

A NATURAL HYBRID OF *DROSERANGLICA* HUDS.
AND *DROSERALINEARIS* GOLDIE IN MICHIGAN

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ABSTRACT

Plants of the natural hybrid of *Drosera anglica* Huds. and *Drosera linearis* Goldie were discovered in a fen in Chippewa County, Michigan and are herein reported for the first time. Leaf aspects of the hybrid are intermediate between the parents and are best expressed as a leaf blade length/width ratio. Multiple measurements of the ratio in the parents and putative hybrid indicate an intermediate state. Chromosome evaluation indicates $2n = 30$ (*D. anglica* $2n = 40$, *D. linearis* $2n = 20$ in the literature). Pollen viability is very low and no seeds are produced in the plants. The corolla is slightly larger in the hybrid than in either parent. In the field, the hybrid appears very vigorous and grows on two low mossy hummocks in a calcareous fen. In culture in the greenhouse, the hybrid plants show heterosis and leaf out and flower earlier in the season than the putative parents.

Key Words: *Drosera anglica*, *Drosera linearis*, *Drosera anglica* \times *D. linearis*, hybrids

INTRODUCTION

While botanizing in a typical calcareous Great Lakes fen along the Lake Huron shoreline in the eastern tip of Michigan's upper peninsula, I noted two stands of *Drosera* which at first glance appeared to be particularly vigorous plants of *Drosera anglica* Huds. As I prepared to photograph the plants, reexamination indicated that the plants might be *Drosera linearis* Goldie. Since the plants seemed to have leaf characteristics of both species, I then conjectured that they might be hybrids of *D. anglica* and *D. linearis*.

A search of the literature indicated that a natural hybrid of these two species had not yet been characterized, although postulated by Wood (1955). Kusakabe (1979) submitted a list of artificial *Drosera* hybrids which he had prepared in his greenhouse. Among these was "*D* \times *linglica*" (Sic; quotes mine), produced in 1976 using *D. linearis* from Ontario and *D. anglica* from Munich Botanical Gardens. There is no record of "*D.* \times *linglica*" having been published horticulturally or botanically.

HABITAT DESCRIPTION

The location is near the shore of Lake Huron in Chippewa County, Michigan. First seen in June 1987, the plants are in a typical Great Lakes calcareous or marl fen of rich type. Such fens are described in detail elsewhere (e.g., Cruise and Catling, 1974; Schnell, 1982; Crum, 1988).

This rather large fen is nearly a hectare in extent and consists of marly sand and peat overlaid by a 1–3 cm layer of very slowly flowing water originating from springs at the fen margins. Scattered across this flat are variably sized and spaced hummocks of *Sphagnum* spp. and other non-sphagnous mosses. The edge of the fen is marked by deep stands of similar mosses extending into a rather dense surrounding woods of predominantly *Picea mariana* (P. Mill.) B.S.P., *Thuja occidentalis* L., *Larix laricina* (Du Roi) K. Koch and *Betula* spp.

Droseras in the fen included *D. anglica*, *D. linearis* and *D. rotundifolia* L. *D. linearis* typically occurs scattered over the marly flat in water, less commonly on hummocks. *D. rotundifolia* usually occurs in sphagnum on the hummocks. *D. anglica* grows preferentially around the bases of hummocks but may appear in the moss.

The plants in question were occupying the entirety of two hummocks approximately 0.5 meter across and located 5 meters apart. They crowded the entire surface of each hummock to the exclusion of other *Droseras* and numbered between 100–200 plants each (Figure 1).

Specimens were collected and pressed 21 June 1987 for my personal herbarium, then submitted to US as my specimen number 870621-1 at the conclusion of studies on 30 July 1994. A few plants were also collected to be grown and observed in cultivation. The area was also revisited and observed over the intervening years.

MATERIALS AND METHODS

Vernier calipers were used to measure corolla diameters as well as leaf blade length (petiole excluded) and maximum width. The numbers of leaves from as many plants are indicated by *n* in the Table. Means, medians and standard deviations (SD) were calculated.



Figure 1. Putative *Drosera anglica* Huds. \times *D. linearis* Goldie in flower in Chippewa County Michigan.

Root squashes for chromosome counts were attempted but were unsuccessful due to a peculiar crystalline material within cells that interfered. Tissue sections of roots disclosed few mitoses. Young flower buds (2–3 mm) were fixed in alcohol:acetic acid (3:1), dehydrated using standard histologic technique and then imbedded in paraffin. Ten micron sections were made and stained with

Table 1. Leaf blade length/width ratios of putative hybrid and parents. *n*—number of leaves from as many plants, **mean**—average of L/W's, **SD**—standard deviation of ratios, **range**—one SD around mean, **lowest and highest L/W's**—lowest and highest ratios in the series, **median**—from list of lowest to highest L/W's in each category.

	<i>D. linearis</i>	<i>D. anglica</i> \times <i>linearis</i>	<i>D. anglica</i>
<i>n</i>	40	47	41
Mean	16.3	9.0	5.4
SD	3.6	1.5	1.5
Range-1 SD	12.7–19.9	7.5–10.5	2.4–8.4
Lowest L/W	10.6	5.6	3.1
Highest L/W	26.6	12.0	9.7
Median	15.85	9.0	5.1

hematoxylin and eosin. There was no ovule or PMC mitotic activity, but many somatic mitoses were noted in the carpels. Those cut at the best angle for counting were selected and amounted to 24 figures in buds of seven flowers from seven different plants.

Surrogate pollen viability was determined by staining with lactol phenol cotton blue. Pollen was placed on a glass microslide, stain added, the pollen mixed with the stain, the whole cover-slipped and set aside for three hours.

Plants were successfully cultivated in the greenhouse in southwestern Virginia in a wet medium of equal parts coarse sand and peat. Minimum greenhouse temperature was 7–8°C. Samples of *D. anglica* and *D. linearis* were kept in similar cultural conditions beside the putative hybrid plants.

RESULTS AND DISCUSSION

Basic morphometric studies were undertaken to find the simplest and most useful demonstration of whether the study plants were hybrids of the putative parent species. Flowers were found to have corollas 1.5 to 2.0 mm larger on the average than either *D. linearis* or *D. anglica* (both of which measure 6–7 mm across). Leaves of the putative hybrids were on the whole 5–6 mm longer than leaves of *D. linearis*. Neither of these features were helpful in precise differentiation for study purposes.

Noting that the leaves of *D. linearis* are linear in character while those of *D. anglica* are obovate to elongate-spatulate, I required measurements to take into account leaf blade width and length in one term. The simplest measurement term in my opinion was leaf blade length divided by width (L/W) in order to obtain an index of minimum complexity.

The resulting ratios, means, medians and SD's are listed in the Table, and means and SD ranges compared in Figure 2, with "average" leaves shown in Figure 3. The study plants fall into an intermediate position between the two putative parent species with minimum overlap. The medians are close to the means indicating a closely Gaussian distribution of samples about the means. I would expect a hybrid of the two species to have these intermediate leaf characters. The larger flower and generally but insignificantly longer leaf of the hybrid will be mentioned later.

Chromosome counts on carpel sections were $2n = 30$. All North American *Droseras* are $2n = 20$ except *D. anglica* which is $2n =$

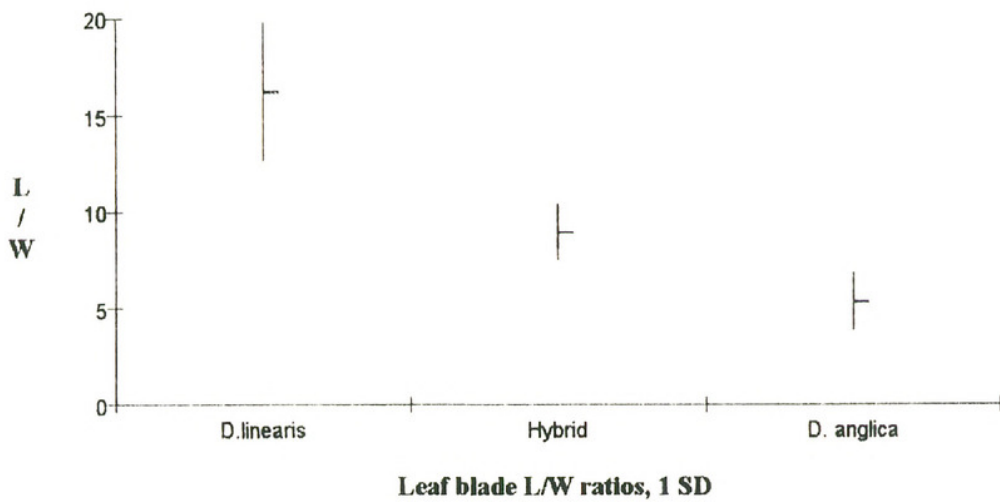


Figure 2. Comparison of leaf blade length/width (L/W) ratios with highest and lowest in each category, and mean indicated by tick in center of each bar.

40 due to its amphiploid hybrid origin (Wood, 1955). These counts are also consistent with a hybrid between the two putative parent species.

Usually, North American *Drosera* spp. self pollinate when the flower closes at the end of one to two days if pollination has not been effected by another agent. *Drosera* hybrids are typically sterile (pers. obs.; Wood, 1955). The study plants, examined at the conclusion of each of five growing seasons, were never seen to set seed in nature or in cultivation while both putative parent species readily did so. Pollen staining indicated that less than 10% of the grains in several different preparations from different study plants stained minimally. Pollen samples from the two species had greater than 95% intense staining. Examination of withered flowers of the study plants at the conclusion of anthesis disclosed a few empty testae with no seeds present. These findings support the hybrid origin of the plants in this setting.

In cultivation, the study plants began spring growth from winter hibernacula three to four weeks prior to either putative parental species. Growth was vigorous and similar to those plants in nature. The hibernaculae frequently budded so that the plants reproduced vegetatively. This activity along with minimally increased corolla diameter and leaf length is attributed to heterosis. I have observed similar hybrid vigor in other North American *Drosera* hybrids.

I conclude that the leaf blade L/W ratios, chromosome counts,

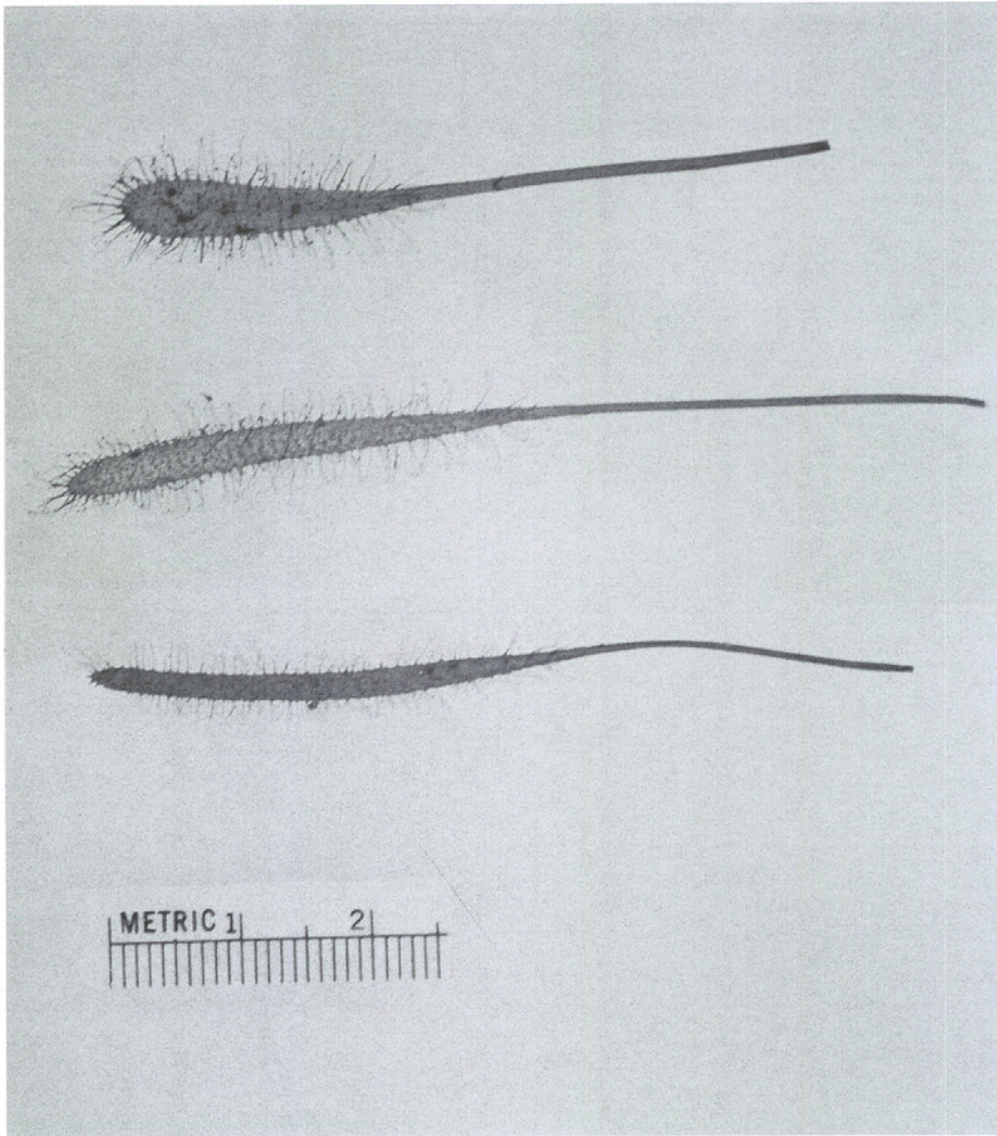


Figure 3. Photo comparison of typical leaves of *D. anglica* (top), putative hybrid *D. anglica* \times *D. linearis* (middle), and *D. linearis* (bottom).

flower sterility, and evidence of heterosis all indicate that the study plants are of hybrid origin involving *D. anglica* and *D. linearis* as the parents.

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