X-ray Evidence for the Existence of Different Modifications of Fatty Acids.

IN continuation of the work on the high order X-ray reflections of fatty acids done in this laboratory (J. A. Prins and D. Coster, NATURE, July 17, 1926), I tried to get the high orders with stearic acid. In determining the long spacing of a crystal of stearic acid obtained by slow crystallisation from acetone, I found the remarkable fact that the crystal showed a long spacing of 43·95 Å.U., whereas a thin layer obtained by melting the acid on a glass strip gave a spacing of 39·75 Å.U. Crystals obtained from alcohol and petrol also showed the larger spacing. A film obtained by evaporating an alcoholic solution on a glass strip gave the smaller spacing, but an acetonic film gave the two spacings, the relative intensities of which were altered by slight changes in the way of forming the film. Apparently these facts point at the existence of different modifications of stearic acid.[1]

As, on the other hand, Garner, Randall and Ryder (*Jour. Chem. Soc.*, 125, 881, 1924; 127, 720, 1925), from a determination of the heat of crystallisation and molecular volume, concluded that undecoic acid exists in two enantiotropic modifications, it seemed worth while to test this point by an X-ray investigation. According to Garner (*loc. cit.*) the transition takes place between 12·5° C. and 17° C. I determined, therefore, the long spacing of a layer of undecoic acid obtained by melting on a glass strip, first at 20° C. and a second time at 12·5° C. the apparatus not being changed between the two exposures (the lower temperature was obtained simply by opening the windows). At the higher temperature a spacing of 25·4 Å.U. was found, which spacing has already been measured by Müller and Shearer (*Jour. Chem. Soc.*, 123, 3156, 1923). At the lower temperature, however, these lines had practically disappeared and another set of lines of strong intensity occurred on the plate, these lines belonging to a spacing of 30·1 A.U. When the temperature was raised again to 20° C. and a photograph was taken after some hours, the lines due to the longer spacing, though not wholly disappeared, were much fainter, whereas the intensity of the lines belonging to the smaller spacing had much increased

These facts give a strong support to the view suggested by Garner and his collaborators.

After these results were obtained the beautiful work of Piper, Malkin and Austin (*Jour. Chem. Soc.*, Sept. 1926) on the different modifications of the even fatty acids came to my notice. As is stated by these authors, the different spacings of stearic acid seem to be independent of the temperature, and only to depend on the manner the reflecting layer is obtained.

The higher orders are now being investigated in order to get some information about the molecular structure of the different modifications.

I am much indebted to the kindness of Prof. P. E. Verkade of Rotterdam, who put a quantity of very pure undecoic acid at my disposal.

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A Rock of Unknown Origin from Glacial Gravel at Ipswich.

A LITTLE time ago I found, in the sub-Chalky Boulder Clay glacial gravel, exposed in the brickfield of Messrs. A. Bolton and Co., Ltd., to the north of Ipswich, an erratic of unusual and arresting appearance. The gravel in which the specimen was embedded is that which, in my opinion, was laid down in the interval of time between the deposition of the Kimmeridgian Chalky Boulder Clay and that of the Upper Chalky Boulder Clay of East Anglia. As I had never before seen a rock in the Ipswich area of the type discovered, I submitted it to Prof. P. G. H. Boswell, of the University of Liverpool, and to Dr. Herbert H. Thomas, of the Geological Survey, for investigation. Both these experts, though giving me valuable information upon the nature of the erratic, were unable to inform me as to its probable source of origin, and Dr. Thomas, suggesting that this source might be in some area of old rocks, such as Scandinavia, advised me to submit the specimen to Prof. Victor Goldschmidt, of Oslo. This I have now done, and with Prof. Goldschmidt's permission, I give below the result of his examination of the rock.

"I have got your specimen, and I have examined it. If the boulder has its place of origin in Norway, it must be a sandstone from one of the pre-Cambrian formations. The rock is a breccia, consisting of fragments of a sandstone rock in a matrix. The sandstone of the fragments is without any doubt a sedimentary rock, containing well-rounded grains of quartz. The matrix is rather fine-grained; the matrix contains perhaps even pyroclastic material, but that could not be ascertained. The clastic grains of the matrix are angular. One may say that none of the Eocambrian, Cambrian, or other Palæozoic sandstones of Norway has any resemblance to your specimen. Among the pre-Cambrian formations there might be several possibilities for placing the boulder. It is most likely that it may be derived from the pre-Cambrian Telemark formation, which, among other rocks also includes quartzitic sandstones, breccias, and also pyroclastics. The general character of the rock, its degree of re-crystallisation, makes it possible, but of course not certain, that it is derived from the districts around the mountain Gausta in Telemarken. My friend, Prof. J. Schetelig, to whom I showed your boulder, also agrees with me. But neither of us has ever seen exactly the same rock *in situ*. We shall look for it in Telemarken. I shall send the boulder back to your address by mail to-morrow. The thin section I shall keep here, to have a possibility to identify the boulder, if I succeed in finding the breccia *in situ*."

I would wish to thank Profs. Boswell and Goldschmidt, and Dr. Thomas, for the help they have given me in this matter. The rock, which I have deposited in the Ipswich Museum, where it can be examined, is of a definite pinkish colour.

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Thermal Agitation of Electricity in Conductors.

ORDINARY electric conductors are sources of spontaneous fluctuations of voltage which can be measured with sufficiently sensitive instruments. This property of conductors appears to be the result of thermal agitation of the electric charges in the material of the conductor.

The effect has been observed and measured for various conductors, in the form of resistance units, by means of a vacuum tube amplifier terminated in a thermocouple. It manifests itself as a part of the phenomenon which is commonly called 'tube noise.' The part of the effect originating in the resistance gives rise to a mean square voltage fluctuation V^2 which is proportional to the value R of that resistance. The ratio V^2/R is independent of the nature or shape

[1] Both lattice-constants have already been measured by Müller (*Jour. Chem. Soc.*, **123**, 2043, 1923; NATURE, **116**, 45, 1925), but he seems not to have paid much attention to the discrepancy between these two results.