had still failed to root. Twelve of these were then treated with water, another 12 with aneurin (1 mg per liter) for 24 hours. One week later a total of three short and poor roots had developed on the water-treated set. Those treated with aneurin, on the other hand, all rooted vigorously and formed a total of 67 sizable roots.

It is also known that certain "essential" amino acids exert a beneficial effect upon the growth of some roots.[5] It can therefore be predicted that cuttings may be found in which root development is limited by these substances.

The above experiments are a logical outcome of the series of discoveries concerning the plant growth hormones. They demonstrate clearly that aneurin, the root growth hormone, if it is applied at the appropriate time after roots have been initiated by auxin, greatly increases the root development of cuttings, and may hence become as important in nursery practice as are the auxins themselves.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

QUANTITY COLLECTING OF PLANKTONIC DIATOMS[1]

IN the contribution to SCIENCE of December 4, 1937, by Dr. G. L. Clarke concerning the collecting of marine plankton diatoms I notice several surprising assertions which were not entirely acceptable on available evidence. Perhaps a word of dissent is in order. For the sake of brevity only brief reference to particular items will be attempted.

1. Small size of plankton diatoms is not always (if ever) detrimental to collecting them. Bigelow,[2] Trask[3] and other American and European observers have commented on the ease of obtaining large quantities at particular times and places.

2. It is not always necessary to "strain very large volumes of water." For example, in the 12,000,000 cells per liter population found by Trask near Grays Harbor, Washington, thirty liters would have yielded a large quantity. This could have been obtained with far less trouble by dipping and "straining" that amount than would be involved in operation of "six tow nets" at once.

3. It seems to be assumed that if diatoms are taken from sea water all specimens are uniformly representative in chemical composition. This assumption is not tenable. At the Scripps Institution of Oceanography it has been found that some larger population near the surface of the sea show nearly 50 per cent. in decadent condition.[4] There are other reasons why the physical or the functional conditions of a particular population should be noted before it is assumed to be representative, although chemical analysis of a number of populations may offset this deficiency in general observation for certain purposes.

4. It is true that "purity of the catch" is requisite for reliable "chemical analysis," but *that* is a common characteristic of plankton diatom populations showing excessive abundance, *i.e.*, above a million cells per liter. In a population as low as 200,000 cells per liter considerable numbers of several other kinds of organisms may be encountered. Some of these have dimensions similar to those of the diatoms and would not be excluded by the ingenious reversed cone device. For full satisfaction concerning "purity" a dense population should be found in which natural exclusion of other organisms is practically complete.

5. As a general statement, the assertion that 200,000 cells per liter "approaches the maximum richness observed for diatom flowerings" is not acceptable. In addition to the reports from European and other North Atlantic waters, there are a number of instances in which millions of cells per liter have been found in Pacific waters from the Gulf of Panama to the region of Juneau, Alaska.[5] The Gulf of Santa Catalina is not one of the most productive regions, but at the Scripps Institution of Oceanography in certain years whole weeks (mss. records) have been noticed in which the abundance remained above a million cells per liter in daily catches.

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THE PREPARATION OF ABSOLUTE ETHER

"THE customary method of preparing absolute ether consists in shaking the ether repeatedly with water to remove alcohol and finally drying with sodium."[1] The

[5] P. White, *Plant Physiol.*, 12: 793, 1937; J. Bonner and F. Addicott, *Bot. Gaz.*, 99: 144, 1937.

[1] Contributions from the Scripps Institution of Oceanography. New Series, No. 12.

[2] H. B. Bigelow, U. S. Bur. Fish. Doc. No. 968, 1926.

[3] P. D. Trask, "Origin and Environment of Source Sediments of Petroleum," Gulf Publishing Company, 1932.

[4] W. E. Allen, *Quart. Rev. Biol.*, 9: 170, 1934.

[5] W. E. Allen, *Bull. Scripps Inst. Oceanog.*, 1: 42, Univ. Calif. Press, Berkeley, 1927; W. E. Allen, SCIENCE, 70: 418, 1929; E. E. Cupp, *Trans. Am. Micros. Soc.*, 53: 25, 1934.

[1] D. W. McArdle, "Solvents in Organic Chemistry," Van Nostrand, New York, p. 83, 1927.

labor required for the preparation, as well as the loss of ether, is much reduced by the following procedure.

To 3 l. of U.S.P. ether is added 450 g. of technical flake sodium hydroxide, and the mixture is allowed to stand at room temperature (25–30°) for two weeks with occasional shaking. After the first day the liquid becomes yellow and the sodium hydroxide appears somewhat powdery. After a week the color has nearly disappeared from the ether, but the sodium hydroxide has become yellow or brown. In about two weeks the ether is colorless and may be used directly for most purposes which require absolute ether, such as Grignard reactions. Since the non-volatile residue is very small (5 cc of the ether thus prepared left <0.01 mg of residue dried at 40°, or $<0.0_32\%$), distillation can ordinarily be omitted. The ether can be decanted and stored over sodium with very slight evolution of hydrogen.

The sodium hydroxide can not profitably be used for a second lot of ether without purification. Smaller proportions of hydroxide to ether result in lengthened time and eventually incomplete decolorization. Other processes using sodium or potassium hydroxide for drying ether are described in patents (Hammond, U. S. 1,466,435 and 1,466,436 (1923) and others). The ether is best stored over a small amount of sodium in bottles at least three quarters full to minimize "breathing" with change in temperature. Under these conditions, no peroxide formation has been observed. The cost of absolute ether made by this method is much less than the current price, and the quality, judged by its behavior both toward sodium and toward dilute permanganate in strongly alkaline solution,[2] is better than that of commercial grades.

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THE USE OF CARBON DIOXIDE IN THE PREPARATION OF SILICIC ACID JELLIES

IN studies on the growth of hydrogen-oxidizing bacteria on silicic acid jellies certain difficulties in the preparation of the jellies have been overcome by neutralizing the silicate with carbon dioxide. To 16 ml of nutrient solution in 6- or 12-oz. glass bottles is added 2 ml of a potassium silicate solution which has been made normal with respect to titrable alkalinity. A sufficient quantity of a mixture of normal hydrochloric, phosphoric and sulfuric acids is then added to give a reaction of approximately pH 8.0. After the bottles containing this liquid medium have been evacuated to a pressure of about 7.5 cm of mercury, a gas mixture consisting of 60 per cent. hydrogen, 20 per cent. oxygen and 20 per cent. carbon dioxide is run in to equalize the atmospheric pressure. The bottles are placed in a horizontal position, and within twenty or thirty minutes the carbon dioxide has been absorbed and the silicate has set to a firm transparent medium with a reaction of approximately pH 7.0.

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[2] G. S. Forbes and A. S. Coolidge, *Jour. Am. Chem. Soc.*, 41: 152, 1919. Commercial U. S. P. ether, absolute ether and the product above gave the following reaction times: 3, 12 and 20 seconds, respectively.

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