

other characters. It may be significant that the change from *Uria aalge albionis* to *Uria a. aalge* corresponds with the first zone of change in percentage of bridling, but it does not seem safe to postulate a causal connexion between the cline in polymorph frequencies and that in melanin pigmentation on the present evidence.

The genetic situation involved is of some interest. From the non-existence of intermediate forms it may be assumed that the control is unifactorial. Whether it behaves as dominant or recessive is, however, less clear, and only breeding experiments or ringing of wild populations could decide this.

This method of describing sub-species and forms makes a useful addition to the usual taxonomic procedure and gives important information as to the processes of species differentiation, the methods by which isolation arises in a widespread group and the speed with which genes may diffuse across such barriers.

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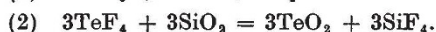
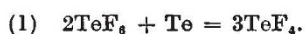
<sup>1</sup> Huxley, J. S., *NATURE*, **142**, 219 (1938).

<sup>2</sup> Johnson, R. A., *Auk*, **35**, 56-61 (1938).

### Tellurium Tetrafluoride

THE formation of a white solid which accompanies the main product tellurium hexafluoride when fluorine is passed over tellurium has often been noticed but its composition has not been settled (Moissan<sup>1</sup>, Prideaux<sup>2</sup>). Yost and Claussen<sup>3</sup> showed that the same or a similar substance is formed by heating the hexafluoride with tellurium in sealed glass tubes, but they were unable to identify the product, which they state is probably the difluoride, TeF<sub>2</sub>.

We have re-investigated the reaction using sealed tubes of both glass and silica. With the hexafluoride alone in the tubes, no reaction occurs and the density of the gas remains unchanged. With tellurium present, a white solid is formed at a temperature of about 200° C. The ratio of fluorine to tellurium in this solid is not constant but decreases with the time the tube is heated, until after heating for several days, the fluorine content becomes very small and the solid approximates in composition to TeO<sub>2</sub>. At the same time the gas pressure in the tube rises and finally attains a value 1.5 times the initial pressure. The gas, originally pure TeF<sub>6</sub>, is converted completely into SiF<sub>4</sub>, as shown by vapour density measurements. The most probable explanation of these facts seems to be that the first product of the reaction is the formation of a new compound, tellurium tetrafluoride, which then reacts with the silica giving silicon fluoride and tellurous oxide:



Further investigation has confirmed the correctness of this interpretation. We have found that the product of the first reaction can be isolated by using a tube composed of pure crystalline alumina. This material, as supplied by the Thermal Syndicate, Ltd., is non-porous and is the only one we have found which is not attacked by this reaction.

In these conditions, the tellurium hexafluoride is absorbed completely by the tellurium at about 200° C., forming a colourless solid which crystallizes in fine needles on the walls of the tube. On exposure to ordinary air, the solid hydrolyses very rapidly with evolution of hydrogen fluoride. By dissolving this product rapidly in aqueous potash, we have been able to determine the ratio F:Te in the substance. Two independent experiments showed it to approximate closely to 4:1.

Quite recently we have been able to prepare larger amounts of the white crystalline material free from excess of tellurium, and to analyse it completely. As a mean of two experiments, we find for its composition: Te = 62.5 per cent, F = 38.7 per cent. The formula TeF<sub>4</sub> contains Te = 62.6 per cent, F = 37.4 per cent. The fluorine was estimated as lead chlorofluoride after precipitation of tellurium as dioxide—a method which we have found to give rather high results when used for the estimation of this element in compounds of tellurium and fluorine.

The results can therefore be regarded as satisfactory, and there can be little doubt that the white solid we have obtained is a new fluoride of tellurium, TeF<sub>4</sub>, which on account of its reactive behaviour with glass and silica and its instability in presence of traces of moisture has not been isolated previously.

Further experiments on the properties and behaviour of this substance are in progress.

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<sup>1</sup> Moissan, *Ann. Chim. Phys.*, **24** (6), 239 (1891).

<sup>2</sup> Prideaux, *J. Chem. Soc.*, **89**, 320 (1906).

<sup>3</sup> Yost and Claussen, *J. Amer. Chem. Soc.*, **55**, 885 (1933).

### Fate of the Sulphate Radical in the Animal Body

PHOSPHORUS enters as phosphate in the numerous compounds in which it is to be found in the animal body; in connexion with the investigations carried out in recent years concerning the fate of ingested phosphorus atoms in the organism, it seemed to be of interest to determine whether or not, in the course of the numerous metabolic processes in which phosphorus is involved, the phosphate radical exchanges its oxygen content with other oxygen atoms present in the body. This question could be answered by injecting into an animal sodium phosphate which contained heavy oxygen (<sup>18</sup>O) as an indicator and then determining if the phosphate recovered in the urine, for example, contained more than the normal amount of <sup>18</sup>O.

As, however, it was recently found<sup>1</sup> that 'heavy-oxygen phosphate' can be obtained by dissolving sodium phosphate in 'heavy-oxygen water' and vice versa, it is apparent that the oxygen atoms present in phosphate radicals exchange their places freely in water and there can be scarcely any doubt that the probability is extremely small of a phosphate radical leaving the body coupled to the same oxygen atoms with which it entered. Sulphate ions, on the other hand, have been found<sup>2</sup> to exchange oxygen atoms either not at all or at a very slow rate with neutral water, even at 100° C., and it seemed of interest, therefore, to investigate whether sulphate ions during their circulation in the body participate in chemical reactions which loosen the oxygen bonds sufficiently to make an oxygen exchange possible.