carotenes per gm. dry weight. Clearly the quantities of carotenoids ingested by fish feeding on such a rich source, neglecting any derived from other food, are much greater than the limited amounts of crystalline preparations with which it has so far been possible to supply them. It may well be that even in wild trout the efficiency of absorption of carotenoids is low, or that much of it is utilized in other ways, of which the only example we have any knowledge at present is the conversion of some carotenes to the vitamins A. If this is the case, the proportion available to the chromatophore cells may be small even under the most favourable conditions.

It is hoped to publish later a more detailed account of these and further experiments.

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Steven, D. M., *Nature*, [**160**, 507 (1947)].

Spontaneous Occurrence in *Lythrum salicaria* of Plants Duplex for the Short-style Gene

The continuation of the work with the purple loosestrife, *Lythrum salicaria*, previously reported[1–4], has confirmed the tetrasomic inheritance of the factor for mid-style. Lacour's determination of the somatic chromosome number as sixty suggests, therefore, the existence of fifteen quadruplets of homologous chromosomes. Since the short style is epistatic to mid, it is possible by legitimate crosses between short- and mid-styled plants to build up genetic constitutions up to four genes for the mid-style; all these appear to be phenotypically alike, or, in other words, the mid-style gene appears to be completely dominant.

In legitimate pollination not more than one parent can be short. Many shorts tested by crosses with long-styled plants have shown themselves to be simplex, containing only a single gene for short-style. Illegitimate short-by-short matings offer peculiar difficulties, and have so far been unsuccessful. It is theoretically possible, however, that simplex short plants should produce, by a process of double reduction, a minority of duplex gametes.

Recent tests involving a large number of second backcross progenies have shown that this does actually occur, and have provided a source of material duplex for short, which is of immediate importance in studying the relations of the genes for short and for purple (*v* pink) flowers which are linked in inheritance. The first indication was a small progeny grown in 1946 giving

Short purple	Short pink	Non-short purple	Non-short pink	Total
24	9	0	5	38

In the light of the larger progeny grown this year from the same plant as seed parent, crossed with pink longs, there can be little doubt that in the chromosomes carrying short its constitution is

$$RS/rS/rs/rs,$$

where R stands for purple, r for pink. It is also duplex M_2m_2 at the mid locus.

This year's progeny has yielded

Short purple	Short pink	Non-short purple	Non-short pink	Total
68	55	4	13	140

About fifty of the short purples from these have been crossed to long pinks to determine the relative frequencies of the ten possible types of gamete. The changed ratio of pink to purple is probably due to better scoring of this rather difficult factor.

One consequence of this finding is that wild cross-pollinated populations must contain, in very unequal numbers, fifteen different genotypes in respect of the factors for mid- and short-style. Of these, one only is long-styled, four are mid-styled and ten short-styled. The approximate relative frequencies to be expected in Nature are given in the accompanying table for a population of 1,000.

m_4	Long	s_4 333·3	$S\,s_3$ Short 177·4	S_2s_2 Short 2·248
$M\,m_3$	Mid	275·9	113·3	1·435
M_2m_2	Mid	52·14	33·23	0·421
M_3m	Mid	4·925	4·862	0·062
M_4	Mid	0·324	0·320	0·004

No plants triplex or quadruplex for short can be produced by legitimate pollination.

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[1] Fisher, R. A., *Ann. Eug.*, **12**, 169 (1944).
[2] Fisher, R. A., and Mather, K., *Nature*, **146**, 521 (1940).
[3] Fisher, R. A., and Mather, K., *Nature*, **150**, 430 (1942).
[4] Fisher, R. A., and Mather, K., *Ann. Eug.*, **12**, 1 (1943).

Gonadal Hormones and Mineral Balance in the Domestic Fowl

It is established that the pullet coming towards the beginning of laying begins to retain calcium and phosphorus at an increasing rate[1,2]. In some cases the rate of retention may be of the order of 0·4–0·5 gm. calcium per diem.

We have sought to imitate this effect in the sexually immature pullet (aged 10–14 weeks) by means of gonadal hormones. The hormones were normally administered in six equal doses on alternate days over a twelve-day period. Œstradiol dipropionate (Ciba) alone to total amounts of 6 mgm., 12 mgm. or 24 mgm., or testosterone propionate alone to total amounts of 8 or 4·5 mgm., failed to increase the rates of retention of calcium and phosphorus significantly over those shown by control pullets. When the œstradiol dipropionate treatments were combined with the testosterone propionate treatment, then the rates of calcium and phosphorus retentions were increased over those shown by the controls to a highly significant degree. No analogous effect was shown by testosterone propionate in respect of the elevation of serum calcium and plasma phosphorus fractions evoked by the œstrogen treatments, although the combined œstrogen and androgen treatments intensified the hypertrophy of the oviduct induced by œstrogen.

The only previous experiments known to us on the effects of gonadal hormones on the calcium balance of birds are those of Clavert and Benoit[3], who secured a sharp increase in calcium retention by adult male pigeons following a single injection of 0·5 mgm. œstradiol dipropionate. It remains uncertain, however, how far the results of their experiments were conditioned by the possible presence of endogenous androgen. We are inclined to the view, therefore, that the increased rates of retention of calcium and phosphorus which take place during the