

**Observations of Substrate and Plant
Associates of Eight Carnivorous
Plant Species in Northern Michigan**

Boreal Flora
UMBS 1988

Glenn Vande Water

Introduction

Carnivorous plants are an intriguing component of many northern Michigan ecosystems. Carnivory has aided these plants in becoming niche specialists; occupying sites that are low in dissolved nutrients.

During June and July 1988 I conducted field observations of species within the families Sarraceniaceae, Droseraceae, and Lentibulariaceae, with emphasis on substrate characteristics and associate plant species.

Field trips conducted by Dr. Edward Voss gave me the opportunity to observe carnivorous plants within many habitats. Subsequent trips to Waugoshance Point, Sec 23, T39N, R5W, Emmet County; Grass Bay, Se 21, T38N, R1E, Cheboygon County, and Ochis Fen, NW1/4, Sec 25, T35N, R5W, Emmet County were conducted to attain additional floristic information. (See Table 1).

Species investigated were Sarracenia purpurea, Drosera rotundifolia, Drosera linearis, Drosera x anglica, Drosera intermedia, Utricularia cornuta, Utricularia intermedia, Utricularia vulgaris, and Pinguicula vulgaris.

Discussion

Sarracenia purpurea:

Sarracenia grows in a range of alkaline and acidic situations (e.g. fens, bogs, interdunal pools, Thuja/Picea Type) Grass Bay offers a fine

example of the moisture and plant associate gradient in which *Sarracenia* occurs. Within the interdunal pool zone water fluctuates in accordance with frequency of rain and Lake Huron levels. The substrate is primarily a fine grained sand and some accumulated organic litter held by the various vegetative structures. A P.H. test at 15 cm below the surface ranged from 7.5-8.0. Within my specific observation site principle vascular associates included *Drosera rotundifolia*, *Drosera linearis*, *Utricularia cornuta*, *Tofieldia glutinosa*, *Triglochin maritimum*, *Cladium mariscoides*, and *Rhynchospora alba*.

The transition zone between the pool and the xeric upland supports dense growths of *Myrica gale*. The most luxuriant growths of *Sarracenia* were encountered in the understory microhabitats of the *Myrica*. I speculate that the canopy of *Myrica* reduces desiccating winds and sun from overwhelming the *Sarracenia* in dry years. Other plants in the shrub zone were *Tofieldia glutinosa*, *Vaccinium macrocarpon*, *Lobelia kalmii*, *Scutellaria galericulata*, *Eupatorium perfoliatum*, and *Pogonia ophioglossoides*.

Sarracenia growing in the zone between *Myrica* and a *Thuja/Picea* Type had a substrate of surface duff and sand with P.H. at 5 and 15 cm ranging from 7.5-8.0. Associates included *Drosera rotundifolia*, *Selaginella selaginoides*, *Tofieldia glutinosa*, *Carex disperma*, *Carex garberi*, *Eleocharis elliptica*, *Fragaria virginiana*, and *Primula mistassinica*.

The floating mat at Orchis Fen is comprised chiefly of members of the Cyperaceae family (e.g. *Scirpus hudsonianus*, *Carex lasiocarpa*, *Rhynchospora alba*, and *Eleocharis elliptica*). *Sarracenia* on these sites seem to prefer

growing on hummocks of Sphagnum sp. This situation is also quite noticeable on the floating mat at Ryerse Lake in the SE1/4 of Sec 9, T43N, R7W Mackinac County. Plant associates at Ryerse include Scheuchzeria palustris, Juncus stygius, Carex oligosperma, Lycopodium inundatum, Drosera rotundifolia and Drosera intermedia.

Though I did not observe Sarracenia in the Thuja/Picea Type at Orchis Fen previous observations of a similar type in S1/2 Sec 33, T22N, R5W Missaukee County revealed Sarracenia growing in Sphagnum sp. hummocks and hollows.

Though Sphagnum sp. is the surface substrate in the floating mat and Thuja/Picea situation the Sarracenia root systems probably reach down into the subsurface which are alkaline in nature.

Mandossin (1965) found Sarracenia growing on a variety of substrates in southern Michigan that ranged in P.H. from 5.2-8.9.

Drosera rotundifolia - Drosera linearis - Drosera intermedia - Drosera x anglica:

Of the above species Drosera rotundifolia is found in the widest range of habitats. It was noted as an associate with Sarracenia purpurea and Drosera linearis in the interdunal pools of Grass Bay, on the organic soil on the edge of Orchis Fen mat with Drosera linearis and their hibred Drosera x anglica, on the hummocks of Sphagnum sp. in the Thuja/ Picea Type, and in rock crevices in the Canadian shield area. Associates at Grass Bay and Ochis Fen mat have been eluded to under the Sarracenia section. In the Thuya/ Picea Type Drosea rotundifolia grows most commonly on the

Sphagnum sp. hummocks as what I interpret as a relic plant from the early floating mat successional stage. Associates in addition to Thuja occidentalis and Picea mariana include Lonicera oblongifolia, Trientalis borealis, Coptis trifolia, Calapogon tuberosus, Liparis loeselii, Carex disperma, Carex trisperma, Carex tenuiflora, and Ga^ltheria hispidula.

In the rock crevices of the Canadian shield Drosera rotundifolia grows with Selaginella selaginoides, Sagina nodosa, Primula mistassinica, Tofieldia pusilla, Campanula rotundifolia, Solidago Uliginosa, and Pinguicula vulgaris.

Drosera linearis tends to grow on soil substrate (i.e. organic soil at edges of mats and interdunal pool sand.) It appears to do best when these sites remain fairly wet. Associates on floating mats include Rhynchospora alba, Carex lasiocarpa, Eriophorum gracile, Scirpus hudsonianus, Menyanthes trifoliata, and Drosera rotundifolia. In the interdunal pool areas associates include Tofieldia glutinosa, Triglochin maritimum, Clad^um mariscoides, Primula mistassinica and Utricularia cornuta.

I speculate that the long term presence of Drosera linearis is dictated by the consistent presence of bare soil situations and water inundation.

Schwintzer (1981) states that Fens may gradually develop into bogs at sites where telluric water influence at the surface is increasingly restricted by thickening peat and growing width of the floating mat. I speculate that as the mat continues to close and Sphagnum sp. and woody plants become an increasingly important component that the increasing shade, acidity, and lack of organic substrate ultimately create a habitat unsuitable for Drosera linearis as well as Drosera x anglica.

Drosera intermedia is best sought at the edge of sedge mats or

hollows within the mat that are inundated by water. Associates at Barclay Lake Sec 11/14, T49N, R9W, Luce County include, Carex oligosperma, Carex pauciflora, Eriophorum spissum, Utricularia cornuta, and Lycopodium inundatum.

At Ryerse Lake similar associates were noted, with additions including Juncus stygius, Scheuchzeria palustris, Rhynchospora fusca, and Dulichium arundinaceum.

Drosera intermedia tends to be more accomodating to increasing acidity of a habitat.

Utricularia cornuta - Utricularia intermedia - Utricularia vulgaris:

Utricularia cornuta may indeed not be considered a carnivorous plant because it often lacks bladders and is found commonly with its roots buried in sand substrate, however, I have included it in this report because it may be evolving from true carnivoy to a total non-carnivorous life history. It was observed in habitats with Drosera intermedia at Ryerse Lake, Sarracenia purpurea at Grass Bay, and Pinguicula vulgaris at Waugoshance Point.

Utricularia intermedia was observed at Orchis Fen and Barclay Lake in water inundated pools with Sphagnum sp. substrate, similar to situations in which Drosera intermedia grow. Surrounding vascular plants at Orchis Fen included Eriophorum gracile, Scirpus hudsonianus, and Carex lasiocarpa and at Barclay Lake Carex oligosperma, Carex pauciflora, Eriophorum spissum and Utricularia cornuta were noted.

Utricularia vulgaris was observed at Grass Bay in non-flowering condition growing in standing pools with extensive growths of Scirpus

americanus and Cladium mariscoides. Overall the plant is much more robust than Utricularia intermedia leading me to speculate that its success is tied to higher water levels than Utricularia intermedia.

Pinguicula vulgaris :

Principally a northern species, Pinguicula vulgaris resides in the northern lower peninsula along cool shorelines.

Observations at Waugoshance Point reveal it growing in calcareous situations at the edge of ephemeral high water sites often in the shade of Thuja occidentalis. It is found growing with Tofieldia glutinosa, Eleocharis elliptica, Selaginella apoda, Selaginella selaginoides, Lobelia Kalmii, Satureja arkansana, Primula mistassinica, Senecio pauperculus, Carex crawei and Carex garberi. A P.H. test at 10 cm below the surface ranged 8.0-9.0.

Previous observations of Pinguicula in Picture Rocks National Lakeshore revealed it growing on sandstone cliffs with Crytogramma stelleri, and Cystopteris bulbifera.

In Ontario along the northern Lake Superior shoreline Pinguicula was observed in rock crevices with Drosera rotundifolia, Sagina nodosa, Tofieldia pusilla, Scirpus cespitosus, Saxifraga paniculata, Selaginella selaginoides, and Campanula rotundifolia.

Summary

Field observations of carnivorous plants elucidated their association with a variety of site indicator species.

Sarracenia purpurea is present in a wide range of P.H. thus the

associate species such as Myrica gale indicate alkaline conditions while Carex oligosperma is in more acidic habitats.

Drosera rotundifolia tends to be the cosmopolitan member of Droseraceae in northern Michigan while Drosera linearis and Drosera intermedia refined their niches to bare alkaline soils that are often inundated with water and water saturated sphagnum mats respectively. Drosera x anglica often appears where Drosera rotundifolia and Drosera linearis grow together.

Utricularia cornuta grows in both sphagnum and sand situations while Utricularia intermedia was noted primarily in floating sphagnum mats. Utricularia vulgaris appears best suited for survival in perennially ponded habitats.

Pinguicula vulgaris southern distribution in Michigan is primarily limited to cool shorelines of the Lake Michigan and Lake Huron. A common associate of Pinguicula vulgaris is Primula mistassinica indicating Pinguicula preference for alkaline habitats.

Literature cited:

Mandossian A. '65 :Plant associates of *Sarracenia purpurea* in Acid and Alkaline Habitat. Mich. Bot. 4: 107-114.

Schwintzer C. '81 Vegetation and Nutrient Status of Northern Michigan bogs and Conifer Swamp with a Comparison to Fens. Can. Jour. Bot. Vol 59, #5.

		sa. pur.	dro. rot.	dro. lin.	dro. ang.	utr. cor.	utr. int.	utr. vul.	pin. vul.
Lycopodium inundatum						x	x	x	
Selaginella apoda									x
Selaginella selaginoides	#	x	x						
Thuja occidentalis	#	x	x						
Scheuchzeria palustris	#					x	x		
Triglochin maritimum	#	x	x	x	x		x		x
Triglochin palustre	#	x	x	x	x		x		
Carex crawei			x						x
Carex disperma	#	x	x						
Carex garberi	#	x	x						x
Carex lasiocarpa	#	x	x	x	x				
Carex oligosperma	##								
Carex pauciflora	##								
Carex trisperma			x						
Cladium mariscoides	#	x	x	x				x	x
Eleocharis elliptica	#	x	x	x	x				
Eleocharis ^{PAU} PAU ciflora	#								x
Eriophorum virginicum			x			x			
Eriophorum spissum			x						
Rhynchospora alba	#	x	x	x	x	x	x		
Scirpus americanus		x	x	x				x	x
Scirpus hubsonianus			x	x	x		x		
Juncus stygius		x	x			x			
Tolfieldia glutinosa	#	x	x	x	x			x	
Tolfieldia pusilla	#		x					x	
Pogonia ophioglossoides		x							
Cypripedium calceolus		x→							
Myrica gale	#	x→							
Potentilla fruticosa	#	x	x					x	
Spiraea alba		x							
Cicuta bulbifera		x							

	SAR PUR	DRO ROT	DRO LIN	DROS ANGL.		PIN VUL
Eupatorium perfoliatum		X				
Andromeda glaucophylla		X	X	X		
Chamaedaphne calyculata		X			X	
Vaccinium marrocarpon	X	X	X	X		
Vaccinium oxycoccos					X	
Primula mistassinica	X					X
Menyanthes trifoliata	X	X	X	X		
Satureja arkansana						X
Castilleja coccinea						X
Lobelia kalmii	X	X				X
Cirsium muticum		X	X	X		
Senecio pauperculus						X

TABLE 1 Associate species noted a representative of carnivorous plants general habitat. (x= presence; #= known alkaline associate; ##=know acidic associate)

sur. pur.= Sarracenia purpurea; dro. rot.= Drosera rotundifolia; dro. lin.= Drosera linearis; dro. angl.= Drosera x anglica; dros. int.=Drosera intermedia; utr. cor.=Utricularia cornuta; utr. int.=Utricularia intermedia; utr. vul.= Utricularia vulgaris; pin. vul.= Pinguicula vulgaris.