OBSERVATIONS ON THE TERATOLOGY OF THE GENUS CUSCUTA.

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Examination of thousands of specimens of the genus Cuscuta, representing all the known species, has shown that this group does not commonly show monstrosities. However, some irregularities of structure have been observed which are briefly described below. Little mention of this genus has been found in discussions on teratology. Penzig[1] mentions forms having pistils with three styles and states that four- and six-parted flowers are common, but I find six-parted flowers to be very rare in the many specimens which I have dissected. Engelmann[2] says: "I have seen very few abnormal irregularities in the flowers of Cuscuta. Sometimes one or more segments of the corolla are partially or entirely changed into a stamen, and the capsule is occasionally three- or four-carpellary, instead of two-carpellary."

Normally, the flowers of Cuscuta are four- or five-parted, perfect, gamopetalous, mostly gamosepalous, hypogynous, and sessile in compact, glomerulate or spicate clusters, or more or less pedicellate in cymose, umbellate, racemose, or paniculate inflorescences. A set of appendages (scales) opposite the stamens and alternating with the corolla lobes, mostly laterally united to form a corona, and more or less adherent to the inner surface of the corolla, is present in the majority of the species. The pistil is two-celled, each cell containing two anatropous ovules. The styles are two, distinct, or more or less united, with capitate, conic, ligulate, clavate, or elongated-filiform stigmas. In the compact glomerulate clusters of some species the several flowers of the cluster are borne in the axis of a single bract, while the loose, more branching forms commonly bear each flower in the axis of a bract.

In *C. cuspidata* there are many bracts in the loose inflorescence which, other than those containing flowers, support at most only rudimentary buds. A specimen collected by Deam in southern Indiana showed an excessive production of bracts and the almost entire absence of flowers (fig. 1. See also Yuncker[3]). Another specimen, possibly *C. sandwichiana*, exhibiting somewhat similar excessive bract production and the suppression of the flowers, was collected by Degener in Hawaii. In this the inflorescence is entirely converted into a mass of overlapping bracts in the axils of some of which are found miniature buds (fig. 2). A specimen of *C. monogyna* collected by Haussknecht in Asia Minor, and given the varietal name of *prolifera*, displayed a strik-

[1] Penzig, O., Pflanzen Teratologie 3:70. 1922.

[2] Englemann, G., Amer. Journ. Sci. and Arts 43:336. 1842.

[3] Yuncker, T G., Amer. Bot. 27:48, *fig. 2*, 1921.

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ing proliferous development. No flowers were formed and in their place were numerous bract-like scales from amongst which the branches were developed (figs. 9 and 10). Several inflorescences in a collection of *C. odontolepis* showed the branches of the inflorescence arising from what appeared to be a normal calyx in place of the bract which is normally present (fig. 7).

The flowers in this genus normally originate exogenously, but endogenously formed flowers seem to be usual for *C. glomerata* (see Bessey).[4] They have also been observed to a lesser degree in *C. compacta* and still less frequently in *C. cephalanthi* and a few other species. This condition, so far as observed, however, appears to be present only in the sub-genus Grammica (i. e. those with capitate stigmas).

While five-parted flowers is the common and apparently typical condition for the genus, several species have regularly four-parted flowers. Three- and four-parted flowers are not uncommon in those species normally five-parted, and three- and five-parted forms are also commonly seen in those species regularly four-parted. Only one or two six-parted flowers, however, have been observed, and it is believed that this condition is extremely rare.

In *C. Purpusii* (fig. 5) and *C. Boldinghii* well formed buds were found between the calyx and the corolla, while in *C. andina* (fig. 3) three well formed lobes of a second calyx within the normal outer one were observed.

A specimen each of *C. Suksdorfii* (fig. 4) and *C. abyssinica* displayed a bifurcated corolla lobe, which, had the cleft been deeper, would have produced a six-lobed corolla. A specimen of *C. planiflora* showed a similar cleft in one of the calyx lobes. The corolla lobes of a specimen of *C. Pringlei* (fig. 11) were cupped at their tips to an extreme degree.

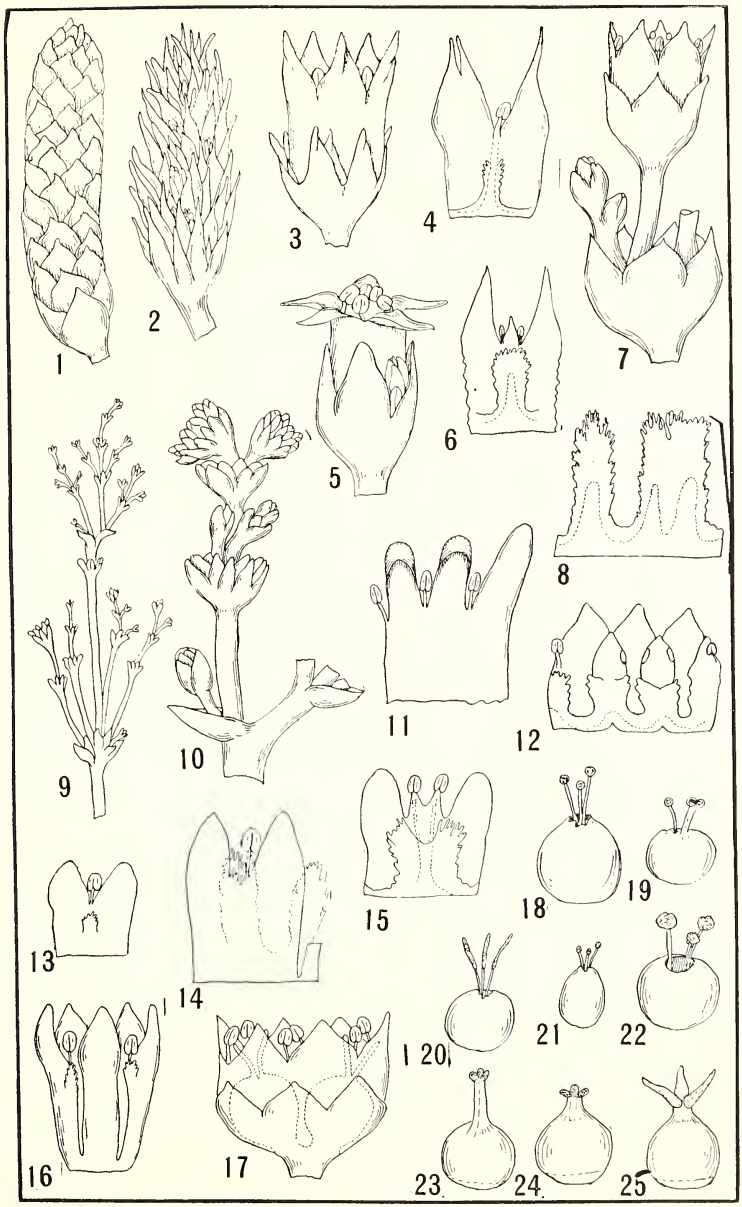
Rarely are the scales united with each other excepting in the lower (bridged) part, but in a collection of *C. Gronovii calyptrata* some of the scales were found to be completely united with each other (fig. 8). In *C. platyloba* (fig. 13), *C. Pringlei, C. suaveolens* (figs. 14 and 16) and *C. stenoloba* an extra set of scales were present on the outside of the corolla opposite the stamens. Normal scales were also present within the corolla. Robbins and Egginston[5] also show this condition in *C. indecora*. This, however, is a very unusual condition. The corollas of some flowers in a specimen of *C. suaveolens* were cleft nearly to the base (fig. 16).

Very few abnormalities of the stamens were seen. In some, *e. g. C. lucidicarpa* (fig. 12), the connective was broadened and petaloid. In one specimen of *C. salina* (fig. 6) a small petal-like projection between two miniature stamens was found. In one or two flowers globular, capitate anthers were noticed. In a specimen of *C. obtusiflora glandulosa* double stamens were seen as shown in figure 15.

Three styles and three stigmas are very common in the genus, almost every species exhibiting this abnormality (figs. 18 to 25).

[4] Bessey, C. E., Amer. Nat. **18**:1145-1147. 1884; **19**:996-997. 1885; **20**:278-279. 1886; Science **6**:225. 1885.

[5] Robbins and Egginston, Colorado Agr. Exp. Station Bull. **248**:7, *fig. 4*. 1918.



Figs. 1-25—See page 338 for explanation.

Choisy[6] pictures a pistil of *C. Gronovii* with three styles, two of which are shown grow together. Three-styled pistils are also mostly three-celled. One of the most unusual abnormalities observed was in a specimen of *C. epithymum Kotschyi* (fig. 17) which showed a six-parted flower containing two distinct and apparently normal pistils each of which contained four seemingly normal ovules.

EXPLANATION OF FIGURES.

Fig.

1. *C. cuspidata*, showing inflorescence composed entirely of bracts;
2. *C. sandwichiana?*, with excessively bracteated inflorescence and with the flowers mostly abortive;
3. *C. andina* with a double calyx;
4. *C. Suksdorfii* showing a bifurcated corolla lobe;
5. *C. Purpusii* with buds between the calyx and the corolla;
6. *C. salina* with two miniature stamens separated by a small, petal-like projection;
7. *C. odontolepis* showing proliferation in inflorescence;
8. *C. Gronovii calyptrata* with united scales;
9. *C. monogyna* showing proliferation of inflorescence;
10. Part of figure 9 enlarged to show details;
11. *C. Pringlei* with cupped tips of corolla lobes;
12. *C. lucidicarpa* showing petaloid connective of stamens;
13. *C. platyloba* with scales on the outside of the corolla;

14 and 16. *C. suaveolens* showing extra scales on outside of the corolla and a deeply cleft corolla;

15. *C. obtusiflora glandulosa* with doubled stamens;
17. *C. epithymum Kotschyi* with a 6-parted, 2-pistillate flower;
18. *C. Gronovii* with three styles;
19. *C. platyloba* with three styles, two of which are grown together;
20. *C. epithymum* with three styles;
21. *C. salina* with three styles;
22. *C. racemosa* with three styles;
23. *C. lupuliformis* with three styles;
24. *C. cassytoides* with three styles;
25. *C. reflexa* with three styles.

[6] Choisy, J. D., Mém. Soc. Phys. Hist. Nat. Genève 9:*Pl.IV, fig. 3*, 1841.