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A PRELIMINARY REPORT OF THE ECOLOGY OF A *DORSERA* MEADOW

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At the Wilburton field meeting of the Oklahoma Academy of Science on May 8, 1937, a student of the writer, Elsie Heft, discovered a new location for *Drosera*, the insectivorous plant commonly called sundew. The writer's party had stopped on the trip between Wilburton and the Potato Hills to examine a meadow in which there was a profusion of the brilliant paint brush. The discovery of the sundew caused the writer to return to the site the following day for more intensive study of the meadow. The interesting results of that study led to a determination to follow the ecological development of the meadow over a period of years. A return visit was made on October 31, 1937. The present paper is an early report on some of the ecological relationships of this meadow.

Two previous reports have been made of finding *Drosera* in Oklahoma. At the 1934 meeting of the Oklahoma Academy of Science, Featherly[1] reported locating *Drosera annua* near Wright City, in the southeastern corner of the State. In April, 1935. Clark[2] collected the same species north of Panama in LeFlore County. The present report locates the plant a little farther west in Latimer County. It is probably distributed throughout the southeastern section of the State wherever similar meadow habitats occur. It undoubtedly has not been found more often because the plants are so small that they easily escape detection. The genus, *Drosera*, consisting of 85 species, is most abundant, according to Small[3] in Australia. Its American species are found for the most part in bogs and wet sand of the boreal region and in the southeastern coastal area. Its presence here is interesting as being outside the usual reported range. It is also noteworthy that the sundew is existing here in a habitat quite different from those usually listed in the manuals.

The identification of the plants found at this locality is not settled beyond all question. Milton Hopkins of the University of Oklahoma, who has gone into the matter for the writer, has tentatively identified these plants as *Drosera annua* Reed. Some slight differences first suggested

D. rotundifolia L., but until the collection of additional material can be made another year, the above identification stands.

The meadow which provides the habitat for these sundew plants is approximately 700 by 900 feet in size, exclusive of an arm extending to the southwest. A swampy area west of this extension suggests that this region might have been wetter at one period of its history. The meadow is bounded on the north and east by highways and on the south and west by wooded areas. It appears from the highway as a flat, grassy area, enhanced in the spring by many flowering plants and overgrown in the fall by tall grasses 3 to 5 feet in height. These native grasses are used by the owner of the field, who cuts and stacks them late in the fall for hay. A portion of the meadow had been cut the last part of October, leaving a stubble 4 inches high. The resulting stacks had not then been removed from the field.

A closer examination of the meadow shows that the ground is not entirely flat. It is marked by a series of mounds which rise from 2 to 2½ feet above the general level of the meadow. There are eight of these mounds in the main body of the meadow, some of them nearly circular, others oval, with the long axis running east and west, all of them approximately 15 to 25 feet across. They are situated roughly in two north and south lines, with one mound lying between these two lines. This arrangement strikes the observer as being not a matter of chance but regular enough to be due to a definite cause. The most important fact concerning these mounds from an ecological viewpoint, however, is that in conjunction with most of them are shallow depressions, lying in each case to the west of the elevation.

The writer is indebted to A. N. Murray of the University of Tulsa for a probable explanation of these mounds and accompanying depressions. The underlying rock at this point is shale, of Carboniferous age. Hard shale was originally covered either by soft shale or by soil. It is possible that fractures in the rock in two directions allowed the erosion to begin, which resulted eventually in rounded mounds being left in regular series. The one mound between the two lines might simply indicate that others of this series have been entirely eroded away. The depressions lying to the west of the mounds are due to the dip of the rock to the west, resulting from the uplift some distance to the east. The accumulation of moisture at these points would be obvious in case of rain, but would also be aided by the dip of the underlying rock. Mounds answering rather definitely this description have been found by Dr. Murray in other parts of the State and have been credited to this origin. Actual proof of the validity of this explanation for the mounds of the sundew meadow would have to come through excavation.

In studying the vegetation of this sundew meadow, it was found that a difference exists between the mounds and the rest of the area. It was also discovered that the sundew is limited in its distribution to the depressions* mentioned above. These low places are so shallow that they might not be noticed if it were not for the slightly wetter nature of the soil in the spring and the plant distribution which accompanies this additional moisture. Later in the year the depressions appear to be as dry as the rest of the meadow.

The present account of the vegetation is limited to the two studies of 1937. In May a collection was made of every plant observed. In the fall the lateness of the season allowed the collection of grasses only since they alone were in usable condition. In the spring 26 species were taken from the mounds, consisting of 17 forbs, 3 grasses, 2 woody climbers, 2

*After finding the plant located thus, the writer discovered that Clark (2) had found it on the north sides of mounds in low places.

shrubs and 1 tree seedling. From the depression 13 species were collected, consisting of 10 forbs and 3 grasses. There was a duplication of only 5 species in the two habitats.

The vegetation on the mounds was so dense that it was difficult to determine from observation alone the most important species. In most places *Plantago Purshii* R. and S. seemed to be the dominant at this season, but statistical methods will be necessary in order to obtain adequate information on the composition of the vegetation. Other important herbs were *Castilleja* sp., *Linaria canadensis* (L.) Dumont, *Oenothera serrulata* Nutt., *Phacelia* sp., *Androsace occidentalis* Pursh., *Schrankia uncinata* Willd, and *Silene antirrhina* L. *Coreopsis* sp. was apparently going to dominate the mounds a little later. The woody climbers, *Rhus Toxicodendron* L. and *Smilax* sp. and the shrubs, *Symphoricarpos orbiculatus* Muench. and *Rubus* sp. were immature specimens and few in number. The single tree seedling was an oak, but too small to allow species determination. The establishment of woody vegetation on the mounds alone indicates their greater age as a habitat for plant invasion.

The plants of the depression did not provide such dense vegetative cover. The *Drosera* rosettes almost covered the ground in small patches. The plants were in flower when collected in May, and were also in fine vegetative condition with drops of liquid exuding from the glandular bristles of the leaves. The five species which were collected both on the mounds and in the depressions were *Oenothera, Androsace,* both already mentioned, *Erigeron* sp., *Hieracium* sp. and a grass. Plants characteristic of the depressions only, in addition to two grasses (all grasses being too immature for determination at this season) were a small species of *Hieracium, Eryngium yuccifolium* Michx. and three species in seedling stage.

A prime object of the trip to the meadow in the fall was to discover the presence or absence of *Drosera* at this season. After considerable searching, several very small plants in seedling stage were found in two of the depressions. These were completely covered over by the tangle of grasses and tall herbs. No mature plants were found. The sundew must therefore belong to that group of plants, the seeds of which germinate in the spring or fall, and which lie over the first winter in seedling stage. It is believed that spring germination might be possible because of the excess moisture at that time and that the young plants might be able to exist through the hot summer by means of the dense vegetative cover. On the other hand it is possible that early fall rains might supply enough moisture to allow germination. It would have been difficult to have determined the age of these small seedlings, but it is hoped that the question of the time of germination of *Drosera* seeds may be answered in the future. An attempt will also be made to discover how long after its fruiting season this annual plant remains alive. It seems probable that the sundew is able to exist in this habitat only by virtue of its being an annual.

As already stated the only collections made in the fall were those of grasses. For the identification of the following, the writer is indebted to J. E. Benedict, Jr. of Washington, D. C.: *Andropogon furcatus* Muhl., *Andropogon scoparius* Michx., *Panicum virgatum* L., *P. aciculare* Desv., *Sorghastrum nutans* (L.) Nash, *Paspalum floridanum* Michx., *Aristida longespica,* Poir., *Setaria lutescens* (Weigel) F. T. Hubb, *Sporobolus asper* (Michx.) Kunth. Although the entire meadow was dominated at this season by grasses there seemed to be some slight differences between the mounds and the rest of the area. All nine grasses were collected in the depression and adjoining flat area near the central mound. On this mound were found two blue-stems, *Panicum virgatum* and *Sorghastrum,* but it is possible that a more complete search of the other mounds made

before any of the meadow was cut would show little or no difference in the distribution of the fall grasses. The two blue-stems seemed to be about equally dominant. These species, along with *Sorghastrum, Panicum virgatum* and *Paspalum* were the taller grasses, while *Aristida* and *Setaria* formed an understory below them. The dominance of the blue-stems during the latter part of the year places this community, which is wet enough in the spring to be called a meadow, as an associes of the subclimax prairie even though it is in the general region of the oak-hickory climax forest.

SUMMARY

The occurrence of that interesting insectivorous plant, the sundew, usually found in bogs and wet sand, is here reported from southeastern Oklahoma for the third time. Its distribution in meadows in this State is noteworthy, first, because it is outside its usual reported range, and second, because the plant is existing here in a habitat which is wet only a small part of the year. The beginning of a long-period study of a meadow containing an abundance of *Drosera annua* is first reported in this paper. The grassy area, located 25 miles south of Wilburton, is marked by a series of small mounds arranged in regular manner and associated with shallow depressions on their west sides. The presence of *Drosera* in this meadow is limited to these depressions where the additional moisture in the spring evidently remains long enough for the plants to bear fruit. The survival of these plants in an area which is dry during most of the year may be by virtue of their being annuals. Seedlings of *Drosera* have been found in the late fall, when the mature plants have disappeared, indicating their germination either in the spring or with the early fall rains.

The meadow is dominated in the spring by a profusion of forbs, with little duplication of species on the mounds and in the depressions. Later in the year grasses become the dominant growth over all the area, with the big and little bluestems the most important. The use of the native grasses as hay does not seem to interfere with the development of the meadow as a fair sample of a subclimax prairie associes, located as it is within the general oak-hickory climax area.

Only a beginning has been made in this study of the meadow as a habitat for the sundew in Oklahoma. It is hoped that future work will yield more information regarding the relationships of this plant and also regarding the ecological development of the meadow.

LITERATURE CITED

1. Featherly, H. I. 1934. Droseraceae, a Family of Plants New to the Known Flora of Oklahoma. Unpublished.
2. Clark, Ora M. 1936. New Discoveries Within the State Extend the Range of Drosera and Cyprepedium. Proc. Okla. Acad. Science 16: 41-42.
3. Small, John K. 1933. Manual of the Southeastern Flora. New York.