Fig. 2. PRE-COMBUSTION, 15 MIN.

It cannot be that nitrogen has a chemical role because 'maturing' *in vacuo* at the same temperature gives the same results. The effect is the same, qualitatively at least, if nitrogen is replaced by pure carbon dioxide or carbon monoxide.

These experiments provide a first explanation of the phenomenon observed by us in which 'static' combustion or combustion in a weak flow of air (2 litres per hour at the same temperature) causes an increase, sometimes a considerable increase, of the speed of combustion of graphite.

We are greatly indebted to Dr. D. P. Riley, scientific adviser to the British Council in Paris, for translating this note.

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¹ Armstrong, *J. Chem. Soc. Ind.*, **24**, 478 (1905). Rhead and Wheeler, *J. Chem. Soc.*, **28**, 846 (1912); **29**, 461 (1913).

Analysis of Cable Sheathing Alloys

THE analysis of the lead alloys with antimony and tin has been the subject of much study mainly directed to the development of a satisfactory and rapid method for the solution of the metal. The methods commonly adopted involve the use of hydrochloric acid containing bromine, hot concentrated sulphuric acid, or hot mixed perchloric and phosphoric acids. All give satisfactory results, but all have drawbacks either by reason of the time consumed or by the precautions necessary to prevent the loss of volatile halides and the necessity of varying the composition of the reagent to suit antimony alloys.

A great deal of work has been done in these laboratories on the analysis of lead alloy cable sheathing containing up to 2 per cent tin, 0.8 per cent antimony and 0.25 per cent cadmium, and a method which has given us satisfaction has now been worked out. The reagent employed for the dissolution of the metal is based on one of the etching solutions commonly employed to disclose lead structure, and consists of a mixture of 20 c.c. 30 per cent hydrogen peroxide and 5 c.c. glacial acetic acid. This mixture is capable of disintegrating 2.5 gm. of lead alloy, which can be in lump form, in a few minutes. The product of reaction is a mixture of lead acetate, hydroxide and higher oxidation products. Antimony, if present, is not attacked, and the finely divided metal gives the suspension a grey colour. Addition of hydrochloric acid to the mixture decomposes the majority of the hydrogen peroxide, dissolves any antimony, and converts the other metals into chlorides. From this point, the analysis of the solution follows conventional methods, except that it is necessary, when reducing antimony by sulphur dioxide, to heat the mixture on the boiling water bath for ten minutes before boiling off the excess sulphur dioxide. This is essential to remove the last traces of peroxides, which react slowly with reduced antimony and give erroneously low results for this metal. Tin may be determined in the same solution by the excellent method described by Evans¹.

The method fails for alloys rich in tin such as solders, which are only slowly attacked by the reagent.

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¹ *Analyst*, **56**, 171 (1931).

Internal Photo-electric Effect and Band Spectra in Proteins

THE failure to explain biological reactions by chemical formulae and correlate biological activity to chemical structure indicates that our basic conception of the structure of living matter, expressed in these chemical formulae, is incorrect. This conception may be summed up by saying that molecules are built of atoms, atoms of electrons and nuclei, each nucleus having its electrons and each electron belonging to a nucleus, only valency or π electrons being shared by two or more nuclei.

It has already been pointed out¹ that many biological phenomena could be explained by supposing that outer electrons of the protein particle form one common system, belonging to the whole particle, in analogy with the modern theory of solids in which the electrons belong to the whole system and cannot be correlated to single atoms. Evidence of such protein structure was found lately in my laboratory by J. Boros, who showed that the electric conductivity of coloured protein films could be increased several hundred per cent by illumination. A large number of dyestuffs was found to be active.

This observation can be explained by supposing that electrons of the protein form a system belonging to the whole particle, the energy terms of the single electrons having fused to bands. The electrons of the dye, excited by irradiation, move on common incompletely filled energy bands of the protein. The observed photo-electric effect also shows that the common band extends over a great number of particles and is not limited to single micels. It is not impossible that in living systems such continua are limited by the cell-wall. It is hoped that the effect described will make biological phenomena accessible to quantum-mechanical treatment.

Prof. P. Gombás and K. Laki took an active part in the development of this research.

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May 14.

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¹ *Science*, **93**, 609 (1941).

Nucleic Acid and the Beginning of Meiosis

A NEW acetic-lacmoid squash method of preparation followed by Feulgen staining of the desoxyribose nucleic acid¹ has made it possible to trace certain chemical and physical changes undergone by the nucleus during the critical stages at the beginning of meiosis. The most favourable material is found in some liliaceous plants with large nuclei. Both types of mother-cell are shown up from their neighbours by their higher concentration in the cytoplasm of nucleic acid which, experience has shown, is associated with deeper lacmoid staining. The embryo-sac is to be preferred to the pollen mother-cell, however, since its development, although similar, is slower and the cell itself, being large and solitary, is more easily picked out from the surrounding somatic cells.

The following species of the genus *Fritillaria* were examined²:

With heterochromatin	Without heterochromatin
2x <i>F. lanceolata</i>	2x <i>F. drenowskii</i>
<i>F. libanotica</i>	<i>F. Elwesii</i>
	<i>F. Meleagris</i>
	<i>F. nigra</i>
	<i>F. obliqua</i>
	<i>F. siehiana</i>
	<i>F. thunbergii</i>
3x <i>F. lanceolata</i>	

The pre-meiotic telophase is normal. Heterochromatin when present remains charged with nucleic acid. The opening of the meiotic prophase is, on the other hand, marked by changes of a special kind which fall into three stages (of which we hope to publish photographs later):

In the first stage the thread structure of the chromosomes is still invisible. But, distributed throughout the nucleus, are masses of Feulgen-positive material of fairly uniform size. They are not rounded, like the semi-fluid heterochromatin, but angular or fibrous in outline. They show no connexion with the nucleolus or, in species possessing it, with the heterochromatin. Indeed, their uniform size and distribution suggest no connexion with chromosome elements at all.

The second stage reveals a shrinkage of these nucleic acid aggregations. At the same time the chromosomes are becoming visible and they appear as even unbeaded threads, that is without chromomeres. Indeed, they have the form that chromosomes take at the very beginning of an ordinary mitosis except that they are, of course, single. It seems that the nucleic acid is now being transferred from the aggregations to the chromosomes (or at least to their euchromatic parts), which have thereby become stainable. The aggregations are merely temporary dumps.

The third stage corresponds (so far as nucleic acid charge is concerned) with that described as leptotene in animals. The dumps have disappeared. The chromosomes are more heavily charged and along their threads chromomeres are now distinguishable owing, it seems, to the intermittent stretching of the threads. Finally, pairing has already begun. It has been suggested on the evidence of the later stages that charging and pairing begin near the centromeres of the chromosomes in *Fritillaria*³ but in these early stages the centromere is not yet distinguishable from the other chromomeres.

During these changes such deposits of nucleic acid as there may be on the heterochromatin are undiminished. Its rounded outlines are undisturbed. This persistence suggests that the temporary dumps contain nucleic acid in a different form from that attached to the heterochromatin. The dumps are more accessible.

Desoxyribose nucleic acid is characteristically found only in association with the chromosome thread⁴. Bodies containing it have been seen in the nucleus unassociated with the chromosomes only as a result of separation from them. This situation has been established by Feulgen staining in mature neutrophil myelocytes in the mouse⁵, at first anaphase of meiosis in the oocytes of butterflies⁶ and during the growth of the oocytes of the toad⁷. In all these cases the separation