grown in artificial light entirely. Since no reference to the growth of plants from seed to seed without sunlight has been found in the literature this preliminary report of the first successful attempt may be of use to plant breeders and agronomists in northern regions.

A great variety of plants including several varieties of wheat, oats, barley, rye and potatoes, buckwheat, lettuce, beans, peas, clovers, radishes, flax and a number of common weeds were grown from seed to seed entirely in artificial light. The seed produced was of good quality, full of starch, and germinated well.

Light for the experiment was obtained from tungsten filament nitrogen filled lamps which were burned for twenty-four hours each day. The lamps are rated to burn 1,000 hours but they averaged 3,000-4,000 hours under continuous use. One set of lamps was found to be more than sufficient to produce an ordinary crop such as the cereals, since the time to head is much decreased by continuous illumination. Spring wheats produced ripe seed in about 90 days. At this rate it ought to be possible now to grow three generations from a cross within one year. The growth of valuable plants in artificial light should be of considerable advantage in northern regions where the light in winter is of short duration and low intensity.

All of the plants tested, except cabbage, have bloomed and each variety does not seem to require any particular period of illumination to cause blooming as found by Garner and Allard.[1]

Four ranges of light intensity were used and a number of plants bloomed in all of them, although the illumination was continuous. The tests were performed in three unheated basement rooms. It was unnecessary to supply any heat other than that produced by the lamps even in the coldest winter weather. For cereals the temperature was controlled automatically at 14° C. by blowing in cold outside air. The energy used in heating the ordinary greenhouse in Minnesota during the winter would be ample for both light and heat in such experiments as these since nearly all the energy of the light finally goes to heat and thus is made to serve a double purpose.

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[1] Garner, W. W., and Allard, H. A.: *Jr. Agr. Res.*, 18: 553-606: 1920.

THE PREPARATION OF CLEAR BEEF AGAR

A CLEAR beef agar with a p_H reading from 6.6 to 7.0 being desired and the usual method for the preparation of such media proving unsatisfactory, inasmuch as a cloudiness often developed in the cleared agar on sterilization, the following procedure has been adopted and has proved uniformly reliable.

The formula is as follows:

Beef extract (Liebig's)	3 grams
Peptone ("Bacto")	10 grams
Sodium chloride	5 grams
Agar Agar	15 grams

These ingredients are dissolved in one liter of distilled water by flowing steam. As suggested by the directions for the preparation of beef bouillon, given by James McIntosh, M.D., and William A. M. Smart, B.Sc.Land.,[1] the resultant nutrient agar is adjusted to a p_H of about 8.2 with an approximately normal solution of sodium hydroxide. After cooling to 45°-50° C., the beaten whites of two fresh eggs are added. Soluble egg albumin powder may be substituted for the fresh eggs, 5 grams beaten up in 50 cc. of distilled water proving satisfactory. If more than one liter is being made, the beaten white of one egg or a proportional quantity of egg albumin powder should be used for each additional liter. After mixing thoroughly by pouring from one container into another, the agar and egg are autoclaved for 15 minutes at 15 pounds pressure, filtered through paper or, preferably, through absorbent cotton by suction, and the filtrate adjusted to the desired p_H with an approximately normal solution of hydrochloric acid. It is then autoclaved for 5 minutes at 15 pounds pressure to insure the complete precipitation of any fine particles remaining in suspension and filtered through paper. After tubing, it is finally sterilized for 20 minutes at 15 pounds pressure. This beef agar remains

[1] James McIntosh and William A. M. Smart: "The Adjustment of the Reaction of Bacteriological Media," *Lancet*, Vol. CXCVII, No. 5017.

clear after sterilization and has given excellent results as a bacteriological medium.

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THE EFFECT OF FEEDING VELVET BEANS TO PIGEONS

THREE groups of three mature pigeons each were fed as follows:

Pen I: Ground velvet beans.

Pen II: Ground velvet beans plus aqueous extract of rice bran.

Pen III: Ground velvet beans plus aqueous extract of rice bran plus 10 per cent. butterfat.

The beans were fed dry and at the start were eaten readily. Pens II and III were given an aqueous extract of rice bran as the sole source of drinking water.

On the second day after feeding the beans, all birds showed ruffled feathers and a drawn-up, sleepy appearance. On the fourth day, one bird in Pen I and one in Pen II died. The remaining birds were in very poor condition. The loss in weight averaged about 80 grams.

Check birds receiving polished rice made slight gains during the same period, and were apparently in thrifty condition. On the fourth day the feed was changed to polished rice in all pens. One bird in Pen III was too weak to eat and was hand-fed on polished rice. Recovery was rapid in all cases.

Two pigeons were then fed ground velvet beans from another source. They rapidly developed the appearance of the birds in the former test. Both died on the eighth day.

Ground velvet beans were forced into the crops of two pigeons that had developed symptoms of severe polyneuritis. A decided improvement in condition was noticed. The birds died, however, on the following night in one case and on the second day in the other.

An aqueous extract of velvet beans furnished as the sole source of drinking water to pigeons receiving polished rice, apparently delayed the onset of polyneuritis, but did not entirely prevent it. The difference in appearance of the birds receiving the extract and of check birds receiving polished rice alone was striking. The feathers of the former remained smooth and glossy, while those of the latter soon became dry and rough looking. These results seem to indicate at least a small amount of water soluble B in the beans.

An effort will be made to ascertain the cause of the ill effect.

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A CHEMICAL SPELLING MATCH

A UNIQUE modification of the old-time spelling bee was staged at the West Virginia University last May with rather remarkable success.

At the suggestion of the writer the chemical faculty of the university arranged to hold a contest among the 376 students taking the course in general inorganic chemistry, and this contest was to be a public match for the spelling of chemical formulæ of such compounds as are ordinarily included in a first year's college course in chemistry.

These students are normally divided into sixteen quiz sections, and it was evident that so many could not be brought on the floor at the same time for spelling. Therefore, eight preliminary matches were held at seven o'clock in the evening of the final match, where two sections, in charge of two instructors, spelled against each other, and then a number chosen from each of these groups, representing one out of every eight students, who became eligible to the final match.

The preliminaries lasted about one hour, after which all the students assembled in the armory and the winners lined up for the final contest. Professor Samuel Morris pronounced the words, and three well-known chemists, not connected with the department, acted as judges. For example, ortho phosphoric acid was given, and the student whose turn it was replied by saying "H_3PO_4."

Upwards of 700 formulæ were prepared for the instructors' use at the preliminaries, and then 50 to 60 additional formulæ in case of emergency for the final match. As a prize, Mr. J. F. Cadden, the winner, was presented with a copy of Mellor's "Modern Inorganic Chemistry." The last five students to spell down were presented with attractive certificates bearing the university seal.

A great deal of enthusiasm and rivalry be-