paper. This seed was planted in the greenhouse on October 9 in flats and the seedlings were transplanted to a bed after they had made a growth of about 12 inches. Artificial lights (three 500-watt Mazda lamps for 100 plants) were turned on from 5 to 12 P. M. each night. Plants 20 feet in length were developed by March 29, and two of the plants came into burr (blossom) at this date. A growth of 12 inches was recorded in one day. This development of a hop plant from seed to blossom in less than six months' time indicates the possibilities of rapid development of new varieties. Professor E. S. Salmon, in England, stated that the "work of raising new varieties of hops is an arduous and expensive one and is necessarily very slow, since the seedling plants do not bear a crop until the third year, and can not be judged for character such as aroma, richness in resins, and cropping powers until the fifth year, at the earliest."

The use of chilling and scarification of seed, the greenhouse and the lights are of great assistance in speeding up a program of breeding with a crop of this type. The striking variability of seedlings indicates a great difference in the value of the different plants. Of course, it will take additional time to test out not only their disease resistance, but also their yielding ability and quality. Also, some time will be required to increase their vegetative parts for planting stock.

This procedure not only speeds up the breeding program, but also gives available plants for testing in the spring when inoculum of the downy mildew disease, which is a true parasite, is plentiful.

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POLYEMBRYONY IN RED SPRUCE

IN the course of a germination test of red spruce *Picea rubra* (Link.) collected in eastern Maine in the fall of 1930, two well-formed radicles, each about 2 cm long, were observed protruding from the same seed coat. Unfortunately, upon removing the sprouted seed the root tips were damaged, so that it was impossible to grow the seedlings. Upon dissection two sets of well-formed cotyledons were disclosed. Both seedlings appeared to be of equal vigor, so that it seems probable that two normal seedlings would have developed, had they been undisturbed. Similar phenomena have been reported by Jacobs[1] in sugar pine, *Pinus lambertiana* (Doug.), in 1 per cent. of all seeds tested by him, and recently by Woodworth[2] in *Alnus rugosa* (Du Roi) Spreng, but the writers are unaware that polyembryonism has been recorded in red spruce. During nearly 300 tests of this species, aggregating over 30,000 seed, this has been the only case observed.

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[1] Allen W. Jacobs, "Polyembryonism in Sugar Pine," *Jour. For.*, 22: 573–574, 1924.

[2] Robert H. Woodworth, "Parthenogenesis and Polyembryony in *Alnus rugosa* (Du Roi) Spreng.," SCIENCE, n. s., 70: 192–193, 1929.

ABBREVIATIONS FOR SCIENTIFIC AND ENGINEERING TERMS

NEARLY two hundred years ago an Englishman determined the value of π to 707 decimal places. One state legislature is said to have "standardized" the value of π as 3. Between these impracticable extremes lies the value which has served, and will continue to serve, the purposes of science.

As a matter of convenience, abbreviations have been established for many words which are in frequent use or which are cumbersome by reason of length. Many of these abbreviations, though not logically derived from the English words which they now represent, have been sanctioned by custom, and the period at the end is the generally accepted sign of an abbreviation. A chemical symbol is quite generally written without the period, and thus in present usage there is a distinction between C (for carbon) and C. (if that form be used for centigrade).

The list of "Abbreviations for Scientific and Engineering Terms" prepared by a sectional committee of the American Standards Association proposes to abolish the period, to change many of the time-honored forms of abbreviation, and in many instances to "standardize" two forms of abbreviation for the same word.

Elimination of the period is proposed "in the interests of economy and the reduction of waste." It is difficult to see how this will be realized. No economy of time is indicated in printing and proofreading where the printer is expected, for example, to set "cu m" (for cubic meter) and (in the absence of periods which determine the spacing) to decide whether cum or cu m is the proper form.

Though the American Association for the Advancement of Science is given as one of the organizations sponsoring this proposed list of abbreviations, the writer has consulted a number of association members without finding one who knew of the list, or who favors it in its present form.

If the list is to be sanctioned by the association, many members who are careful in their use of English will no doubt be interested in the proposed forms. The list appeared in the "ASA Bulletin" of July, 1930, and in a publication dated January, 1931, designated as "A. S. A. Z10i–1931."

The list is not a very long one, but its adoption

promises a long period of confusion. Somewhere between the complete word and the arbitrary and ambiguous form of abbreviation, there is a well-established tradition which should not be entirely ignored if wide-spread use rather than mere official adoption is to be achieved.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

THE MICROPHONE AMPLIFIER

In the transmitter of the ordinary telephone, the vibrations of the diaphragm produce varying pressures upon carbon granules or a carbon button. The electrical resistance of the carbon varies with the pressure: so that an electrical current may be made to vary in accordance with the impressed sound waves. This current, although controlled by the sound vibrations, has much more energy. Hence, the carbon button acts as an amplifier for sound vibrations.

It is, therefore, possible to make use of the carbon transmitter as an amplifier for wireless signals. The circuit is shown in Fig. 1. The output from an ordinary detector valve AB is passed through the coils of a wireless receiving telephone. The type used in this circuit is a Brown telephone. The diaphragm of the Brown telephone is set in vibration by a little metallic reed which is itself actuated by the rectified current from the detector tube. The diaphragm of the Brown receiver is removed and a short light metallic rod is connected from the reed C to the middle of the diaphragm D of a telephone transmitter. Then when the reed vibrates in unison with the incoming signals the diaphragm of the transmitter D presses against the carbon button E. The current

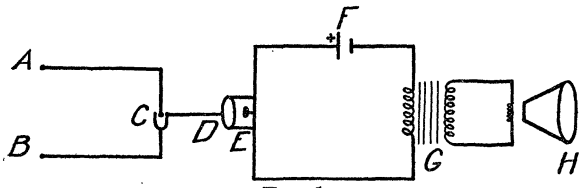

Fig. 1.

supplied from the six-volt storage battery F varies with this pressure. Accordingly a variable current passes through the primary of the audio transformer G. This causes a current in the secondary which actuates the loud speaker H. The audio transformer is inserted to prevent the direct current generated by the battery F from passing through the coils of the loud speaker.

This arrangement gives plenty of amplification, but the quality is rather poor. The device is not very sensitive, as the carbon button will not respond to weak vibrations.

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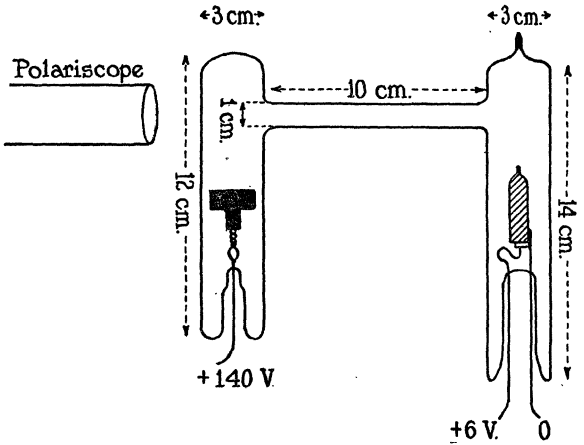
THE USE OF A HOT CATHODE HELIUM LAMP AS A SOURCE OF MONOCHROMATIC LIGHT FOR THE POLARISCOPE

A continuous spectrum in conjunction with suitable prism and diaphragms is not well adapted for precise measurement of rotatory power. The mercury arc unfortunately gives only two lines suitable for polarimetric purposes ($\lambda = 5460.7$Å and $\lambda = 4358.3$Å). The two yellow lines, 5790.7Å and 5769.7Å, are too near to one another to permit an easy separation, especially as a great intensity is needed for measurements of rotatory power. The helium spectrum shows two intense lines, a yellow one ($\lambda = 5875.6$Å) and a red one ($\lambda = 6678.1$Å). The yellow line permits measurements of great accuracy and can be used to great advantage in place of the inconvenient mercury yellow lines. Furthermore, it presents a second advantage in being situated very near the sodium doublet for which the rotations of the majority of organic compounds have been determined.



Hot cathode helium lamp

Except for the red line furnished by the Cd arc, which is difficult to operate for routine work, there is no red light readily available which is intense and pure enough for the purpose specified. The helium red line is located very far towards the red and is ideal for measurements in that part of the spectrum.