

THE NATIVE CARNIVOROUS PLANTS OF SASKATCHEWAN

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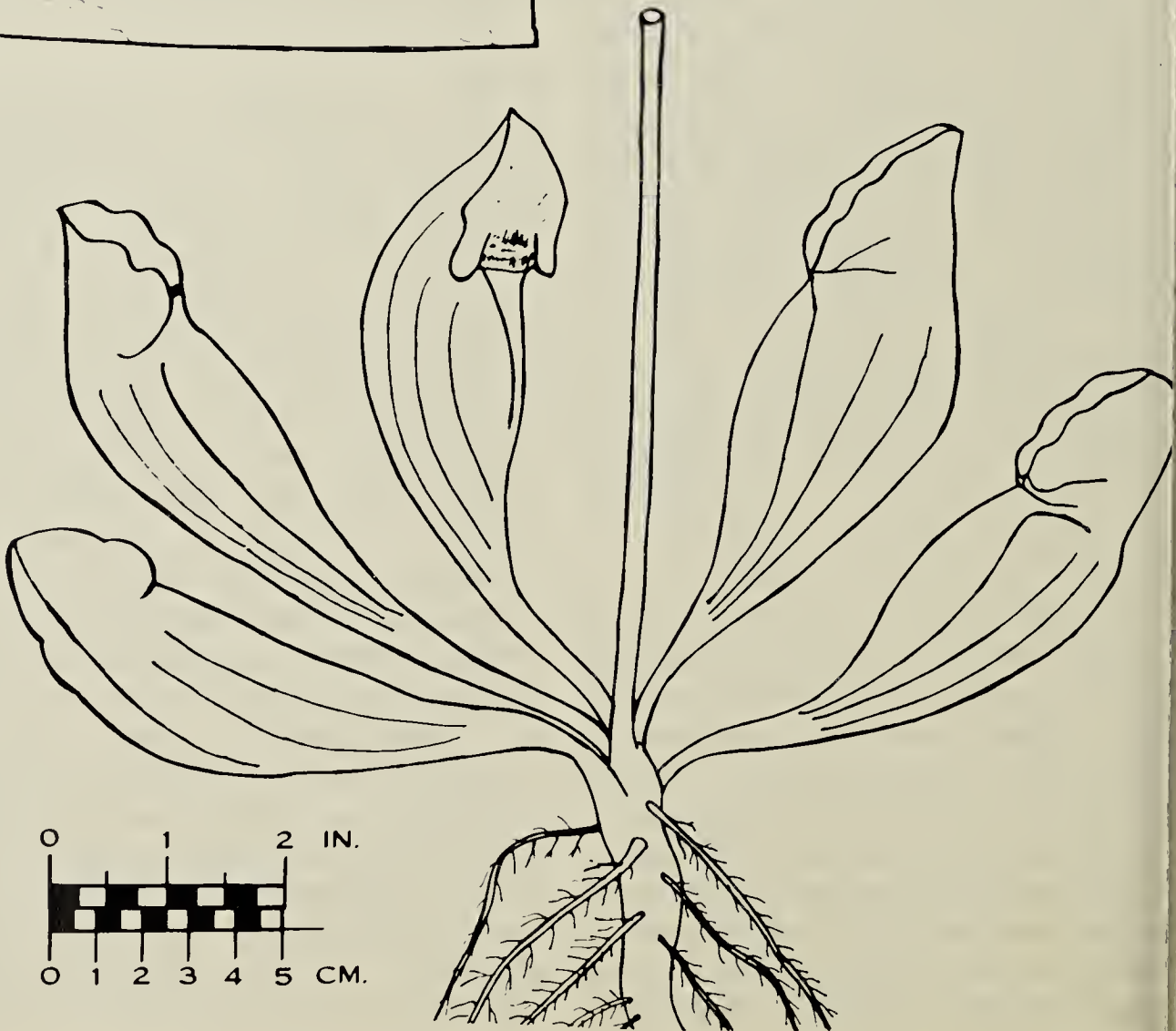
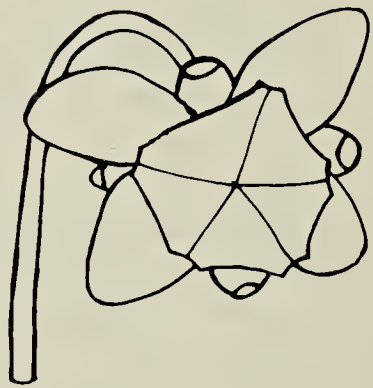
Particularly fascinating for many naturalists and botanists are the so-called "carnivorous" or "insectivorous" plants. These anomalous plants have evolved the "unplant-like" capability of feeding directly on animal life. Such plants are more accurately termed "carnivorous" than "insectivorous", since their "animal diet" may not be restricted to insects alone, and even organic plant materials such as pollen grains may be passively trapped and digested. However, it should be noted that all Saskatchewan carnivorous plants still photosynthesize their food, as do other green plants, and the carnivorous habit merely supplements their nutrient intake. It is likely not accidental that most carnivorous plants are inhabitants of bog or fen peatlands, or of other wet areas often of high osmotic concentrations where the availability of nutrients such as nitrogen or phosphorus may be reduced for the plants. Carnivorous plant groups occur in various unrelated orders of flowering plants and differ considerably in their mechanisms of animal entrapment and digestion. Thus, the carnivorous habit must have evolved independently in most of these.

The reader is referred to such available informative publications as Lloyd, Schell, and Heslop-Harrison which describe carnivorous plants in detail and probe their unique mechanisms of animal-feeding.^{5 7 4} The objective of the present article is to aid naturalists and other interested persons in becoming more familiar with those carnivorous plants that are native to this province and more

knowledgeable about where to look for them. Brief general descriptions of the characteristics of each genus and keys to the included species are given to facilitate their identification. Also to aid in their recognition, drawings of each of our ten carnivorous plant species have been sketched. The Saskatchewan distribution maps show the known documented distribution of each species in the province as represented by voucher specimens filed in the Fraser Herbarium or from literature reports. These maps may reflect the distribution of collectors more than of the actual distribution of the species, since collecting has been far from uniform or random.

The ten species of native carnivorous plants in Saskatchewan belong to four genera: *Sarracenia* (pitcher plants), *Drosera* (sundews), *Utricularia* (bladderworts), and *Pinguicula* (butterworts). Each of these four genera has evolved unique structures and methods for insect entrapment and digestion. The bladderworts are aquatic while most other carnivorous plant species are terrestrial in moist to wet bogs, fens, or mossy shorelines. Of the ten native carnivorous plant species, at least three appear to represent distinctly rare and possibly endangered species in Saskatchewan; these are the narrow-leaved sundew, horned bladderwort, and hairy butterwort. Four additional species — the pitcher plant, oblong-leaved sundew, common butterwort, and lesser bladderwort — are somewhat more frequent and may sometimes occur in

Fig. 1
SARRACENIA
PURPUREA
(PITCHER PLANT)



fairly large local populations, but appear quite sporadic in their Saskatchewan distribution. At least the common butterwort and lesser bladderwort appear borderline for possible consideration as rare and potentially endangered species. Only three carnivorous plant species are quite common and widespread in Saskatchewan; these are the round-leaved sundew, common bladderwort, and flat-leaved bladderwort.

The PITCHER PLANT (*Sarracenia purpurea* L.) is the largest and showiest of our carnivorous plant species (see fig. 1). A solitary, large, nodding, dark purple, fleshy, 5-parted flower with umbrella-like upper styles is borne on a stout leafless flowering-stalk surrounded basally by a rosette of large, unusually modified, hollow, curved, pitcher-shaped, usually red-purple leaves which function as rain-catching receptacles. Insects attracted by the reddish color and nectar secreted by the leaves will be guided along a nectar strip until they slide down the slippery inner surfaces that are covered with downward-pointing hairs, becoming trapped in the "pitchers" which are half filled with liquid. The trapped victim is apparently digested by plant-secreted enzymes and by simple bacterial decomposition, and the plant will subsequently absorb nutrients from this broth. Almost paradoxically, one insect, a minute mosquito species, not only can tolerate them, but actually depends upon the pitchers for breeding, with its larvae later feeding on the organic residues contained in them.

Our pitcher plants occur in bogs, sometimes forming large colonies. Apparently they are quite sporadically distributed in the more southern boreal forest region, mainly in the eastern half of Saskatchewan (see map). Although hardly representing a truly

rare or endangered species in Saskatchewan, the future of pitcher plants in the province does depend upon the future nonalteration of their various local bog habitats.

The SUNDEWS (*Drosera* spp.) are evolutionarily related to the pitcher plants and are classified in the same taxonomic order, although in a different family. However, their mechanisms of insect entrapment are quite different. In the sundews, the small, white-(or pink) — petalled flowers are borne in uncoiling raceme-like inflorescences borne upon very slender, leafless flowering stalks. These are surrounded basally by a rosette of usually long-stalked leaves, the blades of which are densely covered with globular-tipped hairs exuding a viscid fluid to which the insect prey adheres, as well as enzymes to digest the prey. While the primary entrapment method appears simply to be the insect's adhesion to the initially touched viscid glands, neighboring stalked glands also slowly curve inward and downward to contact and enmesh the prey, trapping it even more completely. Perhaps the latter actually function more effectively for hastening the digestion process than for entrapment itself, since the response would seem unduly slow for the latter.

There are three *Drosera* (sundew) species in Saskatchewan, and these may be distinguished by means of the following identification key:

1. Leaf blades inverted-triangular to nearly circular in outline, over 5 mm broad, less than 10 mm long, as broad as or somewhat broader than long, much shorter than the hairy leaf-stalks; the leaves \pm horizontally spreading; seeds spindle-shaped with both ends prolonged
D. rotundifolia
1. Leaf blades linear to spatula-shaped or

narrow egg-shaped, gradually tapering below to leaf stalk, less than 5 mm broad, over 1 cm long, much longer than broad; leaf stalks not hairy, either longer or shorter than the blades; the leaves \pm erect to only slightly spreading.

2. Leaf blades 2.5-5 mm broad, 1-3 cm long, usually much shorter than the leaf stalks, spatulate, oblong, lance, or narrowly egg-shaped; seeds spindle-shaped with both ends prolonged *D. anglica*
2. Leaf blades linear, nowhere more than 2.5 (-3) mm broad, 2-6 cm. long, usually longer than the leaf stalks; seeds rhomboidal without prolonged ends *D. linearis*

The ROUND-LEAVED SUNDEW (*Drosera rotundifolia* L.) is probably our most common carnivorous plant, being nearly ubiquitous on sphagnum moss, especially in bogs, but also in fens, wet black spruce forests, and on "boggy" lake shores (see fig. 2 and map 2).

The OBLONG-LEAVED SUNDEW (*Drosera anglica* Hudson) is a sporadically occurring species in Saskatchewan, recorded most often in very wet, high-mineral, calcareous, "boggy" fens; or on wet mossy or marshy quiet shores, apparently throughout the boreal forest region of the province. Local populations may be large or small. (See fig. 3 and map 3).

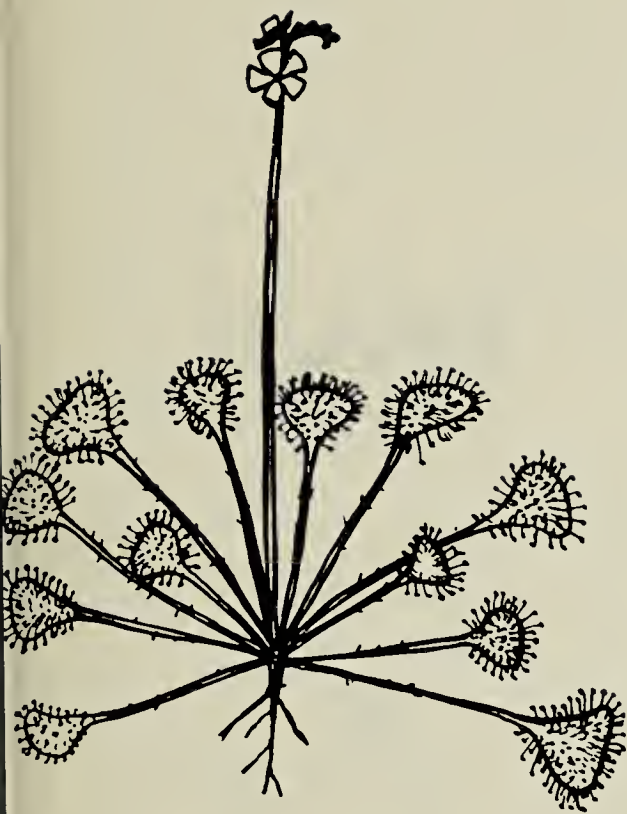
The NARROW-LEAVED SUNDEW (*Drosera linearis* Goldie) is apparently a very rare species in Saskatchewan, known only from Prince Albert [W. P. Fraser 12/7/33 (SASK 12947); 5/8/33(SASK 12952)], McKague [A. J. Breitung 10/8/34(SASK 12950, 124951)] and Garthland [J. H. Hudson #2958(SASK 54271)], where it occurred in high-mineral calcareous "bogs". (see fig. 4 and map 4).

The BLADDERWORTS (*Utricularia* spp.) are evolutionarily related to, and are probably a derivative line from, the figwort family (Scrophulariaceae). The

figwort family also shows a nutritionally-related evolutionary trend toward parasitism in some other groups. The bladderworts are true aquatic plants, rooted to the bottom and entirely submerged, except for the emergent racemes bearing conspicuous, yellow, spurred, "scroph-like" flowers. The leaves are finely dissected and forked one to several times into narrow linear or thread-like segments. Borne on the leaves are small (≤ 5 mm wide), elastic-walled bladders which represent the traps for small aquatic animals. These bladders display an effective, active rather than passive, entrapment mechanism consisting of touch-sensitive hairs at the bladder-mouth which trigger an opening and rapid expansion of the initially flat bladders to suck the prey inside where secreted enzymes will digest it. Since the bladders are small (0.5-5.0 mm wide), the animals primarily captured are small crustaceans, rotifers, aquatic insect larvae, and protozoans.

There are four *Utricularia* (bladderwort) species known from Saskatchewan which may be distinguished by means of the following identification key:

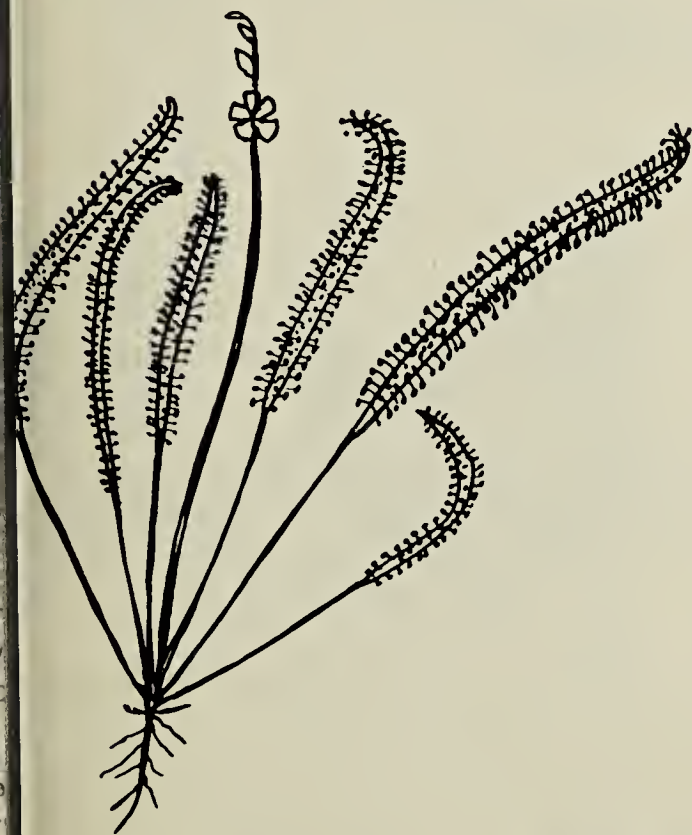
1. Plants of very shallow water, much reduced to a short, essentially leafless and bladderless flowering stem, but the stem base and short root branches bearing some thread-like leaves and a few bladders; bladders minute, 1 mm wide or less; flowers large and conspicuous, 1-3 closely spaced along short raceme, the corollas including spurs 15-20 mm long *U. cornuta*
1. Plants somewhat to much larger, more conspicuous, with stems distinctly leafy; bladders larger, borne on leaves and/or stems.
 2. Bladders borne on separate, elongate, leafless branches; plants small, submerged, usually horizontally creeping on bottom in shallow water less than 2 dm deep and rooting at nodes; leafy shoots



2. DROSERA
ROTUNDIFOLIA



3. DROSERA
ANGLICA

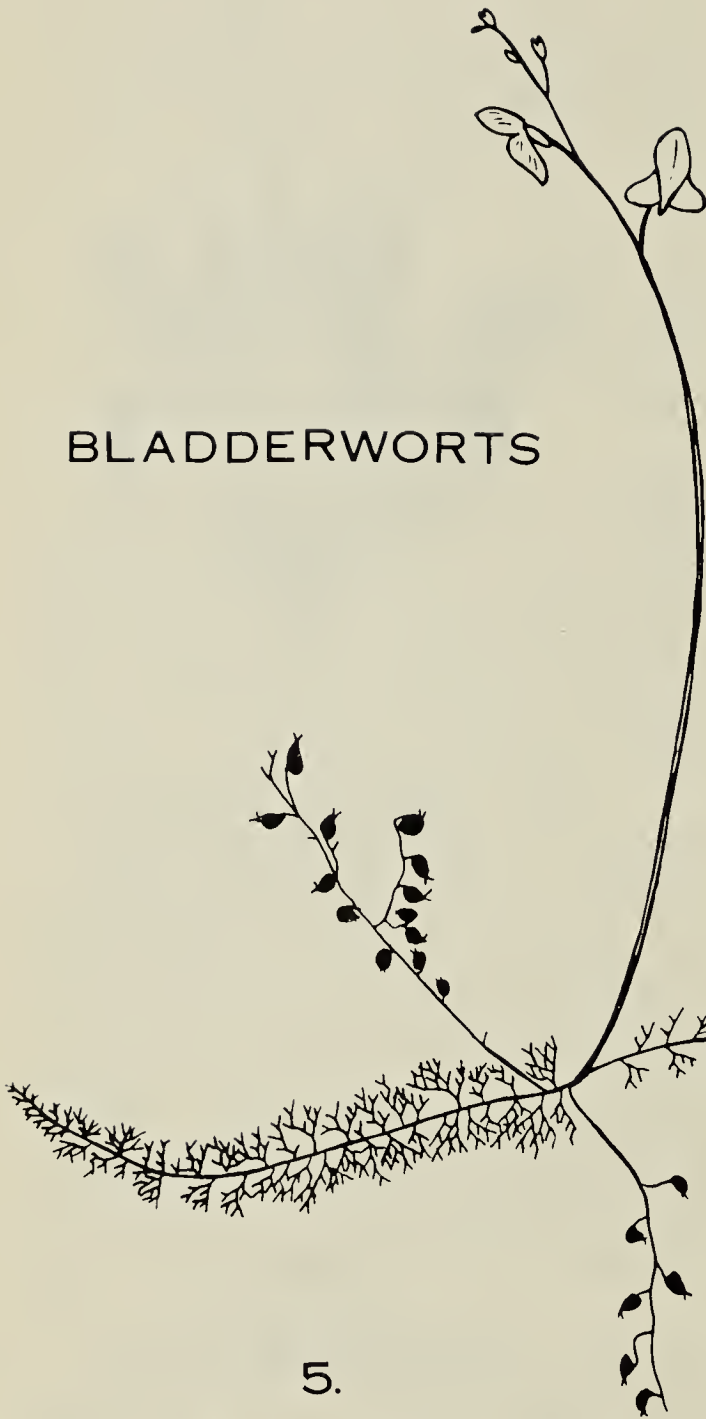


4. DROSERA LINEARIS

THE SUNDEWS



BLADDERWORTS



5.

UTRICULARIA INTERMEDIA



6.

UTRICULARIA VULGARIS

mostly less than 2 cm wide; stems slender, less than 0.5 mm thick; leaves less than 1 cm long, the leaf segments linear, 0.2-0.5 mm wide, distinctly flattened, with obtuse and minutely toothed tips; corollas including spurs 10-15 mm long; fruiting pedicels erect; winter-buds pubescent, 3-10 (-14) mm long *U. intermedia*

2. Bladders borne on or among leaves or regular leafy stems; ultimate leaf segments acute, not toothed; fruiting pedicels arched-recurved.
3. Plants usually large and coarse, in deeper water to 1 m depths, rooted to bottom at single point, with the numerous branches floating near surface; main leaf shoots mostly over 2 cm wide; stem diameters mostly over 0.5 mm; leaves large, over 1 cm long, crowded, the segments thread-like, round in cross-section; bladders numerous, often large, 2-5 mm wide, borne mostly on leaves; expanded flowering racemes 5-20 cm long; flowers large, with corollas bright yellow, 10-20 mm long including the distinct curved spur; flowering racemes mostly longer, often many-flowered; winter-buds large, 10-20 mm long, compact with crowded, hairy, minute bud-leaves *U. vulgaris*
3. Plants small, delicate, submerged on bottom in shallow water; leafy shoots mostly less than 1 cm wide; stems thread-like, less than 0.5 mm in diameter, less than 25 cm long, only sparsely leafy; leaves shorter than 1 cm, with leaf segments very slender, \pm flattened; bladders rather few, 2 mm wide or less; flowers small, with corollas pale yellow, 4-8 mm long, the spurs indistinct, short, rounded; flowering racemes shorter, less than 2 cm long, fewer than 5-flowered; winter buds small, 1.5-5 mm long, more loosely organized, with fewer, glabrous, minute bud-leaves *U. minor*

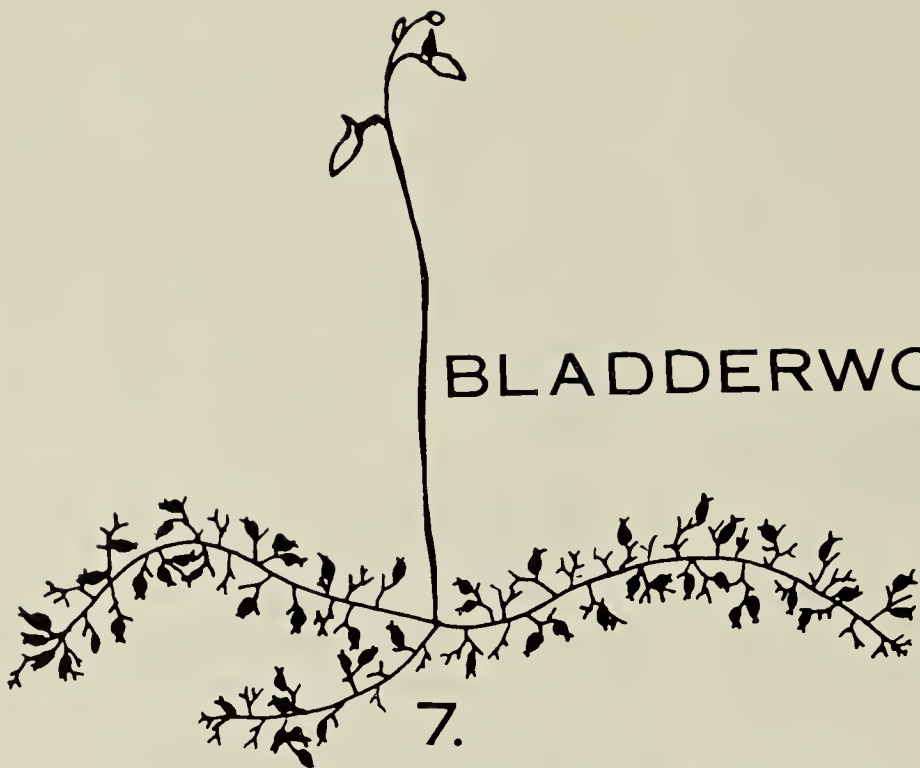
The FLAT-LEAVED BLADDERWORT (*Utricularia intermedia* Hayne) is quite common in shallow water less than 2 m deep in bog and fen ponds and off quiet lake shores throughout the boreal forest and parkland regions of

Saskatchewan. (See fig. 5 and map 5).

The COMMON or GREATER BLADDERWORT (*Utricularia vulgaris* L. var. *americana* Gray) is another common aquatic species in Saskatchewan, occurring throughout the province, mostly in somewhat deeper water to 1/2 (-) m depths in lakes, ponds, sluggish streams, and in water-filled depressions in very wet sedge fens. (See fig. 6 and map 6).

The SMALLER or LESSER BLADDERWORT (*Utricularia minor* L.) has been rather infrequently collected in Saskatchewan and at least formerly was considered a rare and endangered species. Although now recorded from at least 10 scattered general localities in the boreal and parkland regions of the province, the species would appear rare in each location based on present information. However, it may actually be more overlooked than rare, because it apparently flowers only infrequently and is often taken for depauperate specimens of *U. vulgaris*. Our specimen data would indicate that this species is characteristic of very shallow water of quiet shores and water-filled fen depressions, rather than true bogs. (See fig. 7 and map 7).

The HORNED BLADDERWORT (*Utricularia cornuta* (Michx.) is an apparently very rare species in Saskatchewan or at least it has seldom been collected and recorded. Previously it was known only from the south side of Lake Athabasca east of the William River [G. W. Argus #461-62(SASK 30159)], which was the only Saskatchewan record reported by Boivin.² Now, thanks to the sharp eyes of my colleague, John H. Hudson, who noted flowering specimens of this species among collections of *U. intermedia*, two more records of *U. cornuta* can be reported for the province. These are: Mile 107.5 of Highway 105 (Wollaston Lake Road) [J. Ternier & M. Jasieniuk #2404 (SASK



7.

UTRICULARIA MINOR

BLADDERWORTS



8.

UTRICULARIA
CORNUTA

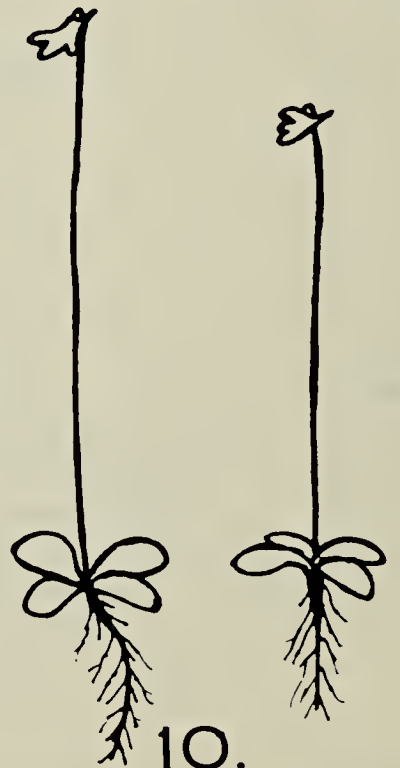


9.

PINGUICULA VULGARIS

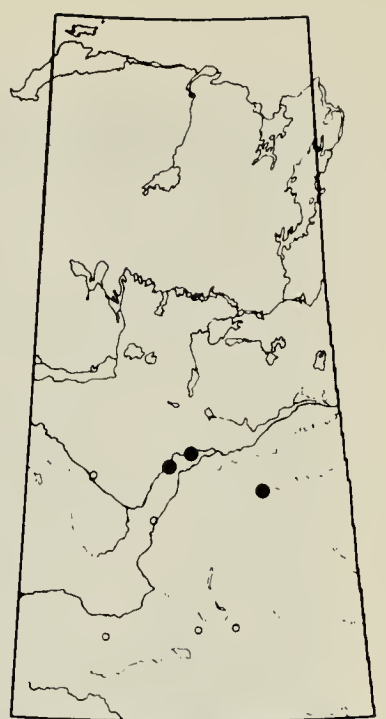
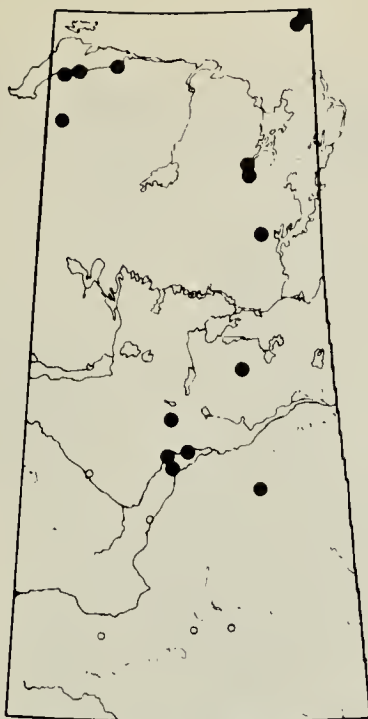
BUTTER-
WORTS

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10.

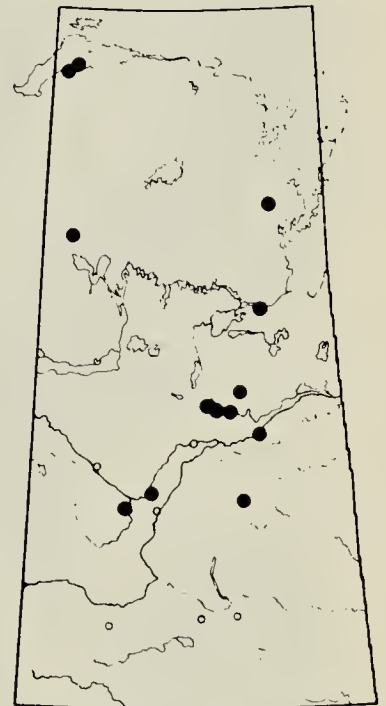
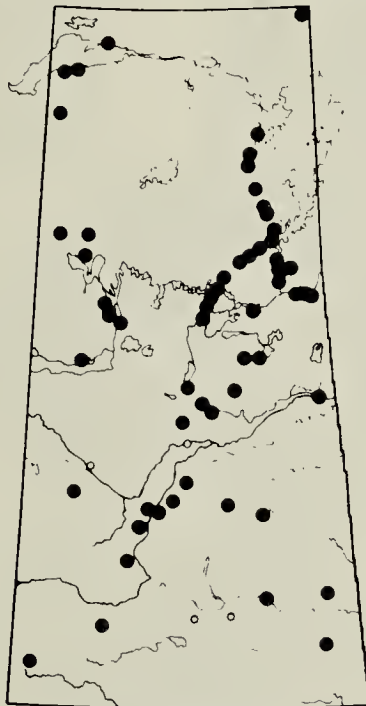
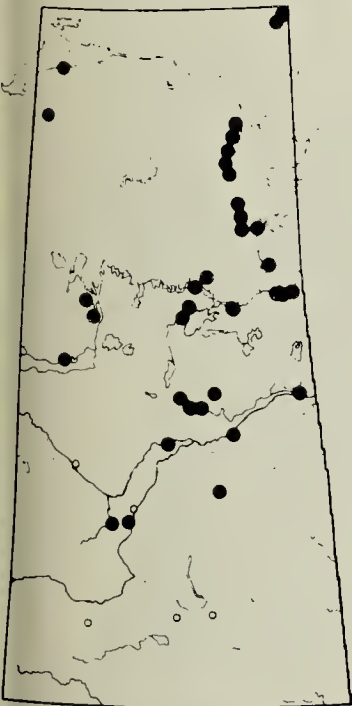
PINGUICULA VILLOSA



1. *DROSERA ROTUNDIFOLIA*

3. *DROSERA ANGLICA*

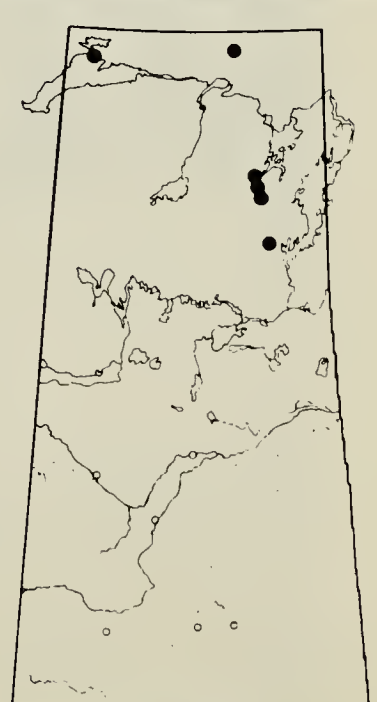
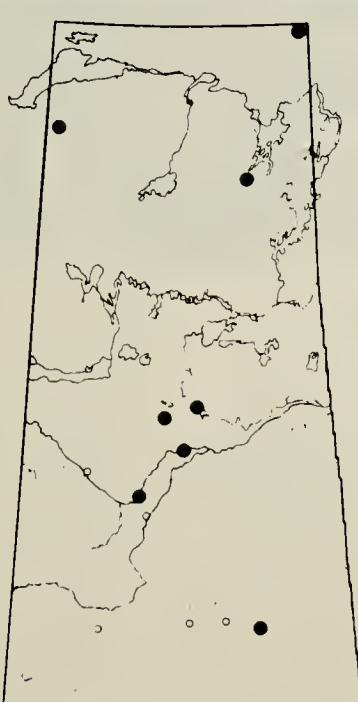
4. *DROSERA LINEARIS*



5. *UTRICULARIA INTERMEDIA*

6. *UTRICULARIA VULGARIS*

7. *UTRICULARIA MINOR*



8. *UTRICULARIA CORNUTA*

9. *PINGUICULA VULGARIS*

10. *PINGUICULA VILLOSA*



Sundew and leaves of Pitcher Plant

Bob Godw

52748 in part]], and Mile 8 of Highway 105 [J. Ternier & M. Jasieniuk #2230 (SASK 53180 in part)]. The habitat of our recorded material is very shallow water of marshy or "boggy" quiet shores. Lacking its conspicuous flowers, this species would seem almost impossible to notice in a

vegetative state. (See fig. 8 and map 8
The BUTTERWORTS or BO
VIOLETS (*Pinguicula*) species a
closely related to the bladderwort
and classified with them in the same
bladderwort family (Lentibulariaceae).
However, their mode of insect capture
trapment differs markedly from that

the bladderworts. The purple violet-like flowers are solitary, each terminating a leafless flower-stalk which arises from the center of a basal rosette of fleshy, elliptical involute, glistening, greasy-viscid leaves which are covered with very small stalked and sessile glands not visible without magnification. These leaves apparently act similarly to "fly-paper" with the stalked glands releasing mucilage when touched, to which the insect adheres. Stimulated by the trapped insect, the sessile glands on the leaf surface then secrete digestive enzymes, which gather in a pool surrounding the prey. Digestion may also be facilitated by the involuted leaf margins.

There are two butterwort (*Pinguicula*) species known in Saskatchewan, which may be distinguished by means of the following identification key:

1. Stems glabrous to sparsely and finely glandular-puberulent throughout; flowers larger, the corollas (12-) 14-17 (-20) mm long including the spur, darker violet-purple; leaf blades 2-4 cm long *P. vulgaris*
1. Stems \pm densely short hairy below; flowers small, the corolla 8-10mm long including the spur, pale violet; leaf blades less than 1 cm long *P. villosa*

The COMMON BUTTERWORT or BOG-VIOLET (*Pinguicula vulgaris* L.), belying its name, is hardly common in Saskatchewan, but instead quite sporadic in its occurrence. The species is recorded in the province from only about 10 scattered localities in the boreal forest and parkland regions, and comes close to qualifying as a rare and potentially endangered species in Saskatchewan. Its habitat is that of calcareous "bogs", wet mossy shores, and springy seepages. (See fig. 9 and map 9).

The HAIRY BUTTERWORT or BOG-VIOLET (*Pinguicula villosa* L.) is apparently rare in Saskatchewan where it

was reported previously only from the north shore of Lake Athabasca⁶ and Offset Lake⁸. In addition to these earlier reports, four new localities for the species have recently been recorded from along the Wollaston Lake Road (Hwy. 105) by the collections of University of Saskatchewan students, Marie Jasieniuk and Judy Ternier. These records, newly reported here, are as follows: Geikie River at the southwestern end of Wollaston Lake [J. Ternier & M. Jasieniuk #2523 (SASK 52754)], 15 miles south of the Geikie River, Mile 100 of Highway 105 [J. Ternier & M. Jasieniuk #1391 (SASK 54670)], Courtney Lake [J. Ternier & M. Jasieniuk #1533 (SASK 52755)], and David Lake west of Reindeer Lake [J. Ternier & M. Jasieniuk #1982 (SASK 52756)]. Its habitat is black spruce or tamarack bogs. (See fig. 10 and map 10).

¹BOIVIN, B. 1969. Flora of the Prairie Provinces, Part II. Provencheria 3, Universite Laval. 293 pp. (pp. 98-99).

²BOIVIN, B. 1972. Flora of the Prairie Provinces, Part III. Provencharia 4, Universite Laval. 140 pp. (pp 347-349).

³BREITUNG, A. J. 1957. Annotated catalogue of the vascular flora of Saskatchewan. American Midland Naturalist 58:1-72 (pp. 36-37, 55-56).

⁴HESLOP-HARRISON, Y. 1978. Carnivorous plants. Scientific American 232(2):104-115.

⁵LLOYD, F. E. 1942. The Carnivorous Plants. Chronica Botanica Co., Waltham, Mass.

⁶RAUP, J. M. 1936. Phytogeographic studies in the Athabasca-Great Slave Lake Region. Catalogue of the Vascular Plants. Jour. of the Arnold Arboretum 197:180-315.

⁷SHELL, D. E. 1977. Carnivorous plants of the United States and Canada. John F. Blair, Winston-Salem, North Carolina.

⁸SCOTTER, G. W. 1961. Botanical collections in the Black Lake region of northern Saskatchewan (1960). Blue Jay 19(1):28-33.