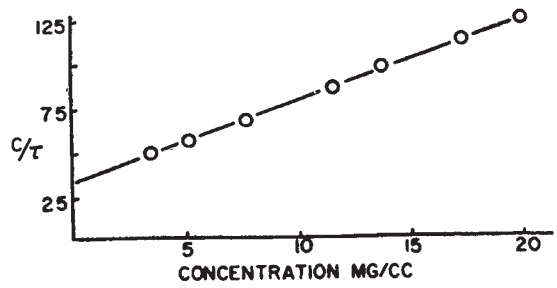

Fig. 2. Concentration-turbidity dependence for potassium penicillin *G* in 0·5 *M* potassium bromide

expediently determined with a differential refractometer and has a value of 0·185. Since these figures indicate a very low scattering system, in contrast to that expected from other work[3], we can ascribe a value of 3,000 as an upper limit to the molecular weight of any particles present.

The angular scattering data, Fig. 1, which indicate no dissymmetry, at once place an upper limit of 300 A. on any particles which may be present. In addition, the molecular weight maximum also dismisses the existence of large micelles of potassium penicillin *G* in the above concentration-range. Thus, although potassium penicillin *G* is slightly capillary-active, as evidenced by a small degree of frothing on shaking its solutions, the bulk phase contains associations of relatively few molecules even under conditions which enhance micelle formation and which also resemble more closely those encountered in biological systems.

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So-called Non-adaptive or Neutral Characters in Evolution

The reaction that set in some thirty years ago against the facile assumption that all interspecific differences are adaptive was good but went too far. Several authors insisted that most specific and subspecific differences were non-adaptive. More recently, Mayr[1], while emphasizing the great importance of selection in speciation, considered that not all geographical variation is adaptive and, in particular, that most of the characters involved in polymorphism are completely neutral so far as survival value is concerned. Later[2], he reversed this judgment on polymorphism.

Carter[3] places considerable emphasis on neutral characters, quoting as evidence banding in the polymorphic snail *Cepæa nemoralis*, Mayr's demonstration of apparently irregular variation in populations of *Cacatua galerita triton* in New Guinea, and the distribution of certain third chromosome inversions in *Drosophila pseudo-obscura*. But Mayr himself points out (ref. 1, p. 89) that size variation in *Cacatua* is not random except perhaps for the population on Biak (and Mayr and de Schauensee[4] have shown that the birds of Biak, which may be in part a very old island, are often different from those of nearby territories). Dobzhansky and others[5] have shown that the inversions are definitely subject to selection; and Cain and Sheppard[6] have demonstrated that variation in *Cepæa*, so often quoted as random, is, in fact, selectively controlled. Other examples quoted by Carter show an apparent randomness of variation, and he considers that it is difficult to see how the characters concerned could have any concomitant effects which might themselves be subject to selection. This is the real basis for every postulate of random variation or (more recently) genetical drift. The investigator finds that he, personally, cannot see any correlations in a given example of variation, and concludes that, therefore, there is none.

In view of the complexity of living things and their environment, a more cautious approach should be used. So far, every supposed example of random variation that has been properly studied has been shown to be non-random. One must agree that some characters have no value in themselves. But when it is found that their variation is stably clinal or otherwise correlated with their environment and history, then selection acting on their concomitant effects must be admitted as the governing factor. Mayr[1] gives many examples. He contends that some clines are non-adaptive because apparently independent of environmental gradients. Here again we just do not know, and he admits that probably some selective factors are involved.

It seems only reasonable, therefore, to suggest that those characters or variation patterns that have been described as non-adaptive or random should properly be described as uninvestigated. One must not assume randomness (or selection) without proof.

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Growth Inhibition in Amphibian Larvæ by 4-Amino Pteroyl Glutamic Acid (Aminopterin)

A number of workers have demonstrated the inhibition of growth in the rat and mouse[1,2], bacteria[3–5], and in the chick[6–8] by means of folic acid antagonists. Seeger *et al.*[5] have shown that 4-amino pteroyl glutamic acid is a powerful antagonist of folic acid by the *Streptococcus fœcalis* R. test, and its toxicity in mammals has been well established.