Raman Spectrum of Diamond.

IN the course of an examination of the infra-red and ultra-violet regions of the spectrum of a large number of diamonds, we have come across one which, unlike the others, is transparent both at about 8μ, and also in the ultra-violet so far out as λ2300. This diamond was consequently well suited for determining the Raman effect throughout a much more extended region of the spectrum in which exciting mercury lines are available.

With this diamond we have in fact identified no less than 17 Raman lines originating from mercury lines within the range of spectrum from λ4358 to λ2378. The mean value of all differences is 1333 cm.$^{-1}$, a value lower than we reported in NATURE of May 10, p. 704, but agreeing with that of Ramaswamy in the same issue, and of Bhagavantam on Aug. 2, p. 168. This still corresponds to 7·5μ, which is removed from the centre of the infra-red band at 8 μ found by us in most diamonds.

With a quartz spectrograph the diffuse band found faintly by Ramaswamy and by Bhagavantam is fairly strong, with its centre about λ4156 as they report. If this diffuse line originates from λ4046·6, the value of $\Delta\nu$ is 651 cm.$^{-1}$ corresponding to 15·4μ about.

In NATURE of June 7, p. 855, Prof. F. Simon is inclined to identify this difference with Reinkober's band in the infra-red at 14μ, but in the examination of the infra-red spectra of a good many diamonds we have failed to detect a band there. Nor have we detected any other Raman line with this difference of frequency, although there are some places in the ultra-violet Raman spectrum where such a line might be overpowered by strong scattered unmodified mercury lines and the continuous spectrum accompanying them.

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J. J. FOX.

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Aug. 7.

Sperms as Living Liquid Crystals.

IT is customary to draw the boundary between living organic and inorganic matter so that crystals represent the highest form of inorganic material and low organisms form the beginning of the organic world, with a definite and deep physiological gap between the two categories. In my opinion, this gap does not exist, since the sperms, which are undoubtedly living, are at the same time liquid crystals.

Stereochemically, Vorländer recognises the long straight stretched molecules as the chief principle in the building of artificial liquid crystals. The protein molecules of the sperms share with these the fine chain structure, and their nucleoproteins also, according to the most recent researches of Levene and London, possess a corresponding stereochemical type. The optical behaviour clearly demonstrates this stereochemical arrangement both in the artificial liquid crystals and in the sperms. The former are optically uniaxial and show positive or negative double refraction. The sperms have also long been recognised as optically anisotropic, and W. J. Schmidt has definitely proved that in the living seedthreads of *Sepia officinalis* L. the chromatin portion of the head exhibits double refraction of the type of an optically uniaxial crystal ($\omega = 1{\cdot}544$; $\epsilon = 1{\cdot}501$; hence $\omega - \epsilon = 0{\cdot}043$). In addition, it is important to note that the double refraction phenomena are the same both in the living sperms and in specimens which have been preserved in alcohol. Debye-Scherrer diagrams show, as well as the alcohol ring, an interference due to the sperms, which surrounds closely the spot of the primary beam, in agreement with the nature of liquid crystals. With regard to the morphological conditions, the moulding forces of surface tension together with the fine structure give rise to many corresponding forms.

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Mushrooms—Mineral Content.

SPECTROGRAPHIC analysis of mushrooms by the method described in NATURE of April 20, 1929, p. 601, has revealed a remarkable composition. A button mushroom from the Cromer district was divided into skin, white portion, gills, and stem and the parts were dried in a water oven at 100° C. The analyses prove that each part has a high potassium and a low calcium content ; the skin contains lithium and it contains most iron. Phosphorus in the dried material varies from about one to three per cent, the gills containing most. The chief interest lies in the presence of silver and copper ; all parts contain these, the stem containing least. The spectra of four standards, containing from 0·001 to 0·01 per cent of silver and from 0·002 to 0·02 per cent of copper, and other elements, were photographed on the same plate as the spectra of the parts of the mushroom. Comparison of the spectra proves that the skin, white, and gills contain somewhat more than 0·02 per cent of copper and that all the parts contain decidedly more than 0·01 per cent of silver ; the silver content of the gills appears to be not less than 0·05 per cent.

The white portions and the gills of two other mushrooms, a button and a flat variety, from the Loddon district, 30 miles from Cromer, have been analysed with similar results.

The investigation is to be continued and extended with the assistance of Mr. H. J. Howard.

HUGH RAMAGE.

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July 26.

Photography on Copper.

THE interesting observation recorded by Dr. C. J. Smithells in NATURE of July 26 is not new. During the course of a long series of experiments on 'metal colouring' at the Birmingham Technical College about thirty years ago, it was found that copper articles, which had been coloured by immersion in a hot solution of cupric chloride, blackened rapidly on exposure to light. I made a number of attempts to fix photographic prints obtained from ordinary negatives by this process, but in every case the image itself suffered from attack by the reagents used.

The most satisfactory method of preparing the sensitive plates was found to be as follows. A sheet of brass or copper was first coated thinly with copper electrolytically and then it was immersed for a few seconds in a boiling solution of cupric chloride, or in a copper sulphate solution containing a little common salt. If the surface after this treatment was not perfectly uniform in appearance, the sheet was scratch-brushed and immersed again in the hot solution. It can then be washed and dried with a cloth. The coating is salmon-pink in colour, is perfectly adherent, and shows none of the white film mentioned by Dr. Smithells.

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