

# CARNIVOROUS PLANT NEWSLETTER

Journal of the International Carnivorous Plant Society

Volume 33, No. 4

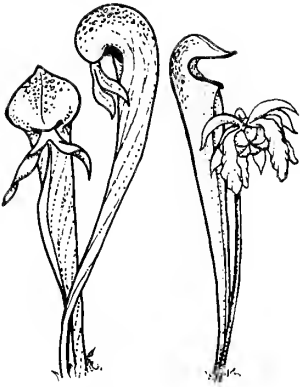
December 2004



# CARNIVOROUS PLANT NEWSLETTER

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Front Cover: *Heliamphora elongata* in habitat on the northern plateau of Ilu-tepui. Photograph by Joachim Nerz. See article on page 111.  
Back cover: *Aldrovanda* habitat near Esperance. Note the dark, clear water with emergent reeds and scattered *Melaleuca* trees. *Aldrovanda* is present at the lake edge. Photograph by Robert Gibson. See article on page 119.

Carnivorous Plant Newsletter is dedicated to spreading knowledge and news related to carnivorous plants. Reader contributions are essential for this mission to be successful. Do not hesitate to contact the editors with information about your plants, conservation projects, field trips, or noteworthy events. Contributors should review the "Instructions to Authors" printed in the March issue of each year. Advertisers should contact the editors. Views expressed in this publication are those of the authors, not the editorial staff.

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<p><i>Darlingtonia californica</i>—Oregon, USA</p> <p><i>Dionaea muscipula</i></p> <p><i>Drosera auriculata</i></p> <p><i>D. binata</i></p> <p><i>D. binata</i>—Coromandel, NZ</p> <p><i>D. burmannii</i></p> <p><i>D. capensis</i> 'Albino'—white flower</p> <p><i>D. capensis</i>—narrow leaf</p> <p><i>D. capillaris</i></p> <p><i>D. collinsiae</i></p> <p><i>D. dielsiana</i></p> <p><i>D. filiformis</i> var. <i>filiformis</i></p> <p><i>D. filiformis</i> var. <i>filiformis</i>—all red, Florida, USA</p> <p><i>D. glanduligera</i></p> <p><i>D. indica</i>—NSW, Australia</p> <p><i>D. intermedia</i>—Cuba</p> <p><i>D. intermedia</i>—Florida, USA</p> <p><i>D. intermedia</i>—Germany</p> <p><i>D. intermedia</i>—New Jersey, USA</p>	<p><i>D. intermedia</i>—North Carolina, USA</p> <p><i>D. intermedia</i>—Rhode Island, USA</p> <p><i>D. intermedia</i>—Venezuela</p> <p><i>D. madagascariensis</i>—Botswana</p> <p><i>D. nidiformis</i></p> <p><i>D. peltata</i></p> <p><i>D. rotundifolia</i>—New Jersey, USA</p> <p><i>D. rotundifolia</i>—Oregon, USA</p> <p><i>D. spatulata</i></p> <p><i>D. stenopetala</i></p> <p><i>D. tokaiensis</i></p> <p><i>Nepenthes mirabilis</i></p> <p><i>Pinguicula ionantha</i>—ESA/CITES, USA sales only</p> <p><i>Sarracenia flava</i></p> <p><i>S. oreophila</i>—ESA/CITES, USA sales only</p> <p><i>S. purpurea</i> var. <i>burkii</i></p> <p><i>S. nbru. subsp. alabamensis</i>—ESACITES, USA sales only</p> <p><i>S.</i> (various hybrids)</p>
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This is a partial list of the seeds available. A complete list is online at the ICPS web site, <http://www.carnivorousplants.org/> or by sending a self-addressed, stamped (if USA), envelope to the seed bank address.

Seed packets are US\$1 each. Please include US\$3 postage and handling for each order. You may pay by cash, check, or money order in US\$. Many members pay with cash. Please make checks and money orders payable to "ICPS Seed Bank".

The seed bank is a members-only benefit. The quantity of seed available to each member is 1 packet of each variety per month and 40 packets total in any 12 month period. Please list alternative seed selections, as other orders will arrive before yours. If you have an e-mail address, please include it so we can correspond should any issues arise. Seeds purchased through the seed bank are intended for your personal use only and may not be sold.

You are encouraged to stock the seed bank with seed produced by cultivated plants. The ICPS policy on wild seed collection is on line at the ICPS web site. Cultivation-produced seeds of species protected by the US Endangered Species Act are distributed within the US only, and in accordance with the ICPS's US Fish & Wildlife Service permit.

Donate seed and get credit for free seed from the seed bank. Seeds of selected varieties are available free to teachers for use in the classroom and to scientists and conservation organizations. It is ICPS policy not to sell internationally seed of plants protected by CITES Appendix I or the US Endangered Species Act.

John Brittnacher, Manager • [john@carnivorousplants.org](mailto:john@carnivorousplants.org)

## NEW CULTIVARS

Keywords: cultivar: *Dionaea* 'Fused Tooth', *Dionaea* 'Louchâpâtes', *Dionaea* 'Noodle Ladle'.

### *Dionaea* 'Fused Tooth'

Submitted: 12 April 2004

This *Dionaea* cultivar has been described by Peter D'Amato (1998) on page 66 of his book, but no photographic standard was ever been supplied to complete the registration. I am supplying these photographs to complete the registration process. The photographs show how *Dionaea* 'Fused Tooth' may change greatly in appearance—during the winter it looks much like a normal *Dionaea*, but during summer growth its strange fused-tooth nature becomes apparent (see Figure 1, p101). I was the creator of both flytrap cultivars *Dionaea* 'Fused Tooth' (in 1990) and *Dionaea* 'Sawtooth' (in 1989).

#### References:

D'Amato, P. 1998. *The Savage Garden*, Ten Speed Press, Berkeley, California, 314 p.

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### *Dionaea* 'Louchâpâtes' (*Dionaea* 'Noodle Ladle')

Submitted: 13 August 2003

In 2000, I acquired a batch of *Dionaea muscipula* 'Fused Tooth', a cultivar that is distinguished by having very wide marginal teeth, each of which is formed by the fusion of three or four marginal spines. This peculiarity is very variable and the details of how it is manifested depends upon a number of variables, especially the season and the specific clone; the fusion usually occurs only on the traps formed during the middle and the end of the season (although it sometimes occurs on traps formed at the start of the season).

Growing within this batch of plants was a small individual that differed from the others by a regular fusion of only a few spines into each of its teeth. The result was that each tooth was about 2 mm wide and was flattened in cross section, in contrast with the normal capillary nature of typical *Dionaea* plants. The tips of the teeth on this peculiar plant are often multiply divided, revealing the fused nature of the teeth (see Figure 2). The teeth are oriented normally, unlike the distorted positioning as is often observed with *Dionaea* 'Fused Tooth'. Because of the many flattened teeth of the cultivar, I am giving this plant the name *Dionaea muscipula* 'Louchâpâtes'; the cultivar epithet can be translated to English as 'Noodle Ladle'. This name is fitting since it describes the culinary tool of the same shape that is used for serving spaghetti noodles. (Those who cannot speak French accurately can approximate the pronunciation of the cultivar epithet as "LOOSH-ah-PATT".)

Another peculiarity with *Dionaea* 'Louchâpâtes' is exhibited near the apex of the trap, opposite the petiole. In normal specimens of *Dionaea*, this region of the leaf lobe margins lacks spines. But in *Dionaea* 'Louchâpâtes', marginal teeth are present on both lobes, all the way to the midpoint of the two lobe margins (see Figure 1, top right inset). This feature is also seen in *Dionaea* 'Cupped Trap', although that cultivar has traps that are cupped like a spoon.

After three years of cultivation, *Dionaea* 'Louchâpâtes' has undergone normal dormancies and has been propagated vegetatively. The progeny are showing the same features as the parent plant.

This cultivar is not a member of the *Dionaea* Dentate Traps Group since its teeth originate from a fusion of multiple marginal spines, and are not short and triangular.

—ROMUALD ANFRAIX • 234 F bd de la duchere • 69009 Lyon • France • a.romuald@laposte.net

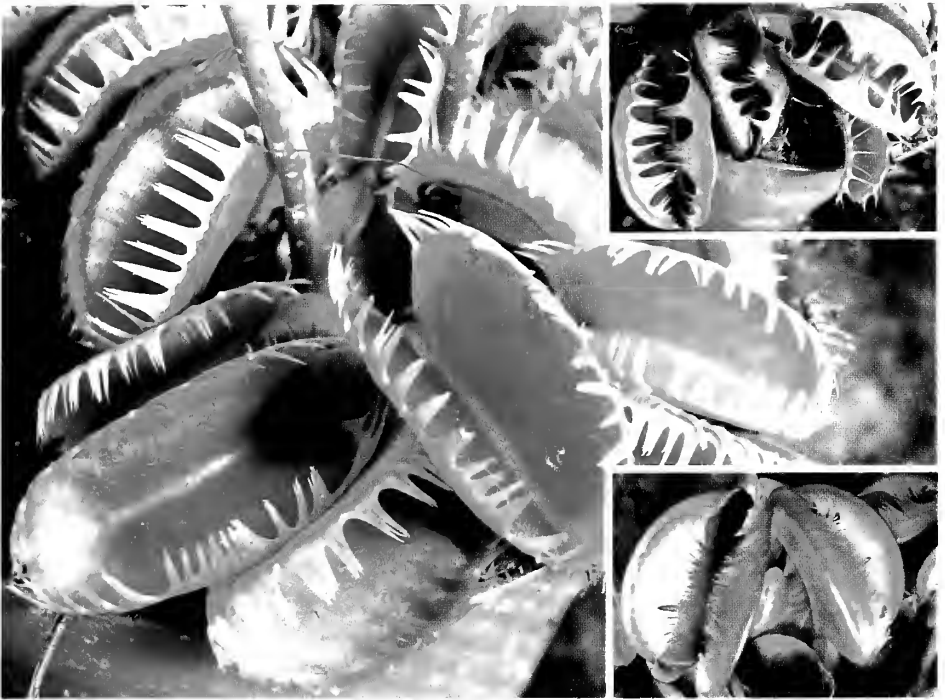


Figure 1: *Dionaea* 'Fused Tooth'. Photographs by Thomas Carow.

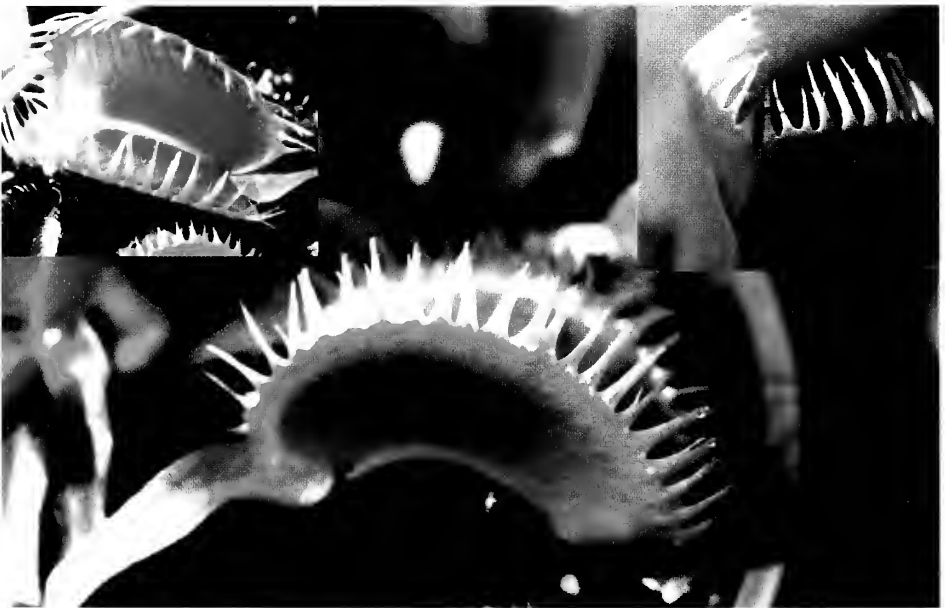


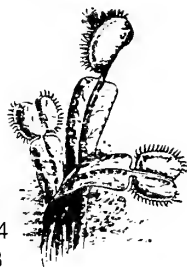
Figure 2: *Dionaea* 'Louchâpâtes', also known as *Dionaea* 'Noodle Ladle'. Photographs by Romuald Anfraix.

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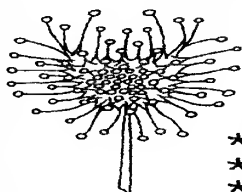
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# CONTRIBUTION TO THE CYTOTAXONOMICAL KNOWLEDGE OF THE GENUS *PINGUICULA* L. (LENTIBULARIACEAE): A SYNTHESIS OF KARYOLOGICAL DATA

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Keywords: genetics: *Pinguicula*.

This paper aims to summarize and briefly analyse the actual karyological knowledge of the genus *Pinguicula* L.

The checklist presented (Table 1) shows all the species of this genus, which have been karyologically studied, in alphabetical order. There are 129 records referring to 35 taxa (30 species and 5 infraspecific taxa). The total of different chromosome counts (considering two or more cytotypes for some units) is 47. The basic numbers are  $\times = 6, 8, 9, 11$  (Table 2).

Examining the data in Figure 1 indicates that 14 taxa (31.8%) show  $2\times$  complement of which 12 are exclusively diploid ( $2n = 12, 16, 18, 22$ ); 3 taxa (4.6%) show  $3\times$  complement of which none is exclusively triploid ( $2n = 24$ ); 20 taxa (45.4%) show  $4\times$  complement of which 14 are exclusively tetraploid ( $2n = 32, 44$ ); 3 taxa (6.8%) show  $6\times$  complement of which 2 are exclusively hexaploid ( $2n = 48$ ); 3 taxa (6.8%) show  $8\times$  octoploid complement of which 1 is exclusively octoploid ( $2n = 64$ ); 3 taxa (4.6%) show aneuploidy of which none is exclusively aneuploid ( $2n = 27, 28, 50$ ). Furthermore, 34.3% of the considered taxa are diploid, 42.8% tetraploid, 5.7% hexaploid, 2.9% octoploid, 14.3% show two or more cytotypes (representing more or less completely euploid series) or possibility of aneuploidy phenomena.

By comparing the karyological data with the systematic ones synthesized in a recent survey of the genus made by Legendre (2000), we can observe that all the representatives at the base of the tree of the karyological relationships (Figure 2) are characterized by homophylly. The subgenus *Isoloba* is here regarded as probably the most primitive and homogeneous, and is composed of homophyllous species showing tropical growth-type. All the representatives of the subgenus *Temnoceras* show homophylly and the tendency to develop a temperate growth-type together with the polyploidy. The representatives of the subgenus *Pinguicula* show both homophylly and heterophylly and, in the large majority, a temperate growth-type.

A group of species with a neo-basic number  $\times = 11$ , probably derived from triploid ancestors (cf. Figure 2), deserves particular attention. Flowing together in this group are two homophyllous representatives with tropical growth-type from the subgenus *Isoloba*, and the four heterophyllous representatives with tropical growth-type from subgenus *Pinguicula* section *Orcheosantlus* (Legendre, 2000).

Unfortunately the karyological knowledge of the genus *Pinguicula* is still partial (only 41.2% of the accepted spontaneous taxa have been studied) and this does not allow us to draw definitive conclusions. As such, to increase the depth of understanding of the cytological knowledge of the genus, it would be very interesting to verify if the peculiar group with  $\times = 11$  continues to maintain the characteristics of isolation from other groups. In this case probably this complex would deserve to be separated in some way from others.

The species with lower chromosome number, and probably the most primitive, is *P. lusitanica*,  $2n = 12$ .

The polyploidy is a phenomenon independently evolved in the three subgenera. The aneuploidy is generally ascendant, and it involves two or three couples of chromosomes.

*Pinguicula crystallina* is confirmed to be the species in absolute more variable from a cytological point of view, and moreover most of the variability is represented in *Pinguicula crystallina* subsp. *liriflora*.

*Pinguicula balcanica* seems to have two basic numbers (Table 1): this suggests an accurate systematic review of this species, aimed to clarify if this karyological variability is linked to some misidentification or to the union of more taxa under this species.

Table 1: Updated synthesis of karyological data for the genus *Pinguicula* L. (Lentibulariaceae). Nomenclature is according to Schlauer (2002); names originally used by the authors are kept in square parenthesis.

species	infraspecific taxa	chromosome number	source of material	Authors	
1 <i>P. alpina</i> L.		2n = 32	Scandinavia	Löve & Löve, 1944	
			France	Doulat, 1947 Zurzycki, 1953	
			Iceland	Löve & Löve, 1956	
			USA	Wood & Godfrey, 1957	
			Poland	Skalinska et al., 1959	
			Russia	Sokolovskaja & Strelkova, 1960	
			Austria	Casper, 1962 Casper, 1963a	
			Finland	Sorsa, 1963	
			Norway	Laane, 1965 Casper, 1966	
			East Sayan	Krogulevich, 1976	
			Slovakia	Murin, 1976 Krogulevich, 1978	
			Mongolia	Murin et al., 1980	
			Austria	Dobes et al., 1997	
	2 <i>P. balcanica</i> Casper			2n = 24	Greece
		2n = 32	Bulgaria	Casper, 1966	
		2n = 44		Heitz, 1926	
			USA	Wood & Godfrey, 1957 Kondo, 1969	
3 <i>P. caerulea</i> Walt.		2n = 32	USA	Godfrey & Stripling, 1961 Casper, 1963a Kondo, 1969	
4 <i>P. colimensis</i> McVaugh & Mickel		2n = 22		Kondo, 1969	
5 <i>P. corsica</i> Bernard et Gren ex Gren et Godr.		2n = 16	Corse	Contandriopoulos, 1957	
			Corse	Favarger & Contandriopoulos,	
			Corse	Contandriopoulos, 1962	
			Corse	Casper, 1963a	
6 <i>P. crenatiloba</i> A. DC.		2n = 16		Casper, 1963a	
7 <i>P. crystallina</i> Sibth. subsp. <i>crystallina</i> et Smith		2n = 24	Turkey	Contandriopoulos & Quezel, 1974	
		2n = 28	Cyprus	Mikeladze & Casper, 1997	
		2n = 16	Italy	Honsell, 1959 Casper, 1962 Casper, 1963a	
				Greece	Contandriopoulos & Quezel, 1974
				Greece	Contandriopoulos & Quezel, 1974
	subsp. <i>hirtiflora</i> (Ten.) A. Strid				
	[var. <i>louisii</i> (Markgraf) Ernst]	2n = 24	Greece	Contandriopoulos & Quezel, 1974	



Table 1 (continued)

		2n = 27	Greece	Strid & Franzen, 1981
			Italy	Peruzzi <i>et al.</i> , 2003
		2n = 28	Italy	Mikeladze & Casper, 1997
	[var. <i>gionae</i> Contandriopoulos et Quezel]	2n = 32	Greece	Contandriopoulos & Quezel, 1974
	[var. <i>megaspilaea</i> (Boiss. et Heldr.) Schindler]	2n = 48	Greece	Contandriopoulos & Quezel, 1974
8	<i>P. ehlersiae</i> Speta & Fuchs	2n = 32	Mexico	Speta & Fuchs, 1982
9	<i>P. esseriana</i> B. Kirchner	2n = 32	Mexico	Speta & Fuchs, 1982
10	<i>P. grandiflora</i> Lam. subsp. <i>grandiflora</i>	2n = 32	France	Doulat, 1947
				Contandriopoulos, 1962
				Casper, 1963a
			Spain	Zamora <i>et al.</i> , 1996
	[ <i>P. reuteri</i> Genty]	2n = 32		Contandriopoulos, 1962
		2n = 64	USA	Wood & Godfrey, 1957
	subsp. <i>rosea</i> (Mutel) Casper	2n = 32		Contandriopoulos, 1962
11	<i>P. gypsicola</i> T. S. Brandege	2n = 22		Casper, 1963a
				Kondo, 1969
12	<i>P. ionantha</i> R. K. Godfrey	2n = 22	USA	Godfrey & Stripling, 1961
				Casper, 1963a
13	<i>P. leptoceras</i> Reichb.	2n = 32		Contandriopoulos, 1962
			Austria	Casper, 1962
14	<i>P. longifolia</i> Ram. ex DC.	2n = 32	France	Doulat, 1947
				Casper, 1962
				Casper, 1963a
			Spain	Zamora <i>et al.</i> , 1996
	subsp. <i>dertosensis</i> (Cañigueral) Schlauer <sup>1</sup>	2n = 48	Spain	Zamora <i>et al.</i> , 1996
	subsp. <i>reichenbachiana</i> (Schindler) Casper	2n = 32	France	Casper, 1962
	[ <i>P. fiorii</i> Tamarro et Pace]		Italy	Tamarro & Pace, 1987
15	<i>P. lusitanica</i> L.	2n = 12	France	Contandriopoulos, 1962
				Casper, 1963a
				Kondo, 1969
			France	Schotsman, 1970
			British Islands	Hollingsworth <i>et al.</i> , 1992
16	<i>P. lutea</i> Walt.	2n = 32	USA	Godfrey & Stripling, 1961
				Casper, 1963a
				Kondo, 1969
17	<i>P. macroceras</i> Link <sup>2</sup> subsp. <i>macroceras</i>	2n = 64	Japan	Uchiyama, 1990
18	<i>P. moranensis</i> H. B. et K.			Kondo, 1969
	[ <i>P. caudata</i> Schlecht.]	2n = 22		
		2n = 44		Casper, 1963a
19	<i>P. mundi</i> G. Blanca, M. Jamilena, M. Ruiz-Rejón & R. Zamora	2n = 48	Spain	Zamora <i>et al.</i> , 1996
20	<i>P. nevadensis</i> (Lindbg.) Casper	2n = 16	Spain	Zamora <i>et al.</i> , 1996

Table 1 (continued)

21	<i>P. planifolia</i> Chapm.		$2n = 32$	USA	Godfrey & Stripling, 1961 Casper, 1963a USA Kondo, 1973
22	<i>P. primuliflora</i> C. E. Wood et Godfrey		$2n = 32$	USA	Godfrey & Stripling, 1961 Casper, 1963a
23	<i>P. pumila</i> Michx.		$2n = 22$	USA	Godfrey & Stripling, 1961 Casper, 1963a
24	<i>P. ramosa</i> Miyoshi ex Yatabe		$2n = 18$	Japan	Yoshimura, 1973
25	<i>P. sharpii</i> Casper et K. Kondo		$2n = 16$	Mexico	Casper & Kondo, 1977
26	<i>P. vallisneriifolia</i> Webb <sup>2</sup>		$2n = 32$	Spain	Löve & Kjellqvist, 1974 Spain Zamora <i>et al.</i> , 1996
27	<i>P. variegata</i> Turcz.		$2n = 64$	Russia	Zhukova & Tikhonova, 1971
28	<i>P. villosa</i> L.		$2n = 16$	Norway	Knaben, 1950
				USA	Wood & Godfrey, 1957
			$2n = 16$		Casper, 1963a
				Russia	Zhukova, 1967
				Russia	Sokolovskaya, 1968
				Canada	Löve & Löve, 1982
29	<i>P. vulgaris</i> L.	[ <i>P. bohemica</i> Krajina]	$2n=32$	Czech Republic	Studnicka, 1989
		[ <i>P. bohemica</i> Krajina]		Czech Republic	Studnicka, 1992
			$2n = 50$		Rosenberg, 1909 Tischler, 1934
			$2n = 64$	Scandinavia	Löve & Löve, 1944
				France	Doulat, 1947
				Iceland	Löve & Löve, 1948 Zurzycki, 1953
				Iceland	Löve & Löve, 1956
				USA	Wood & Godfrey, 1957
				Greenland	Jørgensen <i>et al.</i> , 1958
				Poland	Skalinska <i>et al.</i> , 1959 Sokolovskaja & Strelkova, 1960 Casper, 1962
				Austria	Casper, 1963a
					Lövkist, 1963
				Denmark	Larsen, 1965 Casper, 1966
				Finland	Laane, 1967 Fedorov, 1969
				Norway	Laane, 1969
				Russia	Sokolovskaya, 1972

Table 1 (continued)

	Canada	Löve & Löve, 1982 Krahulcová & Jarolimová, 1991 Krahulcová & Jarolimová, 1991 Zurzycki, 1953
[ <i>P. bohémica</i> Krajina] [ <i>P. bicolor</i> (Nordst. ex Fries) Woloszczák]		
30 <i>P. zecheri</i> Speta & Fuchs	2n = 22	Mexico Speta & Fuchs, 1982

## Notes:

<sup>1</sup>Published under the name *Pinguicula submediterranea* G.Blanca, M.Jamilena, M.Ruiz-Rejón & R.Zamora, see Blanca (2001).

<sup>2</sup>Steiger (1974) published 2n = 16 for *P. vallisneriifolia* and 2n = 32 for *P. macroceras* subsp. *nortensis* J. Steiger ex J. Steiger & H. Rondeau. These chromosome counts proved to be wrong due to misinterpretation of the chromosome shapes. In reality, *P. vallisneriifolia* has 2n = 32 and *P. macroceras* subsp. *nortensis* 2n = 64 (Steiger J., pers. comm.).

Table 2: Ploidy levels in *Pinguicula* L.

diploids × = 6	diploids × = 8	diploids × = 9	diploids × = 11	uncertain categorization
<i>P. lusitana</i>	<i>P. corsica</i>	<i>P. rauosa</i>	<i>P. colimensis</i>	<i>P. balcanica</i>
	<i>P. crenatiloba</i>		<i>P. gypsicola</i>	
	<i>P. nevadensis</i>		<i>P. ionantha</i>	
	<i>P. sharpii</i>		<i>P. puuila</i>	
	<u><i>P. villosa</i></u>		<u><i>P. zecheri</i></u>	
	tetraploids (4×)		euploid series	
	<i>P. alpina</i>		<i>P. notataensis</i>	
	<i>P. caerulea</i>			
	<i>P. eltersiae</i>			
	<i>P. esseriana</i>			
	<i>P. grandiflora</i> subsp. <i>rosea</i>			
	<i>P. leptoceras</i>			
	<i>P. longifolia</i> subsp. <i>longifolia</i>			
	<i>P. longifolia</i> subsp. <i>reicheubachtiana</i>			
	<i>P. lutea</i>			
	<i>P. macroceras</i> subsp. <i>nortensis</i>			
	<i>P. macroceras</i> subsp. <i>macroceras</i>			
	<i>P. plauifolia</i>			
	<i>P. primuliflora</i>			
	<u><i>P. vallisneriifolia</i></u>			
	hexaploids (6×)			
	<i>P. longifolia</i> subsp. <i>dertosensis</i>			
	<u><i>P. mundi</i></u>			
	octoploids (8×)			
	<u><i>P. variegata</i></u>			
	euploid series			
	<i>P. crystallina</i>			
	<i>P. grandiflora</i> subsp. <i>grandiflora</i>			
	<i>P. vulgaris</i>			

## Ploidy level in the species considered

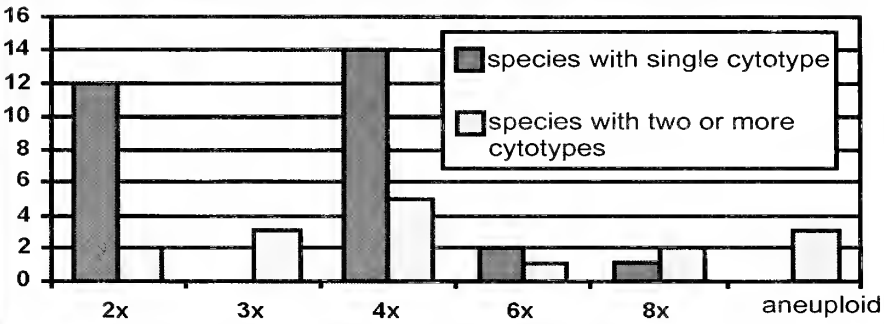


Figure 1: Number of species for every ploidy level, subdivided in species having single cytotypes and species having two or more cytotypes.

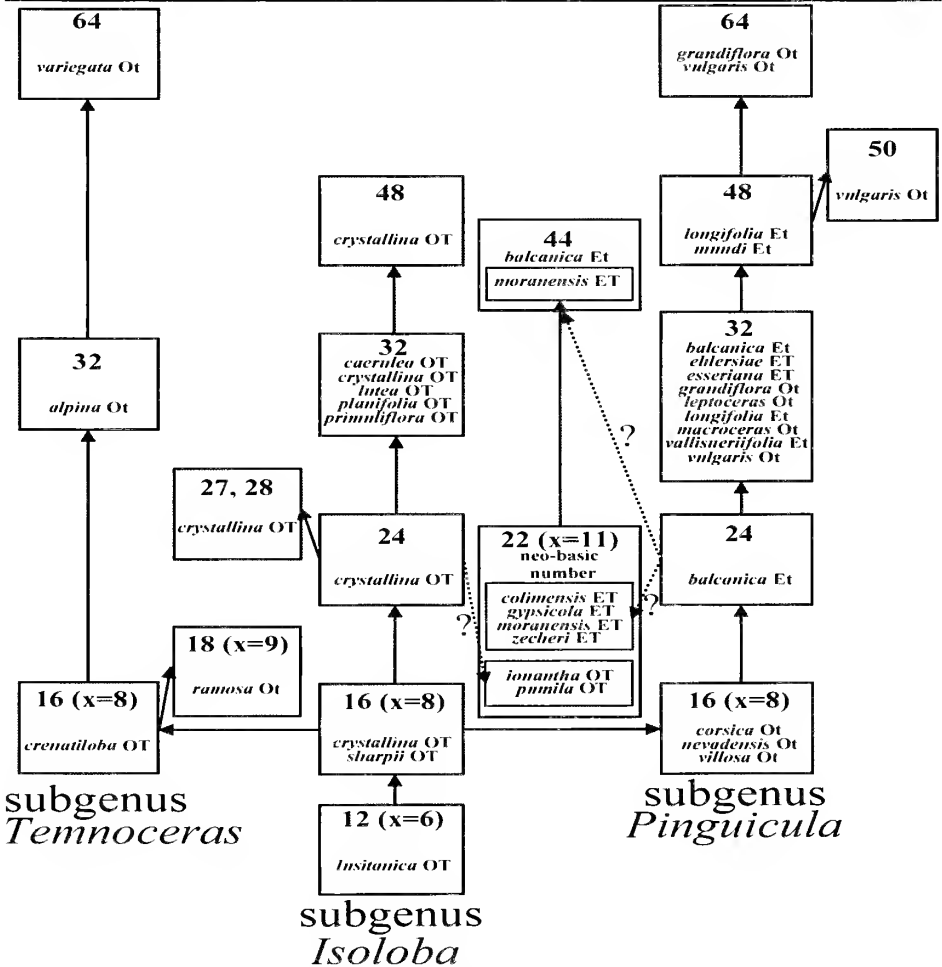


Figure 2: Karyological relationships of the studied taxa of *Pinguicula*. All the known chromosome numbers are organized in a tree subdivided by subgenera. Only specific epithets are cited. OT = homophyllous with tropical growth-type; Ot = homophyllous with temperate growth-type; ET = heterophyllous with tropical growth-type; Et = heterophyllous with temperate growth-type. Extra-karyological information follows Legendre (2000).

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*HELIAMPHORA ELONGATA* (SARRACENIACEAE),  
A NEW SPECIES FROM ILU-TEPUI

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Introduction

Even today, Ilu-tepui remains very poorly explored due to its difficult access. The only way to reach its top is by helicopter. During two expeditions to Ilu-tepui I studied a new species of *Heliamphora* with characteristic elongated pitchers. The first expedition was made in October 1999 to the northeast part of Ilu-tepui (the expedition team consisted of Nerz, Hinderhofer & Carow), the second one was made in March 2004 to the south part of Ilu-tepui (the expedition team consisted of Nerz, Zimmermann & Hoogenstrijd). The mentioned species was photographed and illustrated as an unidentified species for the first time by Charles Brewer-Carias in 1977 (Brewer-Carias, 1987). On an expedition reported by Bill Baumgartl (1993), this species was observed, but identified incorrectly as *Heliamphora ionasii* because at that time, *Heliamphora ionasii* was the only described species from Ilu-tepui. In this paper, I describe this new species, and name it *Heliamphora elongata*. Also occurring on Ilu-tepui is the well known species *Heliamphora ionasii*, and in Table 1 I describe the differences between these two species and also with *Heliamphora nutans* (which seems to be the species most closely related to *Heliamphora elongata*).

While I have only observed *Heliamphora elongata* on Ilu-tepui, it has also been detected at the top of Tramen-tepui nearby (Gert Hoogenstrijd, pers. comm.). This species is a good example of speciation that occurs on the isolated sandstone-plateaus of the Guyana highlands. The tepui plateaus are highly isolated from each other. Steep cliffs and different climatic conditions between the plateaus and the surrounding area make it very difficult or impossible for plant species to spread from one tepui to another (George, 1988). Over time, each tepui has developed a high degree of endemic species. Even on closely situated tepuis, different species can be found. Such is the case with the restricted range of *Heliamphora elongata*.

*Heliamphora elongata* Nerz spec. nov.

*Caudex ramosus, foliis caulescentibus vel rosulatis; antheris 20-32 cm longis, infra medio anguste ventricosis, supra anguste tubulatis, orificiis infundibuliformibus; parallele plurinerviis et transversim reticulato-venosis, extus glabris, parte superiore interiore dense ciliatis intus dense strigosis pilis albis reflexis; appendice apicali cucullata, suborbiculari, 1-1.5 cm longa, 1-1.3 cm lato, basi constricta; inflorescentiis 2-5-floris, racemosis, ad 50 cm longis; flores nutantes, pedicellis 1.5-3.5 cm longis, petalis 4 oblongo-lanceolatis, albidis vel rutilis, 3-5 cm longis; staminibus 11-19, 1-serialibus, filamentis 5 mm longis; ovario valde tomentoso; stylo glabro; stigmata 3 lobata; seminibus fuscis, oblongis, ca. 3 mm longis, testa conspicue membranaceo-alata.*

Herbaceous perennial; rhizomes branching, plants forming dense clumps. Pitchers narrowly ventricose in the lower half, narrowly cylindrical in the upper half, 20-32 cm long, infundibulate in the upper part, mouth 3.5-4 cm wide, ovate. External surface of the pitcher glabrous, inner surface in the upper half with tiny white hairs, in the lower half glabrous, at the base with some coarse hairs; older pitchers dark red, younger pitchers shiny red, rarely green. Lid helmet-shaped, on an elongated neck, 1-3 cm wide, 1.0-2.8 cm long, dark red to almost black. Inflorescence up to 50 cm long, 2-5 flowers, peduncle glabrous, pedicels 1.5-3.5 cm long, bracts ovate with a filiform appendix, bearing rudimentary pitchers, 3-4 cm long, at the upper flowers only 1 cm long. Tepals 4, narrowly oblong-lanceolate, 3-5 cm long, 1.5-1.8 cm wide, white to reddish. Stamens 11-19 in one series, filaments 5 mm long, anthers oblong-lanceolate, approximately 3 mm long, 1 mm wide; ovary 3-celled, 2 cm long, pubescent, style glabrous, seed approximately 3 mm long, compressed, ovate, irregularly winged.



Figure 1: A cluster of *Heliamphora elongata* pitchers.





Figure 2: Flowers of *Heliamphora elongata*. Figure 3: Two *Heliamphora elongata* pitchers.



Figure 4: Colony of *Heliamphora elongata* at Ilu-tepui.

## Specimens Examined

- Heliamphora elongata*: Ilu-tepui S, 09.10.2004 Nerz No. H11u/04/1, flowering plant (Ven)(Holotype)  
*Heliamphora elongata*: Ilu-tepui S, 09.10.2004 Nerz No. H11u/04/2, flowering plant (NY)(Isotype)  
*Heliamphora elongata*: Ilu-tepui S, 09.10.2004 Nerz No. H11u/04/3, sterile plant (Ven)  
*Heliamphora elongata*: Ilu-tepui, Feb. 1977 F. Delascio & Ch. Brewer No. 4967, flowering plant (Ven)  
*Heliamphora elongata*: Ilu-tepui, 15.04.1988 Ronald Liesner No. 23356, sterile plant (Ven)  
*Heliamphora elongata*: Ilu-tepui, 15.04.1988 Ronald Liesner No. 23381, flowering plant (Ven)  
*Heliamphora elongata*: Ilu-tepui N, 09.10.1999 Nerz No. H11u/99/1, pitcher and flower (Ven)  
*Heliamphora elongata*: Ilu-tepui N, 09.10.1999 Nerz No. H11u/99/2, pitcher and flower (NY)  
*Heliamphora elongata*: Ilu-tepui N, 09.10.1999 Nerz No. H11u/99/3, large pitcher (Ven)  
*Heliamphora elongata*: Ilu-tepui N, 09.10.1999 Nerz No. H11u/99/4, flowers, seed capsule and seed (Ven)

## Distribution and Ecology

*Heliamphora elongata* is only known from Ilu-tepui and the nearby Tramen-tepui (Hoogenstrijd, pers. comm.). It is a common species there, and grows in small bogs.

The plateau of Ilu-tepui is at an altitude of approximately 2600 m; the surface usually consists of bare rock, and in the southern part there are many fissures. The vegetation there is very sparse because the heavy rains wash most of the substrate off the plateau, and because the climate is very cool, misty, and rainy. *Heliamphora elongata* survives in these difficult conditions by growing usually in small depressions where substrate can accumulate. Other plants that occur with it include typical tepui species from the genera *Stegolepis*, *Xyris*, *Orectanthe*, and *Bonnetia*. Carnivorous plants such as *Drosera roraimae*, *Genlisea roraimensis*, *Utricularia quelchii*, and *Utricularia amethystina* are also common, due to the restricted nutrient availability in the soil.

*Heliamphora elongata* grows very slowly, and only the most recently-formed 2-3 pitchers of each growing tip are alive; these are surrounded by many (usually 5-7) dead, persistent pitchers. This is the case even when the plants grow in large colonies. It seems that the soils are so nutrient-poor that the plants cannot maintain more than two or three pitchers alive at the same time. The old and dying pitchers may protect the living parts of the plant from mechanical damage from wind and rain. The bold red coloration of the pitchers protect it from the intense UV-radiation at these exposed, high elevation habitats. Although the conditions are very wet at the tops of the tepuis, the weather changes quickly, and it can quickly become dry and the intense sunlight can result in desiccation. The elongated pitchers, with a small opening at the top, would be very effective at retaining water with minimal evaporation. It is remarkable that so few insects were found in the pitchers, however insects are quite rare at the tops of tepuis.

## Relationship to Other Species

Ilu-tepui is part of a group of tepuis in the southeast part of the Gran Sabana. One of these tepuis is the famous Roraima-tepui, and is where *Heliamphora nutans* (Bentham, 1840) can be found. This species is the closest relative of *Heliamphora elongata*. Due to the isolation of these tepuis, a clearly separated species with specific characteristics developed on Ilu- and Tramen-tepui. The most obvious characteristics of *Heliamphora elongata* are the vertically elongated pitchers, the size of the pitchers, and the large, black lids. *Heliamphora ionasii* also occurs on Ilu-tepui, and can bear very large pitchers (Maguire, 1978). *Heliamphora ionasii* is clearly different from *Heliamphora elongata* (see Table 1). Bassett Maguire described it in 1978, and a spectacular photo of this species was published by Mazrimas (1979).

*Heliamphora elongata* has caused much confusion for those attempting to identify it. In herbarium collections (Delascio & Brewer, 1977, No. 4967 (Ven); Liesner, 1988, No. 23356 (Ven); 1988, No. 23381 (Ven) and in the literature (Baumgartl, 1993) specimens have been incorrectly determined as *Heliamphora heterodoxa* var. *heterodoxa*, *H. cf. minor*, *H. mutans*, or *H. ionasii*. The differences between *Heliamphora nutans* and *H. ionasii* are given in Table 1. *Heliamphora minor* has very short pitchers. *Heliamphora heterodoxa* var. *heterodoxa* can no longer be excusably confused with *Heliamphora elongata* because the pitcher and flower characteristics are quite different.

	<i>H. elongata</i>	<i>H. mutans</i>	<i>H. ionasii</i>
Pitcher			
Dimensions	20-32 cm long 3-3.5 cm wide	8-18 cm long 2-6 cm wide	15-50 cm long 5-15 cm wide
Shape	Narrowly ventricose in the lower part, narrowly cylindrical in the upper half, growing vertical from the ground	Ventricose in the lower part, infundibuliform in the upper part, at the base bent to the middle	Ventricose in the lower part, highly expanded in the upper part, at the base bent to the middle
Lid			
Dimensions	1-3 cm long 1-2.8 cm wide	0.5-1 cm long 0.5-1 cm wide	0.8-1.8 cm long 1-2.5 cm wide
Shape	Helmet-shaped, bent nearly horizontal over the lid	Cordate to helmet-shaped, nearly vertical	Cordate, curved
Inflorescence			
Dimensions	Peduncle 30-50 cm long Pedicels 1.5-3.5 cm long	Peduncle 25-60 cm long Pedicels 2-4 cm long	Peduncle ~100 cm long Pedicels 5-12 cm long
Number of flowers per scape	2-5	2-5	2-10
Tepals			
Dimensions	3-5 cm long 1.5-1.8 cm wide	3-5 cm long 1-1.2 cm wide	3.5-6 cm long 2.5-3 cm wide
Shape	Narrowly oblong-lanceolate	Lanceolate, broad base	Lanceolate, broad base
Anthers/ Stamens			
Dimensions	3 mm long	2.5 mm long	3.5 mm long
Number	11-19	19-24	15-20

Table 1: Comparison between *H. elongata*, *H. mutans* and *H. ionasii*.

### Hybrids

At a highland meadow close to Ilu-tepui, we observed (during the 2004 expedition) a population of *Heliamphora ionasii* and also specimens with characteristics intermediate between *Heliamphora elongata* and *Heliamphora ionasii*. It is likely that these specimens represent hybrids between these two species because *Heliamphora elongata* occurs relatively nearby.

### Etymology

The species name "*elongata*" (elongated) was chosen due to the elongated pitchers, which are quite unusual for species of *Heliamphora* of the eastern tepuis

### Discussion

The Guyana Highlands region is a hotspot for evolution (George, 1988; Steyermark, *et al.*, 1995). Due to the local and climatic isolation of the tepuis, an enormous degree of endemic species have developed over millions of years. In many species, it is obvious that they derive from the same ancestor. The populations of *Heliamphora minor* are in such a process of differentiation. The populations of this species on Auyan-tepui bear very fine, white hairs on the inner surface of the pitchers; meanwhile, the populations on the nearby Chimanta-tepui and Aprada-tepui have very coarse hairs at the inner surface of their pitchers. Also, other details such as the nature of the seedling pitchers are consistently different in these distinct populations. Another example of species differentiation in the genus *Heliamphora* can be observed in *Heliamphora heterodoxa* from the area of Ptari-tepui vs. *Heliamphora folliculata* from the Tres Testigos-group (Wistuba, *et al.*, 2001). While the distance between Ptari-tepui and the Tres Testigos is less than 50 km, they are separated by vast savannahs, so in both areas evolution proceeded independently. *Heliamphora heterodoxa* and *Heliamphora folliculata*

*lata* are obviously related (especially when we are comparing the specimens from the top of these tepuis), but they have clearly differentiated to become distinct species. At the Roraima-group of tepuis, the speciation of *Heliamphora* is similar. Each tepui is isolated by deep valleys that are covered with dense forest or savannahs which make it nearly impossible for *Heliamphora* species to migrate from one tepui to another. Three different species are now known to have developed at the Roraima-group of tepuis: *Heliamphora nutans*, known from Roraima-tepui, Kukenan-tepui and Yuruani-tepui; *Heliamphora ionasii*, known mainly from the northern slopes of Ilu-tepui; and *Heliamphora elongata*, currently only known from Ilu-tepui and Tramen-tepui. At the foothills of Tramen-tepui exist another dubious *Heliamphora* population, which seems to be closely related or identical with *Heliamphora nutans*.

Several years ago, botanists had the opinion that there existed two "groups" of *Heliamphora* species. In the western part of the range, where the tepuis are more tropical, only species with elongated pitchers could be found, such as *Heliamphora tatei* and *Heliamphora tatei* var. *neblinae*. These species are adapted to the taller vegetation in this area (Gleason, 1931; Maguire, 1978). In the eastern range of tepuis, species with relatively short pitchers were found, that are adapted to more open habitats. These species include *Heliamphora minor*, *Heliamphora nutans*, *Heliamphora heterodoxa*, and *Heliamphora ionasii*. In recent years, new species of *Heliamphora* have been discovered (Nerz & Wistuba, 2000), which show that there is no strict borderline between *Heliamphora* species from the western tepuis and eastern tepuis. First, a *Heliamphora* species with very short pitchers was found on a western tepui (Cerro Neblina): *Heliamphora hispida*. This shows that species with short pitchers are able to grow on tepuis with relatively tall vegetation. Second, a species with elongated pitchers has now been discovered among the eastern tepuis: *Heliamphora elongata*. It is interesting that *Heliamphora elongata* grows in quite low vegetation. Another new eastern species with relatively long pitchers is *Heliamphora chimantensis*; this species grows in wet highland-meadows on Chimantá-tepui (Wistuba *et al.*, 2002).

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## NEWS AND VIEWS

Guenter Seiter (guenter.seiter@knorr-bremse.com) writes: The International Pollen Agency for *Nepenthes*, a product of the German Carnivorous Plant Society (GFP), has now opened its doors.

Please visit the site at <http://pollen.carnivoren.org> and register. The aim of the International Agency is to provide private persons, companies and institutions with the possibility to find the right partner plant for their flowering *Nepenthes*. The purpose is to facilitate the exchange of pollen of different *Nepenthes* species and hybrids; on the one hand, to protect the plants in their natural habitat and, on the other hand, to make it easier for both hobbyists and professional growers to obtain seeds for their collections and for propagation.

James Cokendolpher (cokendolpher@aol.com) sent us a press release from the US Fish and Wildlife Service. Extracts follow: "George Norris, 66, a resident of Spring, Texas, pled guilty in Miami federal District Court in connection with a conspiracy to smuggle into the United States protected orchid specimens, including specimens of the genus *Phragmipedium*. All orchid species are protected under the CITES. In addition to pleading guilty to the conspiracy charge, Norris pled guilty to six additional criminal charges related to the smuggling of orchid specimens into the United States for sale and admitted to a forfeiture provision in the Indictment which asserts that the orchids or their substitute value is properly forfeitable as part of the action.

"Under federal sentencing guidelines, Norris may receive up to a five-year term of imprisonment and a possible fine of up to the greater of \$250,000 or twice the gain or loss from his relevant conduct, for each of the seven Counts. Norris' co-defendant, Manuel Arias Silva of Lima, Peru, previously entered guilty pleas to two counts of the Indictment and is awaiting sentencing on the charges.

"Arias made several shipments of orchids to his co-conspirator, George Norris, of Spring, Texas, between January of 1999 and October of 2003. Arias would obtain a CITES permit for the shipment from Peruvian authorities, authorizing the export of certain numbers of artificially-propagated specimens of particular species of orchids. Arias would then include in the shipment specimens of species not included on the CITES permit. Norris and Arias admitted by their pleas that to conceal their illegal activity, they would falsely label the protected species as a species included on the permit. Arias would provide Norris a code or "key" that would provide a means for deciphering the false labels and identifying the true species of the orchids. Special Agents of the U.S. Fish and Wildlife Service led the investigation, and were assisted by the Department of Homeland Security, Customs and Border Protection Service and the Department of Agriculture. The case is being prosecuted by the U.S. Attorney's Office, Southern District of Florida as well as the Environmental Crimes Section of the Department of Justice."

This CPN editor (BR) reminds ICPS members that many species of carnivorous plants, including members of *Nepenthes* and *Sarracenia*, are also under the jurisdiction of CITES!

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## LOOKING BACK: CPN 25 YEARS AGO

Retro: Bill Carroll provided a recipe for growing *Pinguicula lutea* from seed: The soil mix is two parts brown fibrous peat moss and one part vermiculite. For sowing seeds, this mix is moistened using one-fourth teaspoon of Mir-Acid (obtainable in garden supply stores) per quart of water. When transplanting, up to one-half teaspoonful of Mir-Acid may be used per quart....He fills the flats half full of water and refills only when empty of water but before the soil mix dries out....He has found that Mir-Acid at the above rates of dilution does wonders for sundews, flytraps and pitcher plants as well as *P. lutea*.

## SPECIAL REVIEW: *NEPENTHES INERMIS* MODEL

Reviewed by Barry Rice



Here is something a little off the beaten path. Josh Cook has created a 1:1 model kit of *Nepenthes inermis*. This model is made out of resin, and is intended to represent the pitcher and attaching tendril of this remarkable plant.

The model consists of four parts—the pitcher, the narrow lid, a small base, and a wire post that attaches the base to the bottom of the pitcher. You must attach the lid to the pitcher. In order to finish this model, you will require glue, putty, sanding material, and a suitable set of model paints to transform the off-white model into a more attractive and botanically accurate light green. The model is accompanied by some information about *Nepenthes inermis*.

If you like carnivorous plants and are also adept at painting models, this model is for you. It is priced at US\$14.99 within the USA, US\$19.99 elsewhere. Josh tells me that he has at least more carnivorous plant models in development (including *Nepenthes lowii*, *N. clipeata*, *N. rajah*, *Utricularia gibba* and *Dionaea*), as well as other botanical oddities such as *Amorphophallus titanum* (1:6 scale, 46 cm/18 inches tall) and *Rafflesia arnoldii* (1:2 scale, 46 cm/18 inches diameter). If you want to see these proposed models, support the development by purchasing this one! For more information go to <http://www.jurassic-gardens.com>.

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## RED *ALDROVANDA* FROM NEAR ESPERANCE, WESTERN AUSTRALIA

ROBERT GIBSON • PO Box 1330 • Dubbo, New South Wales, 2830 • Australia

Keywords: observations: *Aldrovanda vesiculosa*, Western Australia (Australia).

In early November 2000, I discovered *Aldrovanda vesiculosa* L. in a coastal freshwater lake near Esperance, on the south coast of Western Australia. This appears to be the first time this species has been recorded from the southwestern part of the continent and brings the total number of known sites for this species in this country to fourteen (see Figure 1).

The plants at this site were floating just below the water surface or were wedged in between sunken branches on the lake margin. They had weakly branching stems measuring up to 10 cm long, and leaves in whorls of 6 to 8. The oblanceolate leaf blades were up to 4 mm long by 1 mm wide. The snap traps had lobes to 4 mm long by 2 mm wide. There was no sign of flower development at the time. The overall plant colour was an eye catching red throughout. From the short length of the stems, and emergence of some plants from sheltered locations, it appeared that the plants had recently emerged from winter dormancy (see Figure 2).

The lake in which the plants grew was on the coastal plain and appeared to be permanent in nature (see Back Cover). It was relatively shallow, averaging about 1 m deep, with reeds covering much of the lake and growing high above the surface, and local clusters of *Melaleuca* trees grew in the lake centre. A thin layer of plant detritus covered the lake floor in various stages of decomposition, above a quartz-sand substrate. No major creeks flowed into the lake and it appeared that this water body was a window into the local ground water table. From the quartz-sand substrate and abundant organic matter it appears that the water is acidic. Winter frosts in the area are very rare and summer maxima commonly reach the low 30s (°C). The average annual rainfall at the nearest settlement, Esperance, is approximately 600 mm of which about 400 mm fall in the cooler months of the year. Heavy summer rainfall is not uncommon (Bureau of Meteorology, 2002).

The chemistry of the water in the lake is unknown but the South Coast Water and Rivers Commission (2003) have studied other catchments in the region, including the nearby Lake Warden system. This Commission has found that these lakes, intermittent creeks, and rivers are commonly brackish, with highly variable dissolved salt content (ranging from 1.3 to 61.6 milliSiemens per centimetre, based on electrical conductivity at 25°C), and have highly variable seasonal flows. They have measured spot temperatures ranging from 8°C to 24°C; and pH values ranging from 6.9 to 9.9. The ranges for salinity and pH for most of these sites are outside the ranges found for optimum growth of *Aldrovanda* (e.g. Adamec, 1997), so it therefore appears that suitable *Aldrovanda* habitat in this part of the continent is highly localised.

There were several hundred floating stems along a localised section of the lake edge—probably concentrated by the prevailing westerly winds at the time. They grew in the company of *Utricularia australis*, amongst a selection of dead, detached vegetation, including *Melaleuca* leaves. The water in the lake was clear with a weak brown colour, the latter probably due to the presence of tannins. At the time of the visit the area had experienced several months of below average rainfall, and the lake level appeared to be lower than normal. *Drosera pulchella*, *D. nitidula* subsp. *nitidula* and *Utricularia dichotoma* grew in moist soil on the lake edge.

This population occurs at least 2000 km south of the nearest known *Aldrovanda* populations in the Kimberley Region of northern Western Australia (Fitzgerald, 1918; Lowrie, 1998) and they are approximately 2500 km west of southern-most *Aldrovanda* population currently known, on the south coast of New South Wales (Adamec, 1999). The plants at Esperance develop red pigmentation under exposure to bright sunlight; a feature shared with populations in New South Wales and in the Northern Territory (Wilson, 1995; Adamec, 1999). They also have touches of red pigment on the petals (L. Adamec, pers. comm., 2002). At this early stage it appears that the plants from Esperance develop a deeper red pigment throughout than other populations and are much harder to maintain in cultivation (D. Darnowski, pers. comm., 2002).

The study of herbarium specimens revealed recent collections from hitherto unreported populations in the Northern tablelands of New South Wales. These populations occur above 1000 m altitude.

and thus represent the only non-coastal populations known from Australia: based on the herbarium notes the plants also develop red pigmentation. An additional unique aspect of these elevated populations is that they are subjected to long frosty winters with not infrequent snowfalls.

The plants near Esperance appear to represent a naturally occurring population—they are far removed from large human population centres where this species may be cultivated. The Esperance plants share the red pigmentation found in other Australian populations, which may indicate that they may be derived from the same ancestral stock that has been widely disseminated, possibly by waterfowl (Breckpot, 1997). It is yet another demonstration of how this species is able to be transported over large areas of inhospitable habitat, in this case desert, and become established in suitably clean fresh water habitats. Perhaps seasonally migratory species in the sandpiper family (Scolopacidae), such as the Japanese snipe (*Gallinago hardwickii*), have been involved in spreading this species between Eastern Asia and Australia (Schodde & Tidemann, 1997)?

*Aldrovanda* has now been collected from eight or nine botanic subdivisions in four states of Australia. (Bailey, 1900; Marchant *et al.*, 1982; Wilson, 1995; Lowrie, 1998; Adamec, 1999). The uncertainty of total number is due to the imprecise location of the location in Fitzgerald (1918). Recent collections and observations have been made in all but southeastern Queensland and the New South Wales North Coast (e.g. Stanley & Ross, 1983; Bourke, 2000); which is surprising given the abundance of clean coastal lakes in this region. Perhaps it is only a matter of time before this species is rediscovered there?

The discovery of *Aldrovanda* in the south west of Western Australia is an exciting, significant range extension. It also provides a remote population to add to on-going study on this species.

#### Acknowledgements

I wish to thank Phill Mann for his friendship and assistance over the years, and for his help during my travels in Western Australia. I thank Dr. Jeremy Bruhl, director of the Beadle Herbarium, and

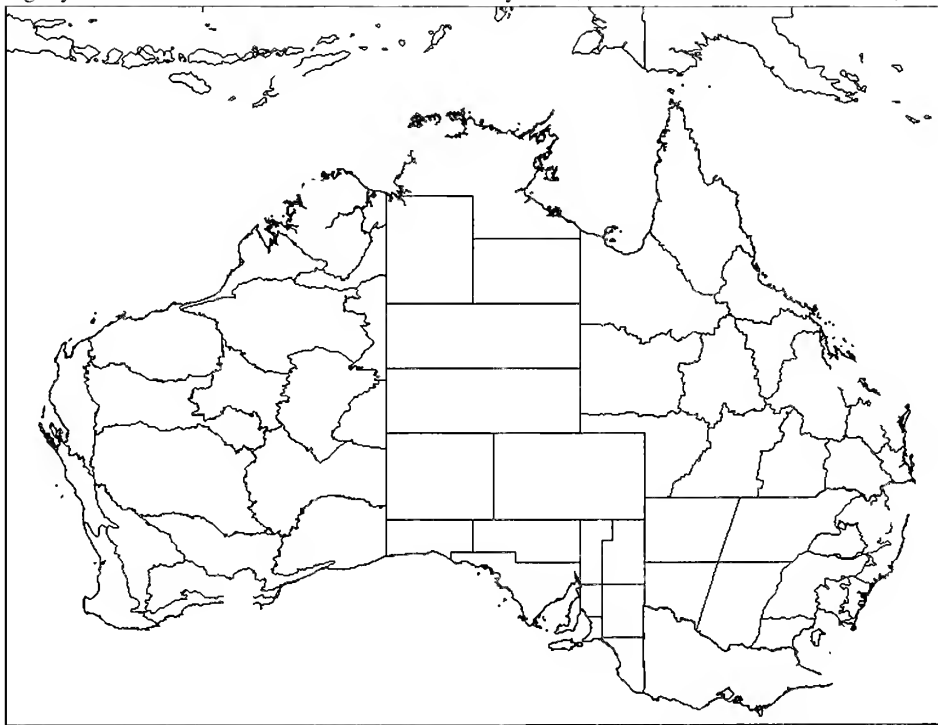


Figure 1: Location map of *Aldrovanda* sites in Australia, and the adjacent island of Timor. State and territory boundaries and botanic subdivisions for all states, except Victoria and Tasmania, are shown. Site locations are based on herbarium study and the literature (Fitzgerald, 1918; van Steenis, 1954; Marchant *et al.*, 1982) and my own observations.





Figure 2: Red plants of *Aldrovanda vesiculosa* growing at the edge of the lake, with *Utricularia australis*.

the helpful staff for study access to this herbarium. Thoughtful discussions with Lubomir Adamec were most appreciated.

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## TAX DEDUCTIONS AND THE ICPS

I would like to remind all our members that the ICPS is recognized by the USA Internal Revenue Service as a nonprofit 501(c)3 organization. Therefore, charitable contributions to the ICPS by USA members are tax deductible.

Should you donate to the ICPS? My resounding answer is yes! Consider some of the accomplishments by the ICPS in conserving rare carnivorous species. The ICPS has funded conservation programs designed to help *Sarracenia purpurea* var. *montana* in Georgia and North Carolina, *Sarracenia jonesii* in North Carolina, *Sarracenia oreophila* in Alabama, Georgia, and North Carolina, and *Nepenthes clipeata* in collections. The *Sarracenia alabamensis* distribution project and the seedbank's distribution of rare carnivorous plant seed are all offshoots of the ICPS conservation program. The ICPS is also involved in the care of sites housing *Darlingtonia*, *Drosera*, *Pinguicula*, and *Utricularia*.

So support the ICPS with your checkbook, as I have done. Support the ICPS conservation programs with your tax-deductible donations. Write out your check to "ICPS Conservation Program" and send it to the ICPS. Save a stamp and send it with your membership renewal! And if you want, indicate what conservation initiative you would most like to see supported. If possible, I will make sure that your check helps fund your favorite program!

Sincerely,

Barry Rice  
ICPS Director of Conservation Programs

## Forget anything?

If you need to renew your ICPS membership, do it this week, do it today. The year that your membership in the International Carnivorous Plant Society expires should be printed on the mailing label for your issue of Carnivorous Plant Newsletter. If it reads 2004, you must renew your membership. Timely renewal by our members saves us money that could be spent printing more color illustrations in Carnivorous Plant Newsletter, conserving wild carnivorous plant populations, or devising other ways to help serve the ICPS membership better.

## BOARD MEMBER ELECTIONS

The end of this year marked the end of terms of office for three ICPS board members: Cindy Slezak (Vice President), John Brittnacher (Secretary), and Jan Schlauer (representing our editorial board). As noted in the Board Member Elections announcement that appeared in the June issue of Carnivorous Plant Newsletter, these three officers were involved with the ICPS during revolutionary times, when the ICPS finally became a nonprofit organization of international scope.

All three of these board members decided to run for re-election. Since no one offered to run against them, an actual election process (with ballots, etc.) was superfluous, and so with the beginning of 2005, their terms will be renewed.

Welcome back, Cindy, John, and Jan!

## LEAF PULLINGS: A “NEW” WAY TO PROPAGATE *SARRACENIA* VEGETATIVELY

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Keywords: cultivation: propagation, *Sarracenia*.

### Introduction

All current methods of vegetative *Sarracenia* propagation involve dividing the rhizome. Rhizome division is often successful even if the division fragment does not have an apical growing point; in such cases a lateral node along the rhizome will usually be activated so that leaves (perhaps at first small and distorted) will be produced and a new plant will thus be established. No other methods of *Sarracenia* vegetative propagation are in practice.<sup>1</sup>

Oddly enough, hidden in the pages of an old 1978 issue of Carnivorous Plant Newsletter is a comment from Bill Scholl, relayed by the then-editor Joe Mazrimas. In this News & Views piece, Scholl claimed that *Sarracenia purpurea* could be propagated by rooting small, immature leaves dipped in rooting hormone. When I encountered this note, I was incredulous. As far as I knew, no current *Sarracenia* horticulturists used such a technique, and I strongly doubted it would actually work. However, it reminded me of a comment that Bob Hanrahan made as an aside in a cultivar description (Hanrahan, 2003); specifically, that *Sarracenia psittacina* could be propagated by leaf cuttings.

Could such a method actually work with *Sarracenia*? It seemed to me highly unlikely, since the technique seems not to have withstood the test of time. As a bit of armchair research, I reviewed my books on carnivorous plant cultivation, but found no reference to the use of *Sarracenia* leaves as a propagation method. While I have great respect for Scholl's and Hanrahan's contributions to our understanding and appreciation of carnivorous plants, I decided that the use of *Sarracenia* leaves to propagate plants was just not plausible.

However, I am a curious primate, so on a lark I decided to make sure that I was correct in my speculations. On 13 March 2004 I prepared several *Sarracenia purpurea* leaf pullings (I call them pullings instead of cuttings for reasons to be explained), tucked them into baggies, and ruefully consigned them to almost certain death.

In mid-April, I inspected the inhabitants of my leaf pulling baggies and was intrigued to see that the leaves were still alive. However, *Sarracenia* leaves are tough and tenacious, so I was not too surprised. I carefully extracted a few of the leaves from the soil, and goggled when I found that they had developed cauliflower-like calluses at their bases!

I exhumed the rest of the leaf pullings, and was aghast to see that several had produced roots! (See Figure 1) *Sarracenia* pitchers were not supposed to do this! In my amazement I showed the rooted leaves to comrades. When ICPS seed bank manager John Brittnacher saw the roots, his eyes glittered and he grinned. (For John, this is comparable to whooping with excitement; perhaps equivalent to Fernando Rivadavia hollering with delight over a field discovery.)

I returned the leaf pullings to their baggies and immediately expanded my experimentations to include other species. My optimism was tempered by caution, for while it was clear that I had managed to produce roots from *Sarracenia purpurea* leaf pullings, there was as yet no evidence that the rooted leaves would survive. Furthermore, even if the leaves did persist in a healthy state, I did not know if they ever would produce leaves. For example, *Hoya kirkii* leaves can be rooted, but the rooted leaves never develop any further plant parts; while interesting, rooted *Hoya kirkii* leaves have no propagation value.

On 23 May 2004, I reexamined the pots in my trials. This time the results were even more astounding. All the *Sarracenia purpurea* leaf pullings had developed roots, and two had begun to make pitchers! (See Figure 2) Furthermore, many of the new species prepared in mid-April showed a range of auspicious signs boding success. These leaf pullings included erect *Sarracenia*; I now had

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<sup>1</sup>In vitro techniques are not in the scope of this article.



Figure 1: Roots emerging from the base of *Sarracenia purpurea* var. *burkii*, four weeks after the leaf pulling was prepared. Photographed in mid-April by Barry Rice.

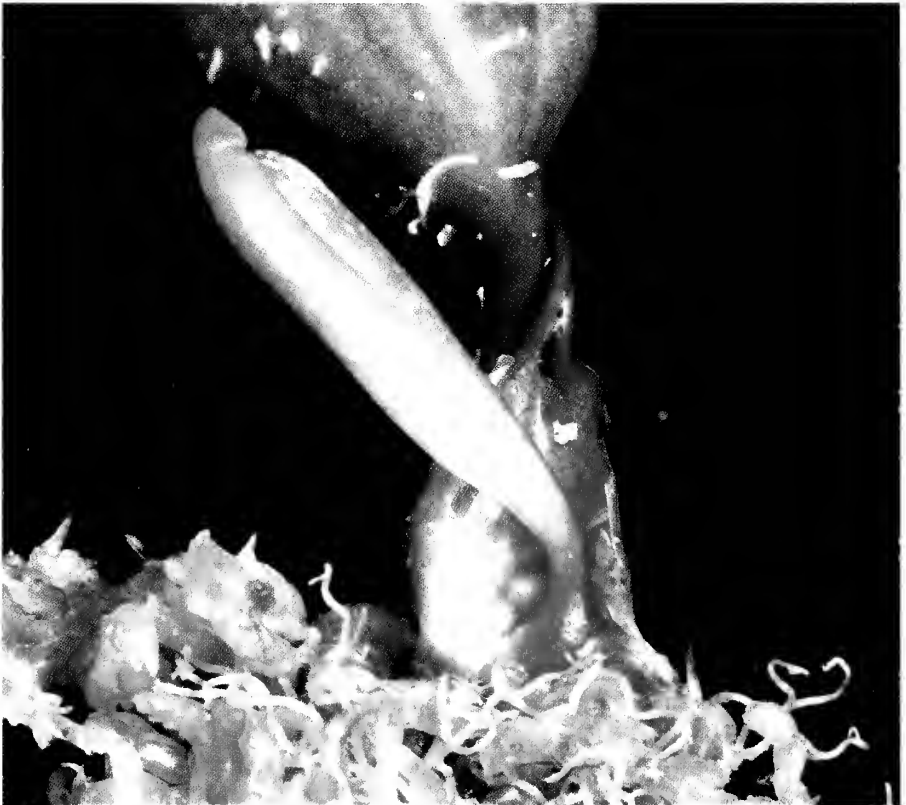


Figure 2: A tiny pitcher emerging from the base of *Sarracenia purpurea* var. *burkii*, eleven weeks after the leaf pulling was prepared. Photographed on 2 June 2004 by John Brittnacher.

evidence that the effectiveness of the technique was not limited to the ground-hugging species (*S. purpurea* and *S. psittacina*).

I have continued to observe the results of these experiments, and have continued to see successes. I have produced a number of healthy, rooted *S. purpurea* and *S. psittacina* plants with excellent root systems and vigorous leaf production. Root production on three of the erect trumpet pitcher species is also healthy, and I have observed leaf production on the *Sarracenia rubra* subsp. *wherryi*. The leaves on this latter species are most peculiar—the shoot extending from the base of the leaf pulling to the soil surface is transparent and covered with short scales. I believe this structure is the plant's resource-poor tactic to reach the soil surface.

### Details on the Technique

As you follow a *Sarracenia* pitcher down towards the rhizome, it becomes ever more narrow. Right at the point of attachment to the rhizome, the pitcher leaf flares and develops a clasping base that grips the rhizome. In order to prepare a successful leaf pulling, it appears to be essential to remove the entire leaf, including as much of the clasping base as possible. Do not cut the leaf off the rhizome—it must be pulled away. Do not use a razor or scalpel to slice off some rhizome with the leaf pulling. To do so might unnecessarily damage the rhizome, and expose it to invasion by pathogens (although it might increase the effectiveness of the technique—see note #4 in the next section).

The leaf tissue of very young pitchers is sometimes so tender that when you try to pull the leaf off, it snaps at the narrow point. *Sarracenia psittacina* is particularly prone to this frustrating tendency. I have found no value in such incomplete leaves, and experience has taught me to discard the leaves whenever this happens.

In order to make high quality leaf pullings, you may need to strip a few years' worth of dead leaves from the rhizome so you have room to work. It may also be necessary to hunt around a little to find a leaf that is easily removed. It does not seem to be necessary to use only young leaves—I have successfully used leaves that were still forming, leaves that were several months old (with a bit of dead crisping along the hood), and leaves at intermediate degrees of maturity.

The leaf pulling should be inserted into the soil so the leaf base is well-buried. I have not yet determined the ideal depth for insertion. I insert the leaf about 3 cm for the prostrate species, and approximately 5 cm for the erect species. The rationale for this insertion depth has merely been to ensure that the leaves are not easily knocked out of the rooting pots. The potting mix does not seem to be particularly crucial—while I have had the best results with dead long fiber *Sphagnum*, a 50:50 sand:peat mix has also been successful.

The potted leaf pullings should be placed in a sealed baggie with a bit of standing water (even if the plants are in a terrarium) as the leaf pullings are particularly susceptible to water loss. It is important to coddle the pitchers for the months required to produce new leaves. Otherwise, maintain normal growing conditions. The pitcher will slowly start to die from the leaf tip, but as long as the leaf base does not brown and rot, the leaf pulling is still potentially viable.

Roots should form within a month, and leaves should follow a month or two after that. When I observe that roots have been produced, I replant the leaf pulling so the young root system is closer to the soil surface—I believe it is best if the developing leaves can reach the surface as soon as possible. It seems that as long as roots are produced, leaves will be produced even though it may take a long time to do so. However, it apparently crucial that the plants be kept in a baggie until leaves are produced. Plants removed from baggies after root formation but before leaf formation have yet to succeed for me.

When I selected leaves for the erect species to be used in this experiment, I only chose leaves that were perhaps 25 cm (10 inches) or shorter. This was only to keep my experiment conveniently small. I do not know if full size pitchers (from erect species) will respond to the leaf pulling technique.

The success mileposts I have achieved in obtaining callus, root, and leaf formation for various taxa are given in Table 1. I do not provide success percentages for each plant, because these are only trial tests with about five leaf pullings per taxon (i.e. not enough to provide meaningful statistics!). In general terms, I have had nearly 100% success rates with *S. purpurea* and *S. psittacina*, but only about a 20% success rate with the other species. Clearly there is room for refining the technique.

Table 1: Leaf pulling success milestones

Plant	Callus	Roots	Leaves
<i>S. flava</i> var. <i>ornata</i>	Y <sup>1</sup>	N	N
<i>S. jonesii</i>	Y	Y	N <sup>2</sup>
<i>S. leucophylla</i>	Y	Y	N <sup>2</sup>
<i>S. minor</i> var. <i>minor</i>	N	N	N
<i>S. oreophila</i>	Y	Y	N <sup>2</sup>
<i>S. psittacina</i>	Y	Y	Y
<i>S. purpurea</i> <sup>3</sup>	Y	Y	Y
<i>S. rubra</i> subsp. <i>wherryi</i>	Y	Y	Y

<sup>1</sup>Leaf pulling died prior to root formation.

<sup>2</sup>Leaf pulling still alive, but this stage has not yet been reached as of November 2004.

<sup>3</sup>Included clones of *S. purpurea* subsp. *purpurea* var. *burkii* and *S. purpurea* subsp. *purpurea* var. *burkii* f. *luteola*.

### Summary Comments and Further Work

It is remarkable how much promise this procedure holds for *Sarracenia* propagation.<sup>2</sup> Now that we know this is possible, many modifications must be investigated. Questions foremost in my mind are the following:

1) Is the best practice to bury the pitchers vertically, as I have done? While this induces root formation with great efficiency, I suspect that the rate of leaf formation would be enhanced for the various erect trumpet species if the pitchers were buried at an angle (perhaps horizontally, just beneath the soil surface).

2) Is it possible to simply root the pitchers in water?

3) Is it possible to use phyllodia for leaf pullings?

4) Would this method have a higher success rate if a small bit of rhizome tissue were nicked off with the leaf pulling?

5) Does the success of leaf pullings depend upon seasonality? My leaf pullings were all done in the spring. Are late summer or winter leaf pullings possible?

6) Is it possible to root the small rhizome scales produced near the end of each growing season?

7) Do rooting hormones increase the success rates?

8) Is this method effective with *Heliamphora* and *Darlingtonia*?

It may be that ultimately the leaf-pulling method will be proven to be efficient and reliable only for propagating the prostrate species (*Sarracenia psittacina*, *S. purpurea*). Even so, since these two species are so loath to divide naturally in cultivation, the leaf-pulling method is an excellent way to propagate slow-to-divide specimens.

The time is overdue, the charge is clear—it is time to explore this simple and effective method of vegetative propagation!

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### References:

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<sup>2</sup>Perhaps only more remarkable is that this technique has essentially been forgotten by *Sarracenia* horticulturists!

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