The sizes of the fruits and capsules change in different ways. They are chiefly regulated by the number of the seeds. The number of the seeds, that is, the suppression of fertility in autopolyploids, depends greatly on the length of chromosomes and on the degree of polyploidy (chromosome number). Plants with longer chromosomes set much smaller percentages of seeds per capsule in respect to their original forms than plants with shorter chromosomes. When the plants have chromosomes approximately equal in length, those of them that have many more chromosomes (higher polyploidy) set less seeds per capsule. This is true for higher degree of polyploidy. It does not always hold for the members of the polyploid series with smaller chromosome numbers. These regularities are of great evolutionary significance.

The contents of various chemical substances are altered in different directions as results of chromosome duplications.

Polyploids have not larger plastids. The latter show great autonomy in respect to the nucleus (chromosomes, genes).

Hereditary variations conditioned by euploid chromosome alterations are of great agricultural value, because we can predict, for most of them, the direction of changes after chromosome doubling. Contrary to this, all hereditary variations conditioned by gene mutations, and structural or aneuploid chromosome alterations, that we can induce at the present time, are not directed.

The realizations of the characters in polyploid plants compared with those of their 'diploids', as described above, are contrary to the mechanistic conception of the nature and behaviour of the organisms.

DONTCHO KOSTOFF.

Institute of Genetics,
Academy of Sciences of U.S.S.R.
Moscow.

[1] Kostoff, D., *J. Genetics* (in the Press).
[2] Kostoff, D., *C.R. Acad. Sci. Moscow*, **19**, 197–199 (1938).
[3] Kostoff, D., NATURE, **141**, 1144–1145; **142**, 753 (1938).
[4] Kostoff, D., *Current Science*, **6**, 549–552; **7**, 8–11, and in the Press (1938).
[5] Kostoff, D., *Priroda* (in the Press).

Genetics of Hybrid Sterility

IT is a remarkable fact that the disturbances connected with genic sterility in hybrids between species (or races) are paralleled within species by similar disturbances caused by single genes. For example, there is an analogy between the asynaptic mutations in several plants and genic asynapsis in hybrids and likewise between the polymitotic mutation in *Zea* and the spermatogenesis in *Drosophila pseudo-obscura* hybrids. Similarly, I have recently found a property analogous to the long-chromosome mutation in *Matthiola* in a grasshopper hybrid, the chromosomes of which also show a sort of 'stickiness' reminding one of the 'sticky' mutation in *Zea*[1]. Dobzhansky has several times directed attention to this parallelism[2], though he does not seem to think it has any deeper genetical significance. In my opinion, there is, however, a possibility of putting the two phenomena on a common basis.

Dobzhansky's admirable work on hybrids between *Drosophila pseudo-obscura A* and *B* has shown that at least eight sterility genes, spread out over the whole set of chromosomes, are present, all of them having like and cumulative effects. We may presumably take for granted that such series of sterility genes are at work in other cases of genic sterility in hybrids as well. Assume that these genes are of the same kind as the sterility genes known to act within species. But instead of having one recessive with a strong effect, we are concerned with a series of recessives with but slight effects. Assume further that they only become effective if a certain, not too small, minimum number is present in a homozygous state. Then, even a moderate mutation pressure will be able to infiltrate a cross-breeding population with mutated genes until the proportion of them at every locus concerned approaches or exceeds 50 per cent. The distribution of mutated loci in any gamete produced in the population, with random mating and absence of linkage, is given by the binomial expansion. Thus the number of mutated loci present in a gamete in a population of moderate size will vary within relatively narrow limits, being usually about half the number of sterility genes in the whole population. Since the mutated genes of two gametes constituting an individual will as a rule be at different loci, individuals homozygous for as many genes as to cause sterility will practically never arise (except on inbreeding). The accumulating evidence as to the occurrence of deleterious recessives in wild populations indeed makes it conceivable that such genes with very slight, but cumulative, effects are widely spread.

The species (or races) engaged in a cross will probably have developed their sterility genes during and after their isolation from each other. Different environments and pure chance will have led, for the most part, to different sets of sterility genes becoming established. At the same time a genetic system making the genes concerned recessive must have arisen (Fisher[3]); these systems, too, must be different, each acting on its own set of genes only.

Consequently, on crossing related species two sets of sterility genes would enter the hybrids. The specific recessive-making systems would break down (*cf.* Harland's work on *Gossypium* hybrids, reviewed by Dobzhansky[2]). The two series of sterility genes, now dominant or semi-dominant, would combine to give the same sterility effect as they would in a homozygous state in a non-hybrid individual.

HOLGER KLINGSTEDT.

Zoological Institute,
Helsinski.
Nov. 12.

[1] Klingstedt, NATURE, **141**, 606 (1938).
[2] Dobzhansky, "Genetics and the Origin of Species" (1937).
[3] Fisher, "The Genetical Theory of Natural Selection" (1930).

Occurrence of Burbot in the Estuary of the River Severn

A SYSTEMATIC study has been made during the past year of the fish and invertebrates caught in the kypes or 'fixed engines' secured between tide marks in the upper regions of the Bristol Channel, between Avonmouth and Gloucester. During the spring of 1938, three specimens of the burbot, *Lota vulgaris*, were obtained. Two, measuring 9 cm. and 10·5 cm. long respectively, were caught during February in kypes at Oldbury, and the third, 11·5 cm., during March at Hallen, some eight miles nearer to the sea. These appear to be the first modern records of this fish in the West of England, although it is not uncommon in the rivers which flow into the