Rodent aggression

from our Animal Ecology Correspondent

The annual cycle of aggressiveness now demonstrated to occur in several species of rodent (Turner and Iverson, *Ecology*, **54**, 967; 1973, Krebs and Myers, *Adv. ecol. Res.*, **8**, 238; 1974) may have an ecological and even evolutionary function of much wider significance than has hitherto been thought. The species *Clethrionomys gapperi* and *Microtus pennsylvanicus* are found in forest and grassland habitats respectively and seldom occur in the same habitat (Grant, *A. Rev. ecol. Syst.*, **3**, 79; 1972). When populations are not expanding rapidly dispersal is minimal. During periods of expansion considerable dispersal occurs resulting in invasion of normally ignored habitats. Iverson and Turner reported such an event occurring when enlarged *Clethrionomys* populations invaded *Microtus* habitats (*Am. Midl. Nat.*, **88**, 440; 1972), but now it has been shown that either species can be the invader.

Working in spruce forest and old field habitats in Manitoba, Turner, Perrin and Iverson have analysed the components of the tidal effect of an invasion of a *Clethrionomys* forest by *Microtus* and shown the part played by the annual cycle of aggressiveness in returning the situation to normal (*Can. J. Zool.*, **53**, 1004; 1975). During the late autumn of 1973 a significant influx of *Microtus* into forest land was observed. Coexistence with resident *Clethrionomys* occurred throughout the winter but came to an abrupt end in May 1974. Intraspecific aggression of both species fell to its lowest during the winter, and with it the level of interspecific aggression. In paired encounters neither species was dominant over the other. Dominance was assessed by scoring the number of aggressive acts performed per standard encounter (*Nature*, **247**, 254; 1974). At the start of the breeding season both species became reproductively mature and both intra- and interspecific aggression increased four-fold.

Curiously enough, early in the breeding season *Microtus* became markedly dominant, winning nearly all ecounters. That they did not displace the resident *Clethrionomys* is thought by Turner and his colleagues to be due to the (unspecified) advantages provided by the home habitat. By early May all the infiltrators had gone leaving the forest once more to the *Clethrionomys*. It seems that coexistence is possible only when interspecific competition is at a low ebb and that it is linked to the reproductive cycle. If resource partitioning is of selective advantage in the summer, why is it not of equal importance in the winter? Food for these species is never likely to be limiting although it will fluctuate in abundance during the year, so summer food shortage is unlikely to be the wedge driving each species back to its own habitat. The sudden cease in hostilities, coinciding with the start of widespread dispersal in early autumn, means that very many more individuals survive for much longer than would be the case if temporary, out-of-range residence was not possible. This has two main effects; one is to allow emigrés to continue their search for fresh pastures, with all the evolutionary advantages this may confer (Christian, *Science*, **168**, 84; 1970); the other is to maintain a higher biomass of rodents during the winter than would otherwise be possible. This allows the existence of larger stocks of predators and a correspondingly higher secondary productivity.

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of the biological significance of these structural findings is whether the conformation observed in the solid state is a representation of that existing in solution. Chen, Giege, Lord and Rich (*Biochemistry*, **14**, 4385; 1975) have attempted to answer this point by examination of the laser Raman spectra of yeast $tRNA^{Phe}$. This technique has the advantage over others in that spectra can be observed in both solution and crystal; furthermore, conformational changes can often be readily detected. The observed spectra are almost identical in the two environments. Chen *et al.* also examined the spectra from both the orthorhombic crystals and a hexagonal modification, which again had essentially the same pattern of Raman frequencies and intensities. They conclude therefore that the tertiary structure of this tRNA is not only conserved in different crystal forms, but most importantly, in solution.

The next stages in the tRNA saga must be to relate this structure to its multifarious biological functions. Present attempts are necessarily speculative. Ladner *et al.* have rightly drawn attention to the quite pronounced segregation of the invariant and variable bases at several places in the crystal structure, which they suggest may be involved in synthetase recognition in one instance, and in ribosomal binding in another. It is to be hoped that the structural studies on synthetases now in progress will answer some of these questions. Kim has also recently turned his attention to synthetase binding (*Nature*, **256**, 679; 1975) and has suggested that symmetry recognition might be important. He has observed that the tRNA crystal structure has approximate two-fold symmetry; sequence data on synthetases suggest that the subunits might also be internally organised into two domains related by two-fold symmetry. It was then straightforward to construct hypothetical symmetrical binding schemes for the two sets of domains in the two molecules; at present, these seem not implausible. ☐

Making galaxies from stars

from M. G. Edmunds

GALAXIES are made of stars. Perhaps the simplest way to model the formation of a galaxy is to imagine a random distribution of stars in space, add a suitable amount of energy, and let the gravitational forces between the stars go to work. Provided not too much energy is put in, the stars will form a more spatially condensed system—a galaxy. Recently J. R. Gott (*Astrophys. J.*, **201**, 296; 1975) has described some interesting model building of this social behaviour of stars.

Elliptical galaxies are observed to be spheroidal systems of stars which contain very little gas. Despite considerable variation in the flattening between different galaxies, the distribution of light from the galaxies as a function of distance from the centre of each system is remarkably similar. This observational relation, originally discovered by Hubble (Hubble's Other Law!), can be used to infer the radial distribution of the mass density of stars within a galaxy. Previous simple models of the gravitational contraction, or "collapse", of elliptical galaxies have given too rapid a decline of the density of stars with radius. The disagreement has led other workers to build more complicated models which introduced star formation and gas to affect the dynamics of the collapse. Gott has now resolved the discovery with observation, relying on stellar dynamics only. He assumes that small fluctuations occur in the density of a smooth Universe as it expands from the Big Bang. Stars form and the stars in a region of high density collapse together to form a protogalaxy. The new feature of his model is a continuous increase in the mass of such a protogalaxy by the infall of stars from surrounding regions. One other process is invoked: as the Universe expands, a protogalaxy can experience gravitational tidal forces from

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