

BRIEFER ARTICLES.

NUTATION IN *BIDENS* AND OTHER GENERA.

(WITH FOUR FIGURES)

THERE has long been a belief, regarded by many as a mere superstition, that the sunflower turns with the sun. In 1898¹ and in 1900² Schaffner published a series of illustrations and observations demonstrating conclusively that such a nutation exists. He makes no mention of any plant other than species of *Helianthus* that exhibit this



FIG. 1.— A single plant of *Bidens frondosa*, taken at 10 A. M., showing the eastward morning nutation.

¹ Observations on the nutation *Helianthus annuus*. BOT. GAZ. 25: 395-403. 1898.

² The nutation of *Helianthus*. BOT. GAZ. 29: 197-200. 1900.

nutaton, nor am I aware that any other plant has been observed to share with *Helianthus* the distinction of being a "sunflower."

During the past four or five years my attention has been repeatedly attracted to other genera that exhibited a diurnal motion almost identical in kind with that of *Helianthus*, and almost if not quite as marked. The accompanying illustrations of *Bidens frondosa* show the extent of



FIG. 2.—Group of *Bidens frondosa*, taken in the morning, to show prevailing eastward nutation (to the left).

the nutation in this species. *Fig. 1* shows one plant in the morning at 10 o'clock. The exposure occupied about one minute and it is evident that the curvature is not due to the wind, nor had the wind been blowing. I have repeatedly observed this same plant in the afternoon and found the westward nutation fully as marked as is the eastward in this illustration. *Fig. 2* shows a mass of plants of the same species in the morning, and illustrates the extent to which this habit preponderates among individuals. The same group taken at four o'clock the same afternoon is shown in *fig. 3*. This is simply a small portion of a roadside patch of weeds that extended for miles. Several counts showed that

between 95 and 98 per cent. of the individuals partook of this motion, some to a considerably more marked extent than others.

Agreeing with the observation of Schaffner for *Helianthus*, the nutation is much stronger when the ground is moist and the air warm and dry. *Fig. 4* is taken with the camera facing away from the sun, as is shown by the shadow of the camera itself near the lower left hand



FIG. 3.— The same group shown in *fig. 2*, taken in the afternoon, to show strong westward nutation (to the right).

corner of the photograph. The almost universal sunward (westward) nutation here is strikingly shown. A photograph taken with the camera facing westward would have had the same general aspect if taken in the forenoon.

The nutation in *Ambrosia artemisiaefolia* is fully as marked as in *Bidens*, as I have determined by a large number of marked plants kept under observation during night and day. Some of these I have watched for many days, as they lay in my path to and from the class-room. Here the maximum eastward nutation is at about 9 A. M. Noon finds

the stem erect, while at 7 or 8 P. M. the maximum westward nutation occurs. The plant begins to assume the erect position soon after sunset, and is usually quite erect by 10 or 11 P. M., and remains so until approaching sunrise.

Outside of the Compositae I find a nutation, though less marked, in *Amaranthus*, particularly in the younger plants, and in many of the



FIG. 4.—*Bidens frondosa*, taken with camera facing east. All plants facing the camera and the sun.

Leguminosae. Doubtless it is to be found in many other families. Among the Leguminosae, Lespedeza, Melilotus, Medicago, and Trifolium are striking in nutation. *Melilotus alba*, for example, is particularly interesting, as the marked nutation strikingly affects the landscape as seen in going and returning from a day's drive.

It is my purpose here simply to call attention to the diurnal bending or nodding of the stem. In addition to this there are of course very complicated changes in leaf position.—FRANK LINCOLN STEVENS, *Agricultural and Mechanical College, Raleigh, N. C.*