find no evidence of the heterogeneity claimed by Jorpes. Similar findings have been reported by Jaques and Waters[4] for the crystalline barium salt of heparin isolated from the blood of dogs in anaphylactic shock.

The latter authors reported that crystalline heparin isolated from dog tissue has a much greater anticoagulant potency than that from beef, suggesting a species difference. More recently, heparin has been isolated as the crystalline barium salt from pig and from sheep lung, and these also have been found to differ in potency. The potencies of samples of crystalline heparin isolated from the four species are listed in Table I. The anticoagulant in each case was purified

TABLE I

THE ANTICOAGULANT POTENCY AND SULFUR CONTENT OF HEPARINS FROM DIFFERENT SPECIES*

Source	Potency u/mg	S. content %
Dog	240	10.8
Ox	100	10.8(2)
Pig	44	10.4
Sheep	23	11.6

* In each case the potency reported is for the air-dried crystalline barium salt, while the sulfur content is for the same sample after removal of the water of crystallization (about 10 per cent).

and crystallized as described by Charles and Scott. The potency was determined by comparison with a standard preparation of pure beef heparin, using a modification of the Howell method. It is evident that heparin isolated from different species varies greatly in potency; *i.e.*, different heparins occur in different species. The barium salts of the various heparins all crystallize in the typical rosettes and sheaves described for beef heparin by Charles and Scott and apparently require almost identical conditions for crystallization. It is rare for a biological substance to show such widely differing activity in different species without a corresponding variation in crystalline structure.

The sulfur contents of the various heparins are also shown in Table I. While there are minor variations in these values, there is no correlation between the potency and sulfur content of these heparins. For example, as previously reported by Jaques and Waters, the sulfur content of dog heparin is no greater than that of the heparins from other species, although its potency is 2½ times that of the beef and 10 times that of the sheep heparin. Furthermore, in the 4 mammalian species studied, sheep heparin has the highest sulfur content and lowest potency. Hence, although removal of the sulfur inactivates heparin (Charles and Todd), the very high anticoagulant activities of the crystalline material from dog, beef and pork tissue must be due in part to factors other than the high sulfur content.

Investigations in these laboratories support the conclusions of Charles and Todd that the heparin in any one species is a chemical individual. It is evident, however, that different heparins are found in different species.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

ELECTRO-FOLIAR DIAGNOSIS

WHILE investigating the alkalinity of greenhouse soils, caused by the use of hard water, and its relationship to chlorosis in plants, especially the role of iron and manganese as a cause of the chlorosis, the idea occurred that perhaps qualitative or semi-quantitative spot tests for these elements could be obtained by electrolyzing the leaf tissue and catching the removable ions in chemically treated filter papers. Accordingly, a suitable form of the well-known electrolysis apparatus was improvised which includes a common table clamp to hold the plant leaves, filter papers and electrodes, a 45-volt B-battery, a nickel crucible cover for the cathode, and a 1½-inch platinum disk for the anode. The general features of the apparatus are shown in Fig. 1.

The following technique was found suitable for the determinations: A plant leaf was perforated over an area of about four square centimeters by placing it on the convex side of a watch glass and tapping it with the teeth points of a fine comb. The perforated leaf was then laid between two small filter papers, which were saturated previously with a dilute acetic acid solution, and the whole then placed between the electrodes. After clamping the electrodes firmly together between insulators, and with suitable electrical connections, the current was passed through the leaf. Perforating the leaf in the manner described, and saturating the filter papers with an acid or salt solution, lowers the electrical resistance of the whole considerably and thus increases the efficiency of the electrolysis. Two minutes' time for current passage gave good tests for nitrates, phosphorus, iron and manganese in certain cases. Obviously, the proper kind of electrodes, current strength, chemical treatment of the filter papers and other experimental conditions to use will depend on the special tests to be made with the apparatus. In all cases, however, the filter papers must be free from the ions under test.

[4] Jaques and Waters, *Amer. Jour. Physiol.*, 129: 389, 1940.

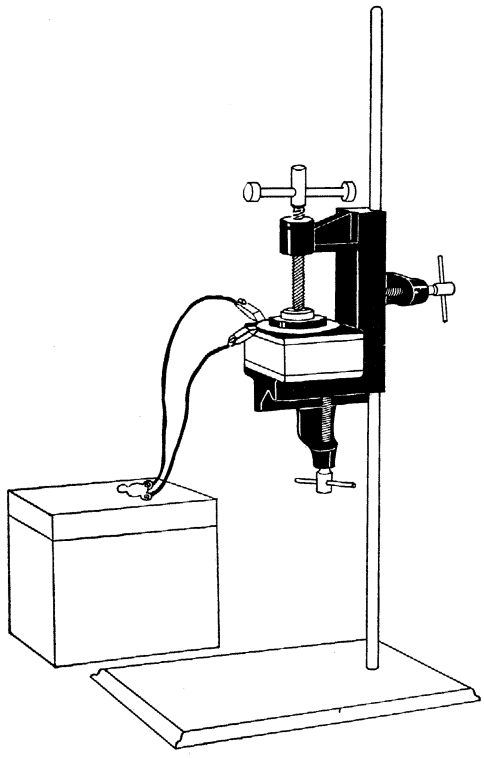

FIG. 1

The method is susceptible to various modifications. An important feature in its operation is the short distance of travel of the ions from the leaf to the papers, which reduces the time period required for a determination. Several papers may be used together when it becomes necessary to separate the testing operations, and one or more leaves may be taken depending on the amounts of the ions required for the tests. Paraffin rings on the papers confine the products of an electrolysis. Micro-cells may be formed by means of thin rubber gaskets. Black papers help to better identify white precipitates or light colored crystals under the microscope. Other modifications of technique may be necessary for special applications of the method.

Many important tests can be made with the method, and it should find a general application. In the field of soil fertility, diagnosis, problems pertaining to either deficient or excess plant nutrients, or to other chemical components of the soil, may be studied by means of rapid determinations of ions in the leaves of plants grown on the soil. Electrolysis of plant leaves should give information about the chemical processes and the physico-chemical states of the ions in the plant not obtainable by means of total analysis, the common method. Another possible use of the method is for the rapid detection of selenium, cyanide, arsenic, aluminum or other toxic substances which may be present in plants that have grown on certain soils.

Data are being collected for a more complete publication dealing with the application of the method to some phase of the general project as stated above.

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A SIMPLE "LIVE" TRAP

AN ordinary spring mouse trap is fastened on top of a cigar box and strings tied at A and E (see Fig. 1). The hook at C is baited and a paper clip D is

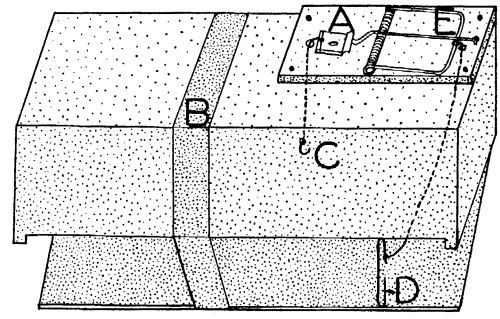

FIG. 1.

fastened to the end of the second string to hold open the lid of the box (placed upside down). A strong rubber band, B, is then placed around the box and the trap on top is set in the usual manner. When the prospective animal nibbles the bait at C the spring pulls the prop D and the rubber band quickly closes the box.

This type trap has been found satisfactory for small mammals such as field mice. By employing a larger box and modifying the bait hook it should be useful for larger animals.

If there is danger of surrounding twigs and grass springing the trap prematurely, a guard can be constructed of fine mesh window screen. Total cost per trap is approximately 5 cents plus 10 minutes' time for construction.

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