the soil under the growing cotton and sorghum. But more nitrates were found under the growing peas than under the fallow plot, showing that the micro-organisms on the pea roots assimilate more nitrogen than the plant needs for its growth, and that this excess is found in the soil. With the ripening of the peas the excess of nitrates increased, indicating a continuance of the activity of the micro-organisms until the plant has ceased to grow. It may be that they continue to grow and assimilate nitrogen after the pea plant is dead—as long as there are juices in the plant. The larger quantities of nitric nitrogen in the soil where the peas were dead, over that where the pods were ripe, would tend to show this. But the bacteriologist only can answer this question. The fact that the corn and peas plot showed less nitrates than the pea plot of the same age, yet more than the fallow plot, shows that the growing corn had used some of the nitrates in its growth. Had the corn been growing at the time the samples were taken, there would doubtless have been found still less nitrates, as the ''corn'' plot, though the corn was about dead, showed practically no nitrates. This excess of nitrates in the corn and pea plot was therefore likely produced largely after the corn had ceased to grow.

These experiments indicate that peas planted with a crop would tend to increase the yield of that crop, unless the peas be so thick as to interfere with the crop's root development, or use up too much water in their growth.

Whether these results will hold good for all leguminosæ, or for peas in all kinds of seasons, only further investigations can determine. It is to be hoped that the agricultural chemists of the various experiment stations will take up this very important line of work.

GEORGIA NORMAL AND INDUSTRIAL COLLEGE.

PETROLEUM INCLUSION IN QUARTZ CRYSTALS.[1]

BY CHAS. L. REESE.

Received August 29, 1898.

THE quartz crystals, of which an illustration is here given, are of interest on account of the size of the cavities and the quantity and character of the liquid in them.

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[1] Read at the Boston meeting of the American Chemical Society, August, 1898.

Sir Humphry Davy,[1] in a study of the fluid contents of cavities in rocks, mentions a single instance in which mineral naphtha was found in a quartz cavity.

A. W. Wright[2] subjected smoky quartz from Branchville, Conn., to dry distillation, and obtained a bituminous material which probably came from microscopic cavities found in the crystals, and Foster[3] obtained a brownish liquid, which contained ammonium carbonate, by distilling smoky quartz.

I have had these crystals in my possession for a number of years and photographed them for the purpose of publishing an account of them, but have only recently been able to obtain definitely the locality from which they came. They were found at Diamond Post-Office, near Guntersville, Marshall Co., Alabama, near the Tennessee line.

The crystals are well developed, especially No. 2, and are perfectly transparent. No. 1 measures 23.6 mm. in length and twelve mm. in width, and No. 2 measures 13.5 mm. by 9.5 mm.

The globule in No. 1, marked *A*, measures two and three-tenths mm. through its longest diameter, by one and eight-tenths mm. through its shortest diameter, and about one mm. thick. The cavity in which *A* occurs is triangular in shape with sides and edges running parallel to the rhombohedral faces and edges and, as far as it can be measured, is about one millimeter deep; its sides measuring about six mm. by five mm. by five mm.

On heating No. 1, the globule *A* broke and the oil wet the sides and edges of the cavity so that it now lies about the walls of the cavity with a globular space in the center, and can be seen to move about when the crystal is turned from side to side. Globule *B* in No. 1 also broke when the crystal was heated and also spread itself about the cavity. The heating was done in water and the breaking of the globule was accompanied by quite an explosion, which caused my removing the crystal from the source of heat for fear of shattering the specimen.

There are other cavities in No. 1 containing oil, but they do not appear distinctly in the photograph.

In No. 2, the two larger cavities indicated in the figure by *C*

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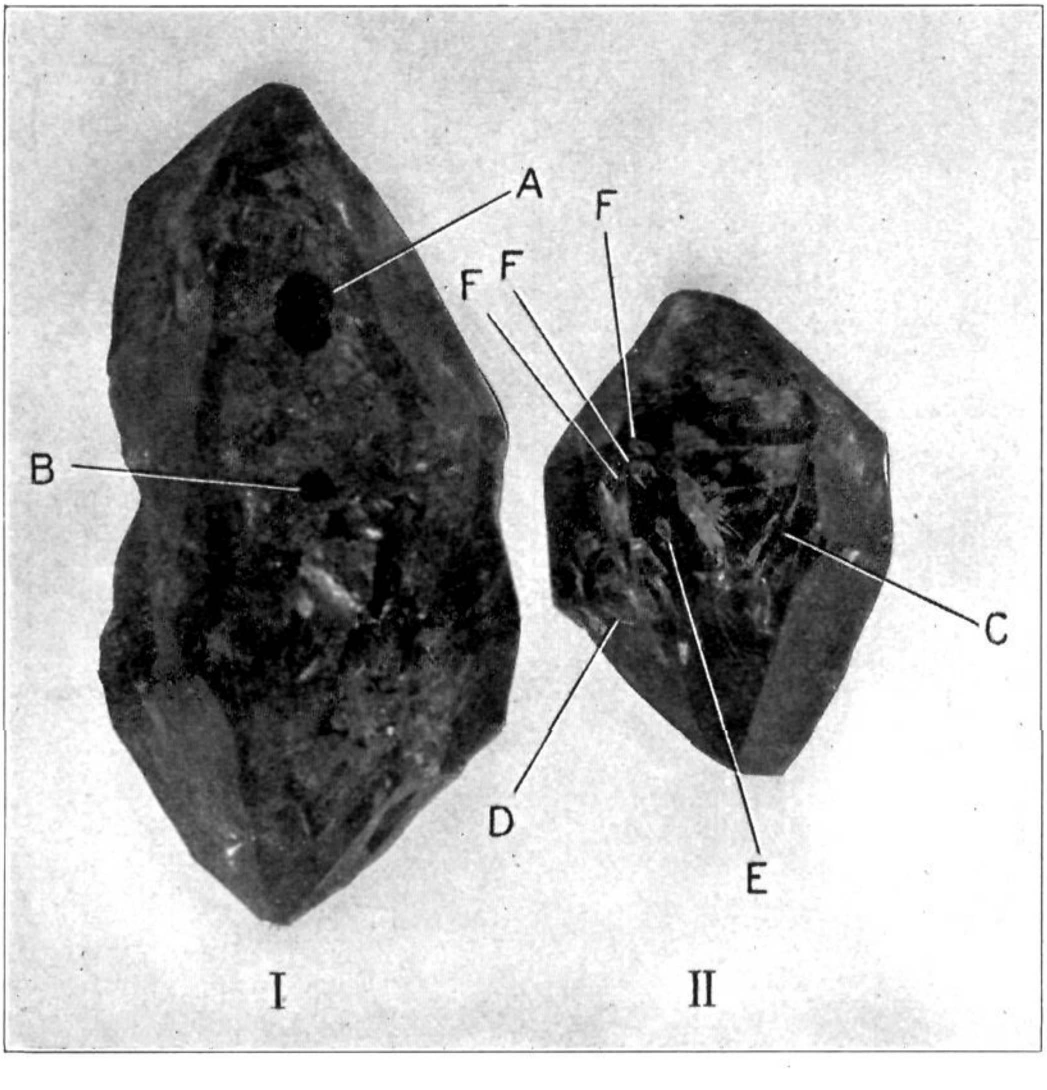
[1] *Phil. Trans.*, *1822*, 367.

[2] *Am. J. Sci.*, 21, 209, *1881*.

[3] Pogg. *Ann.*, 143, 173.


A
B
F
F
F
C
D
E
I
II

and *D*, are also triangular in shape, with edges parallel to the rhombohedral edges, and measure respectively, *C* four and five-tenths mm. by four and five-tenths by three mm., and for *D* three by three by two mm., both about five-tenths mm. thick.

These two cavities also contain oil with a globular space in the center, which can be seen to move about when the crystal is turned.

The cavities *E* and *F*, *F*, *F*, are quite small, but can be readily seen by the naked eye, and are full of oil with the exception of a minute globule of gas.

F, *F*, and *F* are the same cavity, being seen by refraction from the three faces.

The evidence of the character of the oil is not chemical, but yet sufficient to identify it.

It presents the appearance of petroleum in that it has the yellow green fluorescence. Some crystals from the same source were crushed in filter-paper, and the paper having absorbed the oil, showed the grease spot and gave the characteristic odor of petroleum and burned with a smoky flame.

Another evidence of the nature of the liquid is that petroleum occurs in the neighborhood where the crystals were found.

The specific gravity of crystal No. 2 is 2.6123.

[CONTRIBUTION FROM THE JOHN HARRISON LABORATORY OF CHEMISTRY, No. 31.]

I. METAL SEPARATION BY MEANS OF HYDROBROMIC ACID GAS. II. INDIUM IN TUNGSTEN MINERALS.[1]

BY ELIZABETH ALLEN ATKINSON.

Received September 2, 1898.

INTRODUCTION.

THE application of hydrochloric acid gas as a means of separating metals has proved very successful. By means of this agent Moyer[2] volatilized the oxides of bismuth and antimony completely, separating bismuth from lead and copper, and antimony from copper and lead. In addition, this mode of analysis afforded him separations of arsenic from copper, lead, cadmium, silver, cobalt, and nickel.

[1] From author's thesis presented for the degree of Doctor of Philosophy.

[2] This Journal, 18, 1029; Thesis.