§§ B. *Grandifolium.*—Habit the same as in sub-section A; leaves very large; leaflets fewer (about two pairs), large (the blade three to four inches long and an inch and a half wide), entire, the lower side strongly decurrent on the petiolule. Leaves of very young plants are entire! Singular plants of recent development, represented by but few varieties, of which Mikado may be taken as type.

§§ C. *Validum.*—Stem very thick and stout, the plants nearly sustaining themselves; two to three feet high; leaves very dark green, short, and dense, the leaflets wrinkled and more or less recurved. Odd plants, with the aspect of potatoes, represented by French Upright and the New Station.

Another species, *Lycopersicum pimpinellifolium* Dunal, "Solan. Syn.," 3, the Current tomato, is cultivated as a curiosity.—*L. H. Bailey, Jr., Agricultural College, Mich.*

**Experiments with Lima Beans in Germination.**[1]—After reading some of the suggestive writings of Darwin, I began a few experiments with some Lima beans. About forty seeds were planted in the damp sand placed in a cellar. Of these twenty were placed on edge with the scar or hilum downwards, and twenty in a reverse position with the hilum uppermost.

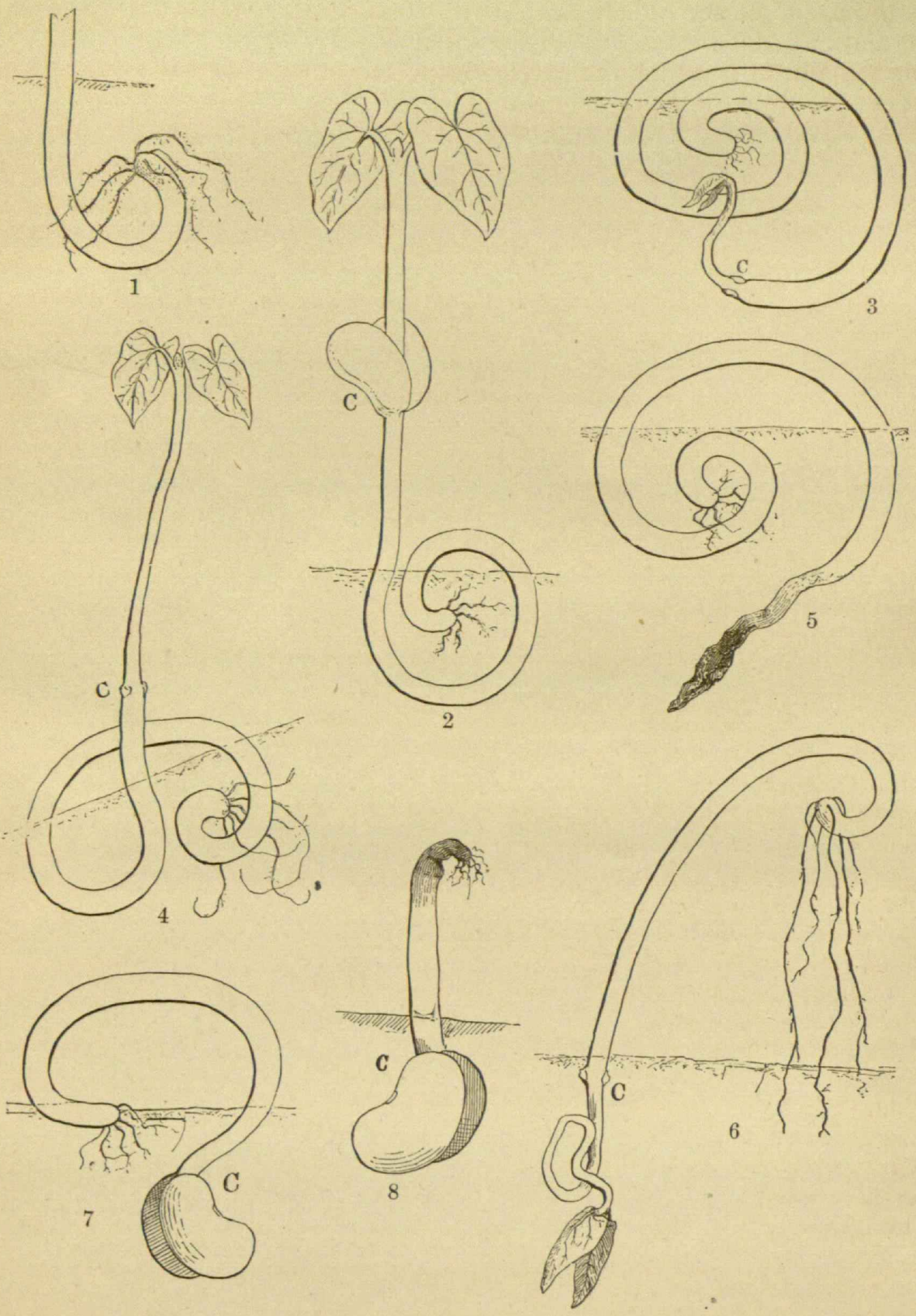
In most cases seeds of this species, when germinating, produce a long radicle, which carries the cotyledons some inches above ground. In this case two seeds produced a very short radicle,—perhaps half an inch long,—so that the cotyledons remained beneath the surface, as is usually the case with germinating peas. The beans planted with the eye down behaved well and came up promptly, all of them, while those placed in the reverse position went through with a great variety of manœuvres, and even then some of these perished in the attempt to make young plants. After some delay a considerable portion of them came out of the ground. Most of these bent the radicle into a half-circle, or, rather, that of an ox-bow, with one arm much longer than the other, carrying up the cotyledons. In making growth in the cellar nearly all of the young plants sent from one to several roots above the surface, where they usually re-entered the sand.

Four out of the twenty with the scar-edge up, after exhausting the nourishment stored in the cotyledons, perished in their attempts to make a successful growth. The lengthening radicle arched up out of the sand, but the plumule finally decayed.

In the sandy soil of my garden were placed twenty-five seeds in the manner last mentioned. A few came up very promptly, but for some time most of them seemed to rest beneath the sur-

[1] Read at the Montreal meeting of A. A. A. S. in 1882, and only a very brief abstract printed, without illustrations.

# PLATE XIX.



face; but a week of rainy weather brought most of the rest to the surface in some form or other. Nine out of twenty-five sent the lower end of the radicle, with its roots, from three-fourths to two and one-half inches above the surface. The plumule for a time remained green, and the cotyledons were not yet exhausted; but in time all of these perished without bringing any green leaves to the surface.—*W. J. Beal, Agricultural College, Mich.*

EXPLANATION OF THE PLATE.

No. 1. The first of those to come up, where the hilum was placed uppermost, usually took the form of this figure.

No. 2. This represents one of those in which the hilum was placed uppermost.

No. 3. In this case the seedling is still struggling to send its plumule to the surface. The cotyledons, which were attached at C, have been rubbed off by the movements of the young plant through the sand.

No. 4. One plant is here represented in which the partially-exhausted cotyledons had been rubbed off.

No. 5. This represents one specimen in which the cotyledons have disappeared and the plumule has decayed.

No. 6. In this case the cotyledons have disappeared; the plumule and primary leaves were still green; some of the roots were still fresh in the soil, though the lower end of the radicle was elevated nearly three inches above the surface of the sand.

No. 7. Six out of twenty-five planted in open ground with the hilum uppermost were much like this figure, and likely to succeed in becoming good plants.

No. 8. Nine out of twenty-five planted as above in the open ground thrust the radicle with its roots nearly straight up out of the soil, sometimes as much as two and one-half inches, when the seedlings perished.

[All the figures were made by Will. Holdsworth.]

## ENTOMOLOGY.[1]

**Note on Respiration of Aquatic Bugs.**—Among the most common insects found in our smaller ponds are those popularly known as "Water-Boatmen." Of these, the more abundant species pertain to two genera,—*Corisa* and *Notonecta*. In each of these genera the insect carries about with it, in its course through the water, a bubble of air, which it uses for respiration. At one time I kept for a considerable period several aquaria containing these insects upon the table where I was working. Some interesting phenomena connected with their respiration attracted my attention. Other duties interfered with the completion of my observations, and I now publish this note merely to call the attention of other observers to the subject.

The habits of the two genera are very different. In each the insect comes to the surface of the water at intervals to obtain a supply of fresh air; but in the case of *Corisa*, inhabiting well-aerated water, this does not seem to be absolutely necessary. The favorite attitude of the species of this genus when at rest is clinging to some object near the bottom of the aquarium; here they will remain for long periods, evincing no desire to rise to

[1] This department is edited by Prof. J. H. Comstock, Cornell University, Ithaca, N. Y., to whom communications, books for notice, etc., should be sent.