latter requiring special modifications of the mouth parts. Several species are sap-feeders when young, and in later stages become tissue feeders.

The first impulse, upon finding some strange new form of insect, seems expressible only in a new ordinal name. Dr. Silvestri has found some small forms (2 mm. long) in Africa and Malasia representing the newest order of insects, Zoraptera.[6] The genus *Zorotypus* is based upon several species resembling young Gryllidæ. They have enlarged hind femora, two jointed tarsi, head with distinct Y mark, no eyes, last joint of palpi enlarged, nine-jointed antennæ, and short one-jointed cerci.

It is indeed refreshing to find a paper on the systematics of Culicidæ that contains no new generic names. Mr. E. Brunnetti[7] has studied the proposed genera of mosquitoes from the standpoint of the dipterologist and comes to the conclusion of Dr. Williston that most of these names are based on characters of no generic value in Diptera, and are therefore synonyms. Under *Culex* he places no less than 72 such names. The value of the various characters is considered, and tables are given to the vaild genera; some names, however, still left in doubt. *Corethra* is regarded as forming a subfamily in the Culicidæ.

We all know that an insect "bite" is not simply a puncture, but our first interest has been to find a remedy. Dr. J. H. Stokes[8] however, has investigated the pathological and histological features of a "bite" and concludes, that, irrespective of pathogenic organisms, the insect introduces a toxic agent which produces considerable changes in the tissues near the "bite." This toxic agent is not injured by alcohol nor by dry heat, but is inert after treatment with hydrochloric acid. The history of a "bite" is divided into four stages; the papular, the pseudovesicular, the vesicular or oozing stage, and the involution or subsidence.

N. BANKS

6 "Descrizione di un nuovo ordine di insetti," *Bol. Lab. Zool. Gen. Agrar.*, VII., pp. 193–209, 1914.

7 "Critical Review of 'Genera' in Culicidæ," *Rec. Ind. Mus.*, X., pp. 15–79, 1914.

8 "A Clinical, Pathological and Experimental Study of Lesions Produced by the Bite of the Black Fly (*Simulium venustum*)," *Jour. Cutan Diseases*, November and December, 1914, pp. 46.

SPECIAL ARTICLES

A CASE OF ASSUMPTION OF MALE SECONDARY SEX CHARACTERS BY A COW[1]

A PURE-BRED registered Ayrshire cow, named Dorothy of Orono (23010), belonging to the University of Maine, produced three calves, on dates as follows: September 17, 1909, September 10, 1910, February 24, 1912. On the lactation following the birth of the second calf she made a record of 12,426.4 lbs of milk and 450.75 lbs. of fat, and was admitted as No. 426 to the Ayrshire Advanced Registry.

After March 24, 1913, the cow never gave any milk. The udder rapidly shrunk to a very small size and the animal began to show the external characteristics of a bull. This change was very slight at first, but soon became much more marked. *After a lapse of 8 months the general external facies and the behavior of the cow were like those of a bull to a remarkable degree.* The neck had become thickened in its posterior parts, and had developed a well-marked crest, as is characteristic of a bull. If the cow had been so screened that only her fore-quarters and neck were visible, any observer would have unquestionably pronounced her a male. The assumption of male characters in these regions was complete and perfect. In the hind-quarters the change from characteristic female conformation in the male direction, while less striking than in the anterior parts, was still clearly evident. The udder shrunk away to a very small size. The hips and rump took on the smooth, rounded, filled-out appearance which is characteristic of the bull, but not of the cow.

The cow was slaughtered on February 18, 1914. Autopsy showed as the only gross ab-

1 This is a preliminary abstract of a paper having the title "Sex Studies. VII. On the Assumption of Male Secondary Characters by a Cow Affected with Cystic Degeneration of the Ovaries," shortly to be published in the Annual Report of the Maine Agr. Expt. Sta. for 1915.

normality a simple cystic condition of the ovaries. Histologically and cytologically these cystic ovaries differed from the normal cow's ovary in but one essential respect, namely, that they had no corpora lutea.

The case described presents for consideration certain definite and clear-cut results bearing on the problem of secondary sex characters. These are:

1. This cow had been a perfectly normal female and had performed all the reproductive functions, both primary and secondary, of the sex.

2. It later assumed certain of the secondary characters of the male, both in respect of structure and behavior, with perfect definiteness, and, so far as the characters concerned go, completeness. This change was, for example, at least as complete and definite as any of those described by Steinach[2] following castration and transplantation of gonads.

3. The gonads of this animal, examined subsequent to the change in secondary characters, were exactly like those of a normal cow, save in the one respect that the follicles were not breaking and discharging ova, but were forming follicular cysts or becoming atretic, and because of this no corpora lutea were formed.

(*a*) The interstitial secreting mechanism of these ovaries was absolutely normal, both in respect of number of cells, and the cytological characteristics of the individual cells.

(*b*) The germinal mechanism was perfectly normal up to the point where ovulation should occur. Then it failed to separate the ova from the ovary.

(*c*) The outstanding, and so far as we can determine the only significant, anatomical and physiological difference between the gonads of this abnormal cow and those of a normal one, consists in the fact that the former lacked any lutear tissue.

A detailed account of the case, with figures, will be given in the complete paper.

Raymond Pearl,
Frank M. Surface

[2] Steinach, E., "Willkürlich Umwandlung von Saügetiermännchen in Tiere mit ausgeprägt weiblichen Geschlechtscharacteren und weiblicher Psyche," *Pflüger's Arch.*, Bd. 144, pp. 71–108, 1912.

A NEW THEORY REGARDING THE FEEDING POWER OF PLANTS[1]

The feeding power of plants has been a subject of a great deal of investigation during the last half century. Undoubtedly mere casual observation of the growth of wild and cultivated plants led investigators long ago to surmise that there is a difference in the feeding power of different species of plants. Numerous carefully controlled experiments have repeatedly confirmed this idea. Of the important mineral elements needed by plants, sufficient phosphates in an available form are most often lacking in a soil. It is largely on this account that phosphates have generally been used in testing the feeding power of plants. Fortunately phosphates are also well adapted to this study. With the rapidly increasing use of phosphate fertilizers, the subject has become one of considerable economic importance, since it may be possible that with a proper selection and sequence of crops as regards their feeding power, the cheap insoluble phosphate fertilizers may be used with greater advantage.

It was formerly supposed that insoluble minerals were made soluble by plants through the action of various acids secreted by the plant roots. As is well known, later experiments, especially those by Czapex, have demonstrated that other than carbonic acid, plants normally excrete at the most, only minute traces of acids. There remains, however, no question that practically all plants excrete through their roots large quantities of carbonic acid. Lately some investigators have suggested that differences in feeding power may be due to differences in amount of carbonic acid excreted by the roots. Experimental data, however, lend little support to this view, and hence indicate that there must be something vastly more important in determining the feeding power of a plant. On reviewing the literature concerning the subject, and considering the data obtained in this laboratory, the writer was led to formulate the following hypothesis:

Plants containing a relatively high calcium

[1] Publication authorized by the director of the Wisconsin Experiment Station.