

copper polished with rouge and water. Some specimens were washed in absolute alcohol, others in benzene, and others in water before being photographed. When rouge was used without a quantity of water it became embedded in the metal surface, as shown by Mr. B. K. Johnson using an immersion microscope, and also by the diffraction photographs showing the normal crystal pattern sharply plus additional rings given by the rouge.

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¹ Sir G. T. Beilby, "Aggregation and Flow of Solids".

² G. P. Thomson, *Proc. Roy. Soc., A*, 128; 1930.

Magnetism of Precipitates of Colloidal Silver.

IN a series of contributions ¹ it has been shown by us that the magnetic properties of graphite, antimony, bismuth, and gold are modified by colloidalisation.

We have recently investigated two forms of colloidal silver. In one method, a dilute solution of silver nitrate was reduced by tannin after adding sodium carbonate. In the second, a dilute solution of the same salt was reduced by hydrazine hydrate. The colloids were coagulated, washed, and dried in vacuum desiccators, precautions being taken to avoid oxidation and impurities. In the former method the specific susceptibility of two specimens was 0.166×10^{-6} and 0.133×10^{-6} ; in the latter method, one specimen had a specific susceptibility of 0.166×10^{-6} . (The specific susceptibility of silver in the massive state is 0.2×10^{-6} at atmospheric temperature (I.C.T.)). The maximum size of the particles was about 10μ . Further attempts are being made to grade the particles and obtain more accurate information.

The hypotheses suggested in the note ² on a similar phenomenon observed in the case of gold are also applicable to silver. Gold and silver are known to possess paramagnetic atoms, but build up diamagnetism only in the massive state. Changes depending on their crystal and block structure can therefore be expected in them.

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Forman Christian College,
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¹ See V. I. Vaidhianathan and Balwant Singh, *NATURE*, 128, 302; 1931, and earlier references there.

² See also a later communication to *NATURE*, 128, 153; 1931, by S. Ramachandra Rao, where the work on graphite, bismuth, and antimony has been repeated by him, confirming the previous results.

Photosynthesis of Carbohydrates *in Vitro*.

IN a recent paper on this subject,¹ unsuccessful attempts by me to repeat the work of Baly² were described. It was not mentioned, however, that consideration had been given to the possibility of the failure to detect any photosynthetic sugars being due to the adsorption of these sugars on the large surfaces exposed by the catalyst powders. The catalysts were, in fact, repeatedly examined for the presence of any organic matter. The kieselguhr supported catalysts and the nickel carbonate were, after use in the photosynthetic tests, heated for some hours with water, and also with absolute alcohol, under reflux. On subsequent evaporation of the water or alcohol, no organic residue was obtained. Tests for charring with concentrated sulphuric acid on the catalysts gave negative results.

In addition, estimations of organic carbon were made, by the method described, on the nickel carbonate after use as a catalyst, but no trace of organic matter was found. Control experiments in which sucrose was estimated in presence of nickel carbonate

showed that the latter did not interfere with the carbon estimation even if present to the extent of 40-50 times the weight of carbohydrate.

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¹ *Trans. Far. Soc.*, 27, 771; 1931.

² *Proc. Roy. Soc., A* 116, 197; 1927. *Trans. Far. Soc.*, 27, 545; 1931.

Growth Curves of the Gramineæ.

IN my paper read at the Belgian Congrès National des Sciences at Brussels in 1930, I gave a short account of my measurements of the growth-energy of *Triticum vulgare*, *Hordeum vulgare*, *Secale cereale*, and *Avena sativa*, in accordance with growth (velocity) curves in general. I followed accurately each day, at the same time, all shoots which issued from one single seed. The curves plotted on rectangular co-ordinates always gave a straight line between the points of inflexion (arithmetical series), and the Archimedes spirals constructed revealed for each kind of plant, during the whole of its life, two distinct growth-waves.

New experiments with the same and other Gramineæ have given the following results: the straight line between the points of inflexion is confirmed; the shoots are interdependent on one another and, in determined order, variable for each individual. For example, numbering the successive shoots of a given *Avena* type, shoot 2 issued from shoot 1, shoot 3 from shoot 2, 4 from 3, 5 from 4, 6 from 5, 7 from 3, 8 from 7, 9 from 6, 10 from 8, and so on, all 195 shoots finally being noted in a table of reference, with their order-numbers, in two separate groups. The roots are in accordance with the corresponding grouping of the leaves, this being directly visible by careful carding of them. Plotting all curves of one sample of a complete individual on rectangular co-ordinates in chronological order, one sees, following the tops, two or more distinct, regularly ascending-descending lines, that is, the pointed growth-waves of the above. From the beginning to the end they mark characteristic sines and cosines (tangents), and their distances apart again show successive agglomerations or groups from birth to death. A detailed account will be published later in *Roux' Archiv*.

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Antwerp, Dec. 23.

Esperanto in Scientific Literature.

FOLLOWING Mr. Morris-Owen's letter in *NATURE* of Dec. 5 regarding the use of Esperanto in scientific literature, readers who are interested, as I am, in meteorology, may like to know that, for several years, the Aerological Laboratory of Tateno (Japan) has issued its yearly reports in Esperanto. These volumes, containing on an average some 250 pages, 9 in. x 12 in., with many tables, diagrams, and maps, place at our disposal a wealth of information on local meteorological data, to which it was almost impossible for us to get access previously. This example was followed a couple of years ago by the Meteorological Office of the Trans-Siberian Railway, at Karbin: the translation into Esperanto is given by the side of the Russian text; which is a boon to the majority among us, who have found it much easier to master Esperanto than Russian. This year, the Institute of Meteorology and Geodynamics of Ljubljana (Jugoslavia) has followed suit, and I gather that similar institutions are considering taking the same step.

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