# Ambiguous gravity

*from Peter J. Smith*
*Geomagnetism Correspondent*

THE chief difficulty in gravity interpretation is that gravity anomalities by themselves can never be used to determine subsurface structure uniquely. There is always a very large, and in theory infinite, number of structural solutions consistent with any observed anomaly, although in practice the quantity of possible structures may often be reduced to more manageable proportions by a combination of common sense, experience of comparable environments, and complementary geological, geophysical or geochemical data. In the end, however, the decision about the 'most reasonable' structure model is likely to depend as much on the quality and amount of the support data as on the gravity anomaly itself.

Disagreements over the interpretation of gravity are therefore common, especially where associated non-gravity data are poor; and this seems to be the situation in the Galapagos Islands. Last year, Case *et al.* (*Science*, **181**, 1040; 1973) reported that over the islands there is a residual negative anomaly of at least 80 mgal superimposed on a broader positive anomaly of unknown amplitude and extent; and they interpreted this in the light of geological evidence in terms of a low density subsurface region related to a hot spot or mantle plume.

But those earth scientists (and there are many) who do not believe in plumes may breathe again, for Watts and Cochran (*Science*, **184**, 808; 1974) have now come up with a model involving simply downwarping of the lithosphere under the weight of the islands—an alternative actually considered and not entirely discounted by Case and his colleagues themselves. Watts and Cochran do not claim their structure is necessarily the right one, nor that a plume does not necessarily underlie the Galapagos; their main point is to re-emphasise the inherent ambiguity of gravity data. Everybody agrees that the matter will not be resolved until other, perferably seismic, data become available.

# Hedgerow removal and bird life

*from Peter D. Moore*
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IN 1962 it was estimated that there were 616,000 miles of hedges in Great Britain (Locke, *Q. Jl For.*, **56**, 137; 1962). This was calculated by Moore, Hooper and Davis (*J. appl. Ecol.*, **4**, 201; 1967) to represent an area of 448,000 acres, which was more than twice the area of the British National Nature Reserves of that time. It was further suggested in these reports that the number of breeding bird species in agricultural land was about twice as great in regions with hedges than in areas where hedges had been removed. Very naturally these authors regarded the extensive clearance of hedges in Britain as one of the principal detrimental events in land management in recent years and it had lead in particular to a reduction in the quantity and diversity of bird life in rural districts.

These findings have been generally accepted, but Murton and Westwood (*Br. Birds*, **67**, 41; 1974) now question their validity. These authors claim that the overall diversity of birds in a 200-acre sample area of agricultural land in Cambridgeshire has changed little, and may even have increased, since it was last censured in 1960–61. This is despite a reduction in hedgerows to one third of their former extent and the reclamation of half of the area then considered 'rough and waste'. These results are bound to cause confusion among conservationists.

One should first ask what is meant by diversity in this context. Murton and Westwood use an index of diversity devised by Fisher, Corbett and Williams (*J. anim. Ecol.*, **12**, 42; 1943) which is based on the assumption that the frequency distribution of species ranked according to the number of individuals by which they are represented, follows a logarithmic series. Although this frequency relationship has often been demonstrated in plant and animal communities, such theoretical indices can be misleading; an empirically derived diversity measure would have been preferable (see Hurlbert, *Ecology*, **52**, 577; 1971).

Whatever the relative merits of diversity indices, one is still faced with the fact that during the ten year period, the total number of species recorded in summer rose from 63 to 66 (although 19 of these species had decreased in numerical abundance) and in winter fell from 65 to 59; in effect there was little change in the total number of species recorded. Murton and Westwood account for this by considering the hedgerow to be a suboptimal habitat for most species which breed in them. Hedgerow removal therefore results in either a retreat of the species to optimal sites (such as woodland) or a modification in the bird's breeding behaviour (blackbirds may nest among the stumps of the cleared hedgerow and along ditch banks). Less adaptable species such as the song thrush may decrease, but are often replaced by other species such as the reed bunting.

These explanations are very acceptable but they do suggest that the area sampled is not typical of regions in which hedgerow clearance has been practised. It differs in the retention of woodland fragments, hedgerow stumps and ditches, all of which serve to maintain diversity. Their conclusions cannot, therefore, be construed as general principles relating to the widespread effects of hedgerow removal.

# Lethal mutants in *Drosophila* development

*from Benjamin Lewin*
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THE imaginal disks of *Drosophila* provide one of the most promising systems for the genetic analyses of development and the recent isolation of many lethal mutants in disk development is therefore an important step towards defining the components of the system. The disks are larval tissues which subsequently give rise to many of the adult tissues; they include wing, leg, antenna and eye disks. Each disk is thus determined to produce a particular adult structure, the differentiation of which is triggered on metamorphosis. The disks provide an interesting experimental system, for passage of disks through the abdomens of adult flies allows indefinite continued growth, without loss of the determined state (which can be tested by injected tissue into larvae and identifying the adult tissues formed from it after metamorphosis). Transdetermination occasionally takes place, when the state of determination of tissue changes from one disk type to another; and homoeotic mutants exist in which certain disks give rise to adult structures usually formed from other disks.

The independence of the programmes for larval and adult development in *Drosophila* is emphasised by the observation that mutants which prevent disk development may be lethal to the adult but need not affect the larval stage at all. The characterisation of lethal mutants which affect all the disks is reported by Shearn and Garen in the April issue of the *Proceedings of the National Academy of Sciences* (**71**, 1393–1397; 1974). The mutants fall into two classes: *diskless* mutants form no imaginal disks; whereas *small disk* mutants form some or all of the disks, but whichever are present are small, misshapen and cannot differentiate into adult structures.

Mutants were isolated by screening for lethals dying in late development after treatment with chemical mutagens. The 23 *diskless* and 34 *small disk* mutants fall into 52 complementation groups; 48 groups contained one