The conductivity of phosphorescent calcium sulphide was later separately investigated at the University of Heidelberg, and it was shown that certain wave-lengths not in the infra-red gave a maximum effect, which was contrary to what one might have expected from Lenard's theory. Rather the effect was a maximum near the point where the photoelectric effect stopped, suggesting some relation between the photoelectric and actinodielectric effect. An investigation of the relation between these two effects (which amounts to finding out the relation between the ease with which the electrons are ejected and the increase in conductivity for different wave-lengths of light) was started for sulphur, during the summer of 1913, by the writer at the Davy-Faraday Research Laboratory of the Royal Institution, London, England, but was not finished.

The relation between the photoelectric effect, actinodielectric effect and phosphorescence has been discussed by the writer and a general theory of phosphorescence has been developed which includes fluorescence, fluorescent X-rays, organic phosphorescence and self-luminous radioactive substances.[2] In the review of this theory in the "Beiblatter zu den Annalen der Physik" the difference between Lenard's theory of phosphorescence and the author's is not clearly pointed out. The author's theory takes into account resonance, Stokes's law and a critical energy content, which is not done by Lenard.

In conclusion, in respect to phosphorescent calcium sulphide, it should be said that red light does increase its conductivity, but *does not* give a photoelectric effect.

CHESTER ARTHUR BUTMAN

SPECIAL GROWTH-PROMOTING SUBSTANCES AND CORRELATION

THE vigor of potato sprouts bears a direct relation to the size of the seed piece, or in other words to the amount of tissue surrounding the eye. When a certain minimum is reached, the vigor of the sprouts decreases as the size of the seed piece is reduced. The weak, slender sprouts produce correspondingly weak plants which remain weak during their entire period of growth and yield a small crop of tubers.

The weak sprouts are not due to lack of usual food materials, as sprouts on pieces still large enough to contain an abundance of these substances, show considerable decrease in vigor. If a lack of sufficient ash constituents is responsible for the weak sprouts, they might be expected to approach their usual vigor if the small pieces be allowed to sprout in rich soil, as the sprouts form roots very quickly in moist soil. The sprouts from such pieces, however, do not gain any vigor under these conditions.

It seems logical to conclude that the potato tuber contains a limited amount of a special growth-promoting substance and if the amount of tissue surrounding the growing bud is too small, there is not enough of this substance available for normal growth.

Some of the experimental data is included in Bulletin No. 212 of the Maryland Agricultural Experiment Station under the following title: "Physiological Basis for the Preparation of Potatoes for Seed." While this bulletin was in press an article appeared by Loeb, in which he states that equal masses of sister leaves of *Bryophyllum calycium* produce approximately equal masses of shoots in equal time and under equal conditions, even if the number of the shoots varies considerably. He concludes that the limited amount of material available for growth and the automatic attraction of the material by the buds which grow out first, explain the inhibiting effect of these buds on the growth of the other buds.

If the correlative inhibition of bud growth on the potato tuber has a chemical basis it does not appear to be identical with the growth-promoting substance which the writer has postulated and which seem to effect the growth of sprouts only after they have started. Several facts in connection with the growth of sprouts on potato tubers could be mentioned to substantiate this conclusion but the two following experiments seem sufficient.

If a potato tuber bearing vigorous sprouts on the terminal end is cut transversely into

[2] See "The Electron Theory of Phosphorescence," *Physical Review*, 1912.

halves, sprouts will appear on the basal half. Therefore, this half still contained sufficient growth material to produce sprouts. This proves that, although the basal buds would not grow out before their connection with the terminal end of the tuber was severed, they were not prevented from doing so because the terminal sprouts had automatically attracted the limited amount of material for growth.

If a tuber, before the end of the rest period, is cut into transverse slices the buds on the basal slices will grow out first. If the tuber is cut lengthwise into fractions the growth of basal buds is entirely suppressed. The terminal buds on these fractions do not produce sprouts until the end of the natural rest period for whole tubers, which in some cases is a month after the basal buds on the transverse slices have grown out. The basal buds seem to have a shorter rest period than the terminal ones but are unable to grow out until their connection with the terminal end of the tuber is severed. This experiment shows that the terminal end of the tuber, even before its buds have grown out, may inhibit the growth of buds more basally situated.

Potatoes are sometimes affected with a physiological disease called "Spindling Sprout," because the whole tubers produce long, slender, weak sprouts. In all probability the special growth-promoting substances are abnormally low in these tubers. In this connection, however, the most interesting symptom of the disease is a lack of any inhibiting effect of the terminal buds on the other buds, as the sprouts appear, as a rule, simultaneously over the entire tuber. The behavior of the *Bryophyllum* plants reported on by Braum[1] may have been due to a condition of the particular plants analogous to the "Spindling Sprout" of the potato. If this were true it would account for the instances of regeneration of *Bryophyllum* leaves seemingly at variance with the experiments described by Loeb.[2]

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[1] Braun, Lucy E., *Bot. Gaz.*, 65, 191–193, 1918.
[2] Loeb, J., *Bot. Gaz.*, 65, 150–174, 1918.

QUOTATIONS

THE MEDICAL PROFESSION IN GREAT BRITAIN AND THE WAR

The effect of the war upon the number of medical students in their different years of professional study has been described from time to time by the president of the General Medical Council. Between the years 1910 and 1914 the annual entry of first-year medical students averaged roughly 1,440. Since the war the number of these entries has increased by five or six hundred a year. Thus the whole number of students actually pursuing medical studies in the medical schools of the United Kingdom has shown a steady upward movement. In May, 1916, the total was 6,103, in January, 1917, it was 6,682, in October, 1917, it was 7,048, while the latest figure, for May, 1918, was 7,630. But for some time the larger withdrawals of male students from the medical schools for combatant service or for service as surgeon probationers in the navy, more than nullified the increased entries and bade fair to produce a serious deficiency of new practitioners in the years 1918 and 1919. Urgent representations upon this matter were made to the government. As a result something has been done to make good the threatened shortage by the return of third-year students from active service to complete their studies, by the retention in the medical schools of students on their way towards qualification who are liable to be called to the colors, and by limiting the period of service of surgeon probationers. The Minister of National Service has further undertaken to provide that, if possible, the supply of students in training shall be kept at a level sufficient to give an annual yield of at least 1,000 new practitioners. This is the official estimate, but it will be well to remember that though there has been heavy wastage among medical men through the hazards and hardships of war the declaration of peace will be followed by the release from military duty of the majority of the medical men now serving in the army and navy. Demobilization is a matter which effects the medical profession at least as much as other sections of the community. The method in