both equal to one, the numbers of both phenotypes affect each other equally: if α and β are both zero, the numbers of one phenotype have no effect on the fitness of the other. Clarke's definition means that the density-dependent fitnesses must lie in the range from one when numbers are low to zero when numbers tend to infinity.

Not only is Clarke's model genetically reasonable with fitnesses lying in the correct range of values, but it also produces a logistic model of population growth, and is therefore ecologically reasonable too. Thus, if the population is monomorphic with only one phenotype, say m, present, Clarke's model is then approximately the same as the logistic equation.

Clarke shows by his analysis of the model that there is a wide range of values of the parameters which allow for the establishment of balanced polymorphisms. It is interesting that when the numbers are low, the density-independent selective values determine the spread or elimination of the gene and selection is mainly for increased reproductive rate. Selection of this sort has been called "*r*" selection as opposed to "*K*" selection for increasing the carrying capacity of the population. Both types of selection are incorporated in Clarke's model. Darwin himself was well aware that selection for increased reproductive rates, or *r* selection, would not by itself increase the final size of the population and Clarke's model makes these ideas quantitative. Clarke also shows that in his model a polymorphic population consisting of both phenotypes will generally be larger than a monomorphic one. Thus his model describes quantitatively another fact which Darwin had originally noticed.

In the *Origin of Species*, Darwin explained that populations of mixtures of different varieties produce greater yields than populations of only one variety: if different varieties have slightly different environmental requirements they will compete less as individuals than the individuals of a single variety all competing for the same requirements. Clarke gives the conditions that a polymorphic population should be larger than a monomorphic one. They can be stated in terms of the carrying capacities, K_1 and K_2, of the two monomorphic populations. In Clarke's notation K_1 and K_2 are equal to $k_1(w_1-1)$ and $k_2(w_2-1)$ and his conditions are then $\alpha<K_1/K_2$ and $\beta<K_2/K_1$. For example, if both phenotypes have the same monomorphic carrying capacities, and will both therefore reach the same final population size, then the inequalities show that α and β must both be less than one if the polymorphic population is to be larger than the monomorphic ones. This simply means that the fitness of one phenotype must be reduced less by a given number of individuals of the other phenotype than by the same number of its own phenotype. The model gives an exact quantitative expression to Darwin's idea.

Thus, for the first time, there is now an ecological and genetical model which combines the essential observed features of both ecological and genetical data. Bryan Clarke has produced a simple and realistic model which is the first step towards a theoretical ecological genetics.
—From our Population Genetics Correspondent.

TUMOUR VIRUSES

Unexpected Integration

from our Cell Biology Correspondent

WHEN polyoma virus or simian virus 40 infects and transforms a non-permissive cell, viral genomes are apparently stably integrated in the host genome such that they are transcribed and also inherited as the transformed cells multiply. When, by contrast, these viruses replicate in the nuclei of permissive cells, which eventually lyse, it has generally been assumed that the replicating viral genomes remain free and independent of the host genome. The argument has always been why complicate the issue by invoking integration during the lytic cycle in the absence of any data which might hint of integration in such circumstances?

Of recent months, however, the notion that SV40 or polyoma virus genomes might integrate into permissive host cell genomes has become noticeably more widely mentioned as a possibility yet to be excluded. Now the latest issue of the *Journal of Virology* contains a pair of reports, by Lavi and Winocour and by Tai, Smith, Sharp and Vinograd (**9**, 309 and 317; 1972), which indicate that during the replication of SV40 in permissive cells recombination events leading to the integration and excision of the viral DNA can and do occur even though they may not be a prerequisite of the replication of the virus.

Winocour and his colleagues reported in 1969 that DNA extracted from SV40 particles which had been grown on BSC 1 cells hybridized to a significant extent with BSC 1 DNA, from which they concluded that host DNA had become covalently incorporated into at least some of the viral DNA molecules. When other groups failed to repeat these observations, however, there was a widespread tendency to disregard them. But Winocour per-

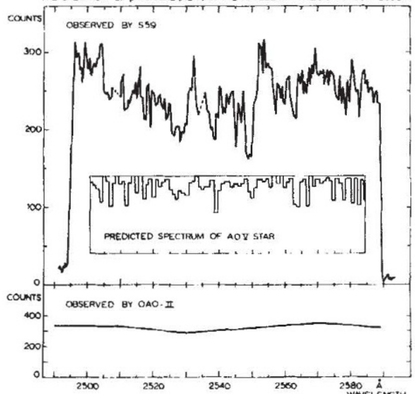
TD-1A Looks at Stellar Atmospheres

NEXT Monday's *Nature Physical Science* (April 24) contains data from the first satellite equipped to obtain high resolution spectra of stars in the ultraviolet between 2000 Å and 3000 Å. The illustration shows part of the spectrum of the first star to be observed, β Aurigae, with for comparison a spectrum of the same object obtained by the Orbiting Astronomical Observatory OAO 2 which had lower resolution.

The spectrum was obtained by the European satellite TD-1A on March 20, a week after its launch from the Western Test Range, and is reproduced in an account of the functioning of the ultraviolet spectrometer by the Dutch group responsible. They also show a spectrum of β Aurigae near 2800 Å, in which the Mg II lines which are expected to give new information on the physical conditions in the outer stellar atmosphere are prominent.

The Dutch group explain that the experiment was proposed by Professor C. de Jager (Astronomical Institute, Utrecht), and that spectra can be obtained in three wavelength bands of width 90 Å, centred near 2110 Å, 2540 Å and 2820 Å. The spectral resolution is 1.8 Å. Detailed ultraviolet spectra will be valuable for the information they are expected to give about conditions in the atmospheres of young stars which also tend to be hot.

In the first sequence of observations spectra were obtained for γ Columbae (magnitude 4.35) and 67 Ophiuchi (magnitude 3.97) as well as for β Aurigae (magnitude 1.90). According to the Dutch group it will be possible to observe two hundred stars of spectral types O, B and A brighter than magnitude 4.5.



Spectrum of β Aurigae, the first star to be observed with the stellar spectrophotometer on board the European satellite TD-1A, with for comparison the predicted spectrum for a star of type AO and a spectrum obtained by the Wisconsin package on OAO 2.