some as described by Stern[4], as a result of crossing-over in males between the X- and the short arm of the Y-chromosome.

To verify the above, I undertook the following experiments: males, having the gene forked and either the short or the long arm of the Y-chromosome attached to the proximal end of the X-chromosome, were mated to *yy* females. If crossing-over between X- and Y-chromosomes in males takes place when the X-chromosome is divided into two strands, then it may be possible to obtain forked females with attached X's.

The experiments gave the following results: the males forked XY short produced 44,240 flies, and among those there were found 26 forked females with attached X's. The males forked XY long yielded 43,852 flies among which only one forked female with attached X's was found. Males without any part of Y-chromosome attached produced about 100,000 flies, among which no females with attached X's were obtained.

These results indicate that crossing-over in males between X and the short arm of the Y-chromosome occurs much more frequently than with the long one and that this crossing-over takes place between chromatids.

Further experiments are in progress.

M. J. NEUHAUS.

Maxim Gorky Medico-Genetical Research Institute, Moscow, U.S.S.R.

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The 'Photosynthetic Unit' in the Assimilation Process of Green Plants

IN connexion with the recent letter of Henry I. Kohn[1] on the 'photosynthetic unit', I should like to point out briefly the result of a discussion given in a paper which was communicated by Prof. F. G. Donnan to the *Journal of General Physiology* early in April of this year.

An explanation of the fact that the plant can accumulate the four quanta necessary to reduce one molecule of carbon dioxide with practically no loss of energy may be found in the peculiar structure of the chloroplast and in the state of the chlorophyll in the living plastids. According to the investigations of Liebaldt[2] and Mencke[3], the chloroplast consists of a lipoid phase, in which the chlorophyll is dissolved, which is itself dispersed in an aqueous 'hydroid phase'.

It seems that the chlorophyll has to fulfil two different functions, depending on its situation in the chloroplast. The chlorophyll molecules on the surface of the lipoid phase (in contact with an aqueous phase) combine with carbon dioxide to form a light-absorbing chlorophyll carbon dioxide complex, and in this way take part in the reduction of the carbon dioxide.

The greater part of the chlorophyll molecules is dissolved in the interior of the lipoid phase and absorbs the energy of the light, which is then stored in the form of electronic excitation energy. It is well known that electronic excitation energy is practically never directly transferred into kinetic energy (heat)[4]; therefore the quanta absorbed in the interior of the lipoid phase will be handed over from one chlorophyll molecule to another by a sort of resonance effect, and eventually reach the chlorophyll molecules on the surface. In this way all the energy absorbed in the interior can ultimately be used for the assimilation process on the surface. This process implies that the chlorophyll molecules in the lipoid phase are in a state of strong mutual interaction. The observed shift of the absorption maximum of chlorophyll in the living plastids by 150–200 A. towards the red region as compared with chlorophyll in solution or in the colloidal state[5] may be due to interaction forces of this kind.

It is also possible to explain Kautsky's observation[6] that strongly assimilating leaves show a considerably weaker fluorescence than in the normal state. In the case of non-assimilating leaves, the energy coming from the interior of the lipoid phase is not captured on the surface and is eventually given up as fluorescent light.

On the basis of these arguments, the 'photosynthetic unit' of Emerson and Arnold is determined by the ratio

$$\frac{\text{(active) chlorophyll in the surface}}{\text{chlorophyll dissolved in the interior of the lipoid phase.}}$$

The obvious implication is that for every chlorophyll molecule on the surface (actively reducing carbon dioxide) there are about *500 molecules in the* interior which provide it with the necessary quanta.

In conclusion, I should like to thank Prof. F. G. Donnan for his continuous help and interest.

JOSEPH WEISS.

Sir William Ramsay Laboratories of Inorganic and Physical Chemistry, University College, London, W.C.1.

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Acetylation of Agar

IN view of the recent publication by N. W. Pirie[1] on the acetolysis of agar, it seems advisable to communicate preliminary results from this laboratory, where an investigation on the structure of agar has been proceeding.

Pirie states that agar is difficult to acetylate in comparison with many other polysaccharides. This does not appear to be the case, however, when suitably prepared agar is treated with pyridine and acetic anhydride, as chloroform-soluble agar acetates are formed, the acetyl content of which varies, with the duration of the time of acetylation, from 36 to 43 per cent (as CH_3CO). Deacetylation regenerates agar indistinguishable from the original in its ability to form a gel, and no apparent degradation has therefore occurred during the acetylation process. When a chloroform solution of the acetate is allowed to evaporate, a tough colourless film is obtained.

The low specific rotation of these acetates in chloroform solution ($[\alpha]_D^{15}$ $c.-30°$) may be connected with the presence of β-linkages in the molecule, since the hydrolysis of agar gives rise to a solution of positive rotation ($[\alpha]_D^{15}$ $c.+30°$).

Experiments on the hydrolysis of agar indicate that the reducing power of the solution after hydrolysis is not wholly accounted for by the presence of