

courtesy of Dr. Erwin F. Smith. The plants were X-rayed by the modern methods, using hard rays. Preliminary experiments have shown that with the technique employed normal plants were not disturbed by the X-rays in their growth and development. Preliminary inoculation with the *Bacterium tumefaciens* have also shown that the inoculations were uniformly successful and were followed by the development of a large crown gall. 43 plants were inoculated with the microorganism and the inoculation was followed immediately by X-ray treatment. The treatment was given to each plant 6 times in the course of 2 weeks at intervals of 2 days. Simultaneously with the X-rayed plants, control plants of the same age and size were inoculated with the microorganism from the same subculture. All the control plants developed a large crown gall, the majority of the X-rayed plants on the other hand developed no growth, and only a slight swelling appeared at the place of inoculation. In 10 plants there developed a small stunted growth.

The microscopical study of X-rayed galls, a full report of which will be given later, indicates that the main immediate action of the X-rays on the cells of the crown gall consists not in a direct destruction of the cells, but in the arrest of the proliferating power. The analysis of the mechanism of the action of the X-rays on the crown gall seems to indicate at the same time that the rays influence and inhibit the functions of the cells directly and do not destroy the bacteria. But this phase of the subject will also be discussed in greater detail in a subsequent publication.

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### The two forms of glycine.

By K. GEORGE FALK and KANEMATSU SUGIURA.

[From *The Harriman Research Laboratory, The Roosevelt Hospital, N. Y.*]

The two forms of glycine, plates from water, and needles from alcohol and water, were studied.

Emil Fischer<sup>1</sup> had shown that an acid chloride could be ob-

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<sup>1</sup> E. Fischer, *Ber.*, 38, 2914 (1905).

tained from the latter, but not from the former. Further differences between the two forms were found on heating (decomposition temperatures), in the reaction with nitrous acid (van Slyke method for amino-nitrogen), and toward bromine.

124 (1302)

**On the absorption of apomorphin and morphin through unusual channels.**

By **DAVID I. MACHT** (by invitation).

*[From the Pharmacological Laboratory, Johns Hopkins University and the James Buchanan Brady Urological Institute, Baltimore.]*

The alkaloid apomorphin is well known as a typical centrally acting emetic, producing vomiting by the direct stimulation of the vomiting center. In case of dogs, as is also well known, morphin is found to produce emesis almost equally well. The author has taken advantage of these facts in the study of absorption of drugs through various unusual portals of entry.

On introducing a few milligrams of apomorphin in the form of powder or on instilling a few drops of a solution of 1 per cent. of that drug into the conjunctival sac, vomiting was found to be produced generally in from three to five minutes. Exactly the same phenomenon was observed after the administration of small quantities of morphin. These experiments indicate that the above drugs are easily absorbed through the eye into the general system. That this absorption is in part, at least, due to direct entry into blood and lymph channels and is not a result of an indirect absorption through the nasal ducts, was proven by obstructing the latter canal. This was done in two ways: in some cases the nasal duct was ligated and in the other cases it was occluded by cauterization. Even after obstruction of the nasal duct, apomorphin and morphin were found to produce emesis, though the process required a longer time.

In a similar manner apomorphin and morphin, when introduced into the vagina of dogs, can be shown to promptly induce vomiting, thus demonstrating their absorption through the vaginal wall.