ing the head or by some stridulatory apparatus. Experiments conducted by the senior author, however, seem to indicate that termites hear air vibrations very poorly if at all, while at the same time they are very sensitive to substratum vibrations. This fact together with the definite proof that the head hammering produces a distinct substratum vibration tends to support the idea that these insects communicate with each other through the nest material. Probably the asymmetrical mandibles of *Capritermes* and allied genera are modified for making a substratum vibration by snapping the mandibles. As these substratum sounds are generally associated with disturbance, it is thought likely that they are utilized as symbols of danger.

The jerking motion of termites commonly observed did not register enough vibration through the substratum to be detected in the apparatus, and there seems to be no indication that this action is a method of communication by sound, although evidence points to the strong possibility that termites communicate by means of this jerking motion, possibly by means of an odor stimulation.

There is some indication reported by Dr. T. E. Snyder, of the U. S. Bureau of Entomology, that excessive substratum vibration frequently produced will deter termites from occupying certain situations. Crossties of railroads with heavy traffic and buildings occupied by cotton machinery in motion seem to be immune to attack, and the above experiments indicate the reason.

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AN ACCURATE DROP RECORDER

SOME time ago in a brief review of the various existing drop recorders I described one model of Hainke's suction electrode type.[1] Recently at the request of a former colleague I constructed an instrument in which certain important changes were made. The resulting device was so much better than the one previously described that it may be of interest to others whose problems demand a high order of accuracy in the measurement of small flows. As will be seen by a reference to the figure[2] the instrument consists of three parts. *A* consists of the usual condom displacement chamber already described; in place, however, of the long inlet tube, I now fit a fine glass rod *R* which supports the condom thus insuring more complete emptying. *B* is the sulphate reservoir and also vacuum chamber combined, made from a

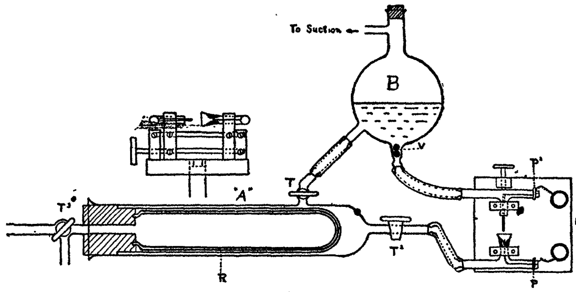

FIG. 1

250 cc pyrex flask. In the bottom tube which connects to the upper electrode is a bead valve *V* to prevent back-flow should the suction fail. When the instrument is not in use the tube leading to the electrode should be clipped off. *C* illustrates the electrodes. The top or cup of the lower one should be on a level with the middle of the displacement chamber to which it is connected. Electrical connection is made by means of a platinum wire running from the base of the cup to the binding post *P*. The upper movable or suction electrode consists of a fine platinum tube connected to its binding post P^2. To use the instrument the displacement chamber is filled with 10 per cent. sodium sulphate solution from the reservoir through the tap *T*, the exit tap T^2 being closed. In order to avoid disconnecting the animal or other source of inflow, use is made of the three-way tap T^3. Suction is now turned on, and for this purpose I personally use a filter-pump on the recorder stand worked from the laboratory compressed air. The clip is removed from the upper electrode tube and air bubbles freely in the vacuum-tube. T^2 must, of course, be closed. As the displaced fluid wells up in the cup it comes in contact with the suction electrode, momentarily making contact, which is recorded in the usual way.

Variation of the size of the drop is obtained in three ways. Firstly, by the size of the suction electrode tube; secondly, by the type of surface it takes its drop from, the larger the surface the larger the drop, hence the funnel shape of the lower electrode; thirdly, by the amount of suction used, the greater the suction, naturally, the smaller the drop. This latter, however, can not be too great unless extremely sensitive electrical recorders are used, as the contact time is correspondingly shortened.

The apparatus as demonstrated will easily give an accuracy of 600 drops per cc, using an ordinary thousand ohm telephone relay and simple signal connected through a 45-volt wireless battery. Using such a sensitive instrument as a string galvanometer with a finer electrode probably well over a thousand drops per cc could be readily recorded. Movement of the electrodes alone gives about 500 per cent. variation.

[1] O. S. Gibbs, "Drop Recorders," *Jour. Lab. and Clin. Med.*, 12: 686, 1927.

[2] I am indebted to Mr. J. G. Allen, of the cableship *John W. Mackay*, for the drawing of this instrument.

SUMMARY

An improved form of drop recorder is described which has an accuracy of 600 drops per cc.

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SPECIAL ARTICLES

A STUDY OF IODINE IN SOUTH CAROLINA[1]

SINCE the day Courtois made iodine from seaweed by heating it with sulphuric acid, and only a year or two later Gay-Lussac identified it as an element and gave it the name "iodine," much has been written in regard to its sources, properties and uses.

Research work in recent years indicates that the amount of iodine found in water, soil and plants from different sources varies to a considerable extent. In some sections of the United States, where there is a deficiency of iodine in the water and food, goiter is quite common, and certain troubles such as hairless pigs and big head in calves and sheep are quite prevalent. The presence or absence of iodine in a region has therefore a very important bearing on the health and happiness of the people.

Something over two years ago a project was begun by the chemistry division of the station with the idea of studying the relationship of the mineral content of feeding stuffs grown in South Carolina and the mineral content of the soils upon which they were grown. Iodine is one of several elements involved in this study.

Where the plant obtains its iodine and why plants from some sections of the country carry more iodine than others are points of considerable interest. From the analysis of many soils and waters from different parts of South Carolina it would seem that there is sufficient iodine present for the plants. The original source of this iodine is a matter for some discussion. It is likely that most of it comes from the rocks from which the soils are formed, especially in the Piedmont section.

However, there are other possible sources. It is quite possible that some is being carried through the air from the ocean along with micro-organisms and dust particles, while the coal smoke washed down by rain is another source. Rain-water at Clemson College carries some iodine. Another source is that of nitrate of soda. Caliche, the mineral from which nitrate of soda is obtained, is the greatest commercial source of iodine to-day. Several samples of nitrate of soda used in this state during the year 1928 analyzed from .027 to .054 per cent. of iodine.

[1] Contribution from the Chemistry Division of the S. C. Experiment Station.

During the years 1923 through 1927 there was sold in South Carolina annually an average of ninety-three thousand (93,000) tons of nitrate of soda. And this state had been using this fertilizer for many years previous to this.

This would mean the addition of approximately ninety-three thousand (93,000) pounds of iodine annually to the soils of this state. The iodine in sodium nitrate is largely in the form of sodium iodate.

SOILS

In the analysis of soils less iodine is found in the first six inches, and it increases with each succeeding six inches through a depth of eighteen inches. This may be due to several causes. It has been shown that there is an evaporation of iodine from the soil. The growing plant removes a portion, while leaching by water carries some in the opposite direction.

Less iodine is found in the soils from the middle section of the state than those from the upper portion. This may be due to a difference in the soil formation, the soils from the Piedmont region being formed from granites, quartzites, gneisses, etc., which usually show considerable iodine.

There is very little data for comparison on the iodine content of soils in this section of the country. The results as found in this state are shown in the table below:

Location	No. of samples	Iodine—Parts per Billion			
		0–6 inches	6–12 inches	12–18 inches	Total
State Park	36	142	246	377	**765**
Clemson College	15	188	419	627	**1,234**
Florence	45	304	508	638	**1,650**
Bishopville	18	185	707	1,023	**1,915**
Trenton	18	344	888	1,181	**2,413**
Gaffney	9	684	1,161	1,176	**3,021**

IODINE IN FEEDING STUFFS

Although there is a lack of uniformity in the iodine content of plants of the same variety, yet there is no doubt that some plants have a greater preference for it than others.

From the results of this investigation it seems that vetch, winter field pea and soy-beans run somewhat higher in iodine than the other feeds, while among the vegetables, spinach, lettuce, mustard and turnip tops are the best iodine carriers.

There are other feeds that are possible sources of iodine. A sample of fish meal and one of tankage received recently by this laboratory analyzed 1,350 and 1,000 parts per billion of iodine respectively.