interested in these gastropods. Anybody wishing to learn more about the group should write to the appointed coordinator C. Pettit, Manchester Museum, The University, Manchester M13 9PL, England.

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