

duration of the experiments, the solution had to be changed from time to time.

To learn from another point of view how a nutrient solution affects the early growth of young leaves developing from the bud, a series of experiments was performed with young willow twigs, during the months of March and April, this being the time of the year when the process of the opening of buds seems to depend only upon a favourable temperature. This experiment was designed also to test water absorption by young leaves.

The solutions (other than nutrients) used in the experimental work in connection with this paper were made by dissolving the molecular weight, in grams of the substance, in a liter of water. This method of preparation is similar to that indicated by Pfeffer* (Ewart's Trans. 1900, p. 146), and by Detmer and Moor (p. 326), who designate them *normal solutions*. This method is also that adopted by True (1898, p. 410-411) and (1900, p. 185). These, however, are not *normal solutions* as defined by Mohr† and other analytical chemists. When salts contained water of crystallization, or hygroscopic water, it was found more convenient to determine the specific gravity of the solution and from this calculate its concentration. A convenient apparatus for finding the specific gravity of a solution was arranged; and as such apparatus may be of some use in a laboratory of plant physiology, a full description with diagram is given (Fig. 1). The stock solution once obtained, there was no difficulty in preparing solutions of less concentration as occasion required. The solutions of hydrochloric and of sulphuric acids were *normal solutions*, as were those of potassium and of sodium hydrate. These were procured ready prepared from the chemical supply house.

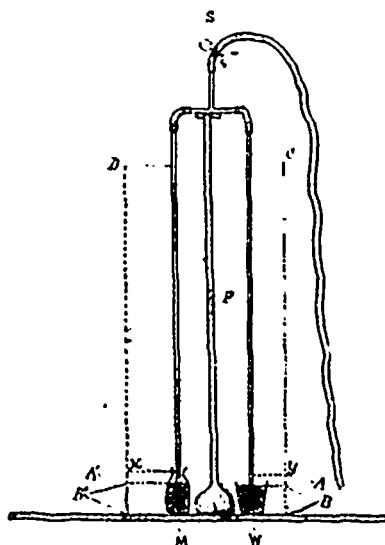


FIG. 1.

Two small glass tubes, held in a vertical position by the support P, are finely graduated and connected by a "T" tube to the leg of which is attached a rubber tube. One of the tubes is inserted in distilled water at the temperature required, the other in the liquid to be measured. The stop-cock S is opened and the ascent of liquid due to capillarity, A and A', measured. Then by sucking on the rubber tube the liquids rise to D, etc. Now the sp. g. of M is $\frac{Cy}{Dx}$.

* See bibliography at the end.

† Titrimethode, p. 56.