Schumann plates. It consists essentially in dissolving off more or less of the gelatine by means of acid. I have not yet succeeded in obtaining certain or uniform effects, but in the most favorable cases the sensitivity of the "half tone" plates used in the mass-spectrograph has been increased ten to twenty times without seriously altering their other valuable properties.

The immediate result has been the definite proof of the complex nature of the element tin which had been previously suspected (*Phil. Mag.*, xlii, p, 141, July, 1921). Tin tetramethide was employed, and a group of eight lines corresponding approximately to atomic weights 116 (c), 117 (f), 118 (b), 119 (e), 120 (a), 121 (h), 122 (g), 124 (d) was definitely proved to be due to tin. This conclusion was satisfactorily confirmed by the presence of similar groups corresponding to $Sn(CH_3)$, $Sn(CH_3)_2$ and $Sn(CH_3)_3$. The intensities of the various components indicated by the letters in brackets agree quite well with the accepted chemical atomic weight 118.7, and incidentally preclude the possibility that any of the lines, with the possible exception of the extremely faint one at 121, are due to hydrides.

The spacing of these eight lines, which are only just resolved, show that their differences are integral to the highest accuracy, but the lines themselves compared with known lines on the plate give atomic weights always tending to be 2 or 3 parts in 1,000 too light for the above whole numbers. That this remarkable divergence can not be explained as experimental error is very strongly indicated by the following consideration. The discharge tube had been used previously to investigate some very pure xenon. The line due to $Sn^{120}(CH_3)$ should therefore have appeared exactly halfway between the two strong xenon lines 134, 136. It was actually quite unmistakably nearer the former, so much so that the two were only partially resolved. The same irregular grouping repeated itself in another portion of the field in the following spectrum. It seems, therefore, difficult to resist the conclusion that the isotopes of tin have atomic weights which are less than whole numbers by one fifth to one third of a unit of atomic weight, but satisfactory settlement of this important point will probably have to be deferred till a more accurate mass-spectrograph has been made.

Incidentally I may add that the presence of the two faint components of xenon 128 and 130 previously suspected has now been satisfactorily confirmed.—F. W. Aston in *Nature*.

SPECIAL ARTICLES

CRATERLETS IN EAST-CENTRAL ARKANSAS PROBABLY DUE TO THE NEW MADRID EARTHQUAKE

THE following brief description of six craterlets occurring on and about the border between the southeast quarter of Sec. 31 and the northeast quarter of Sec. 32, T. 8 N., R. 7 E., is of interest because it apparently extends the sphere of destructive violence of the New Madrid earthquake from that illustrated in Bulletin 494, United States Geological Survey, to within about 20 miles northwest of Memphis. These are also of interest because few, if any, larger than these have been described.

Occurrence: Five of the craterlets occur on the upper surface of one of the low ridges of the Mississippi flood plain. The sixth is a double craterlet, occurring on the slope of the ridge. They apparently bear no relationship to each other except as regards origin and age. With the exception of the double craterlet, they are saucer-shaped, with diameters ranging from 10 to 40 feet, and depths ranging from 2 to 6 feet. One part of the double craterlet is about 15 feet by 10 feet along the diameters of its elliptical outline. The smaller craterlet is about 10 by 8 feet along similar directions. They are separated by a ridge about three feet high. The bottoms of both craterlets lie about 4 to 5 feet below the surrounding surface. These craterlets are all located within a radius of 800 feet.

Origin: The ridge on which these craterlets occur has long been cultivated, and between cultivation and sporadic attempts to fill them up, any evidences of rims that may have surrounded the craters have disappeared. However, the material about the craterlets is made up of the characteristic fine sand and clay that appears in all the dredgings in this vicinity, together with rocks that range in size from 1 inch through to 11x4x5 inches. These rocks

very clearly are not indigenous to the flood plain materials that form the ridge. The supposition is that they were forced up from below by gaseous and water pressure that gave rise to the craterlets.

Age: No evidences as to age was obtained by the writer. However, as similar craters are found farther to the north and are there shown to have been formed at the time of the New Madrid earthquake, it is logical to assume that these were formed during the same disturbances.

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AZOTOBACTER IN SOILS[1]

SOME time ago the writer[2] called attention to the apparent relation existing between the presence of Azotobacter in soils and the absolute reaction of the soil. At that time less than one hundred soils, all local, had been examined and the reaction was determined colorimetrically upon an extract of the soil. Since then 418 samples of soil collected from 39 counties in Kansas and 25 states other than Kansas have been cultured for Azotobacter and their presence or absence in such cultures compared with the absolute reaction of the soil determined colorimetrically upon an extract of the soil, and also with the reaction of the soil determined electrometrically upon a suspension of the soil.

These soils have been arbitrarily divided into two groups: those, the hydrogen-ion concentration of which was found to be greater than 1×10^{-6}; and those with a lower hydrogen-ion concentration. This particular division point has been chosen because the large amount of data that have been accumulated indicate that the maximum hydrogen-ion concentration tolerated by Azotobacter is very near this point. Comparing the presence and absence of Azotobacter in these two soil groups with the reaction we can, by making use of Yule's[3] association correlation formula, obtain a mathematical expression for the association or correlation existing between the reaction and the presence or absence of Azotobacter.

An application of this formula to our data gives, when the reaction of the soil was determined colorimetrically, a coefficient of 0.956. When the reaction was determined electrometrically the coefficient was found to be 0.942.

It has been demonstrated in this laboratory that when Azotobacter are introduced into a soil with a hydrogen-ion concentration greater than 1×10^{-6}, and not containing Azotobacter, they can exist therein for an appreciable length of time. Considering the relative ease with which soils may become inoculated under natural conditions, and also the probability that other conditions may inhibit the growth of Azotobacter in soils the reaction of which is favorable, it is believed that an association, or correlation coefficient as high as that indicated above is significant in indicating the influence of the hydrogen-ion concentration of a soil upon the ability of that soil to support Azotobacter.

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[1] Contribution No. 47, Department of Bacteriology, Kansas Agricultural Experiment Station.

[2] P. L. Gainey: SCIENCE, N. S., 48, pp. 139-140; *Jour. Ag. Res.*, 14, pp. 265-271.

[3] G. Udny Yule, *Phil. Trans. Roy. Soc.*, Ser. A, Vol. 194, pp. 257-319.

GENERAL MEETING OF THE AMERICAN CHEMICAL SOCIETY

THE sixty-third general meeting of the American Chemical Society was held at Birmingham, Alabama, Monday, April 3, to Friday, April 7, 1922, inclusive. The council meeting was held on the third, the general meeting on the morning and afternoon of the fourth and divisional meetings all day Wednesday and Thursday. Excursions were enjoyed in Birmingham on Friday, and some fifty of the members took a special excursion to Muscle Shoals on Saturday. Full details of the meeting and program will be found in the May, 1922, issue of the *Journal of Industrial and Engineering Chemistry*. The registration was 381, coming from 36 states and one from the island of Mauritius. Twenty-eight ladies attended the meeting.

General public addresses were given by Carlile P. Winslow, director, U. S. Forest Products Laboratory, on "The development of