

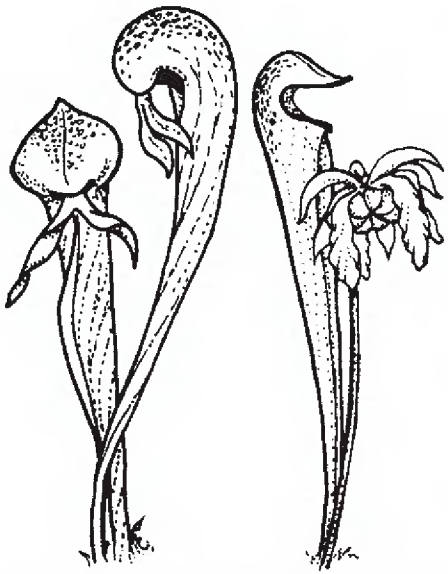
CARNIVOROUS PLANT NEWSLETTER

Journal of the International Carnivorous Plant Society

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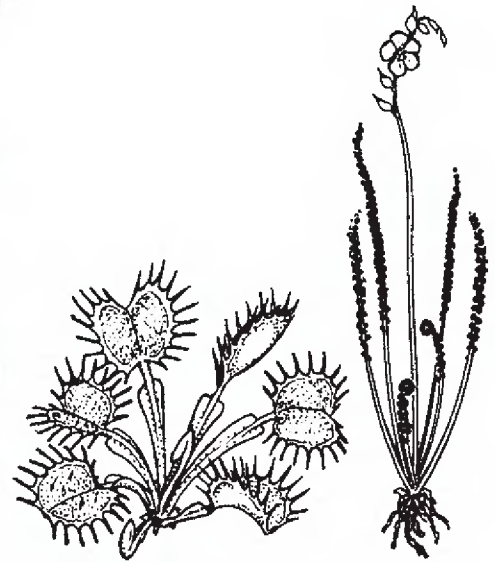




CARNIVOROUS PLANT NEWSLETTER

Journal of the International
Carnivorous Plant Society
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Volume 47, Number 4
December 2018



Front Cover: Maggie Chen admiring a nice *Darlingtonia californica* pitcher during the ICPS Conference field trip. Photo by Maggie Chen. Article on page 142.

Back Cover: A specimen of *Sarracenia* 'Adrian Slack' given directly from Bob Hanrahan to Barry Rice, where it is being grown at UC Davis. This individual has never been in tissue culture. Photo by Barry Rice. Article on page 160.

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. Advertisers should contact the editors. Views expressed in this publication are those of the authors, not the editorial staff.

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CONTENTS

Erratum-----	135
ICPS Conference 2018, Santa Rosa, California -----	136
The 2018 ICPS Grand Expedition in California and Oregon -----	142
Adrian Slack (1933-2018)-----	148
The long overdue recognition of <i>Sarracenia rubra</i> subsp. <i>viatorum</i> -----	152
Contribution to knowledge of <i>Sarracenia</i> ‘Adrian Slack’ genetic background-----	160
Possible pollinators for two Japanese <i>Pinguicula</i> species -----	167
Sand wick for <i>Cephalotus</i> -----	170
New Cultivars -----	172

ERRATUM

ANDREAS FLEISCHMANN, FERNANDO RIVADAVIA, AND PAULO M. GONELLA

According to ICN Art. 21.2 (Turland *et al.* 2018), a generic or infrageneric taxon name must not be a noun in the genitive singular, which “*Drosera* sect. *Brasiliae*” de facto is. Hence the section name has to be corrected formally (without change of authorship, as it is just a correction of the termination, see ICN Art. 32.2). This is done herewith, by grammatically correcting the section name which was published by Fleischmann *et al.* (2018, Carniv. Plant Newslett. 47: 4) to *Drosera* section *Brasilianae* Rivadavia, Gonella & A.Fleischm.

Acknowledgments: Jan Schlauer is thanked for pointing out this faux-pas, enabling prompt correction.

Literature

- Fleischmann, A., Gonella, P.M., and Rivadavia, F. 2018. A new sectional name for the Brazilian tetraploid clade of *Drosera* subgenus *Drosera*. Carnivorous Plant Newsletter 47: 4-9.
- Turland, N.J., *et al.* (eds.) 2018. International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code) adopted by the Nineteenth International Botanical Congress Shenzhen, China, July 2017. Koeltz Botanical Books, Glashütten.

ICPS CONFERENCE 2018, SANTA ROSA, CALIFORNIA



The lecture hall, filled with rapt carnivorees. Photo by John Brittnacher.

The 12th International Carnivorous Plant Society conference was held 3-5 August, 2018, at the Hyatt Regency Sonoma Wine Country located in downtown Santa Rosa, California, USA. The location was chosen because the hotel could simultaneously hold the conference lecture space, plant show, sales area, and have rooms for attendees all in one central location within easy walking distance of restaurants and other amenities.

The conference was sponsored by the Bay Area Carnivorous Plant Society (BACPS), the oldest carnivorous plant society in the United States, and the world-renowned carnivorous plant nursery California Carnivores with additional support from the Los Angeles Carnivorous Plant Society and the San Diego Carnivorous Plant Society. It is with much gratitude and great appreciation that we applaud Damon Collingsworth, Daniela Ribbecke, Lauren Paulson, Gina Morimoto, Arthur Yin, Brian Lipinski, Allyson Long, Rebecca Robinson, Pablo Ramudo, Doris Quick, Daryt Jov Frank, Stephen Davis, and their team who worked tirelessly to plan and coordinate this event.

There were 193 people in attendance at the conference and many more people visited the BACPS plant show and sale on site. At times the conference area was totally packed. The attendance for the 2016 ICPS conference in Kew Gardens in London, England was 160. Everyone at the 2018 conference seemed to be in awe and expressed excitement that the conferences continue to grow in attendance.

Peter D'Amato delivered the opening address, which briefly but informatively covered the history of human interaction with CPs, from the discovery to the cultivation and hybridization of carnivorous plants, tying in Peter's history and work with the plants as he joined the scene. He mournfully recalled the experiences of the older folks in the audience of buying carnivorous plants as teenagers and having no clue how to grow them. He said because of the advancement of tissue culture and the rise of the Internet we have arrived at this tenable Golden Age of Carnivorous Plants where anyone can get plants and find out how to grow them.



Part of the crowded sales room. Photo by Noah Yawn.

The amazing presentations given ranged from big-picture topics like conservation in Drew Martinez's "Does Cultivation Undermine Conservation", challenging us to read plant descriptions and think about location-data and seed-grown vs. tissue-cultured plants, and Naoki Tanabe's update on the "*Nepenthes clipeata* Project" to the microscopic in Ulrike Bauer's "Convergent & Divergent Evolution of Pitcher Traps" and Ulrike Muller's "Bladderwort Traps: The Fastest Predators". The latter-mentioned presentations revealed some of the incredibly specific and often seemingly physics-defying functions that these plants have evolved to capture prey. There was a theme of flower-related talks this year, including *Drosera* flower ecology and guilds where unrelated plants have similar flowers to attract the same pollinators (Robert Gibson) and have similar flower behavior (Andreas Fleischmann). Fleischmann also covered other genera beyond *Drosera* and how they all will eat their pollinators if it is possible and there are the opportunities. Larry Mellichamp discussed how pollinators specifically interact with *Sarracenia* and their flowers. Fernando Rivadavia gave us a crash-course on carnivorous plant phylogeny and John Brittnacher's presentation, "*Drosera filiformis* and Friends: Do Plants Care About "Species"?" questioned what makes a species. Rivadavia predicted increasingly inexpensive genetic testing of plants – like how 23andMe is now available for us – that will help to solve the problem of "mystery" or "unknown hybrid" plants as well as to more accurately and, arguably, logically determine a species by looking at genes. To close the conference, Jeremiah Harris showed us his incredible photos of his trip to Papua to hunt for *Nepenthes*. All talks were recorded and will be made available by the ICPS.

At the end of the conference's second day, Damon stood before the conference attendees and delivered a heartfelt and emotionally-charged speech on those seemingly insignificant moments that completely change your life, like when as a little boy, a friend took Peter D'Amato to a local bog with *Drosera rotundifolia*, or when Damon bought a Cape Sundew from Peter in 1989. "I'm incredibly grateful for that sundew I bought almost 30 years ago," he said. These moments led to California Carnivores being opened, to "The Savage Garden" being written, influencing, encouraging, and educating who knows how many of us to learn about and to grow these beautiful, alien plants. Larry [Mellichamp] said, "It's amazing how many people are in this room. It used to be

just 3 people sitting around.” All of this led to Damon’s surprise announcement, “We’re giving a lifetime achievement award to Peter D’Amato,” which was met with a standing ovation from the entire conference. This was followed by an impressive line of representatives of carnivorous plant societies and communities who took turns at the mic to tell stories about Peter or how he, California Carnivores, and “The Savage Garden” impacted their lives. Teary-eyed, blown away, and nearly speechless, Peter humbly and graciously accepted the beautiful silver-plated *Nepenthes* pitcher award. “Oh!” Peter exclaimed as he turned on the spot and returned to the microphone: “I almost forgot to tell everyone about my new book, which is a work of fiction, called “From a Crevice in Hell” which I’m hoping to finish this winter.” Peter described it to me as a “science-fiction tale, dark comedy, parody of other monster plant stories, thriller, horror nightmare, and an apocalyptic novel all in one,” and, having read everything he’s written so far, I enthusiastically agree; it has been so much fun to read and I can’t wait for everyone else to experience it themselves.

For me, the ICPS 2018 conference was an experience more memorable and impactful than I could’ve hoped for. It was wonderful to visit California Carnivores and talk with Peter, Damon, Daniela & co. again. To retread those incredible jungle aisles, this time with so many more respected growers, cultivators, and experts right next to me, ogling the same plants or nearby, collected in groups laughing as they shared stories or, I’m assuming, discussed plants, was pure delight.

The talks given were educational, inspiring, and entertaining, and I could have happily sat and listened for days if not weeks longer. I came away having learned so much across a wide variety of topics, further fueling but also helping to direct my pre-existing question of what I want to strive to do for these plants that we’re all so passionate about. I was ecstatic to get to meet and talk to so many of you, and am still surprised at how approachable and open everyone was. The enthusiasm to not only share knowledge but to also ask questions and be eager to learn was tangible in each conversation. If I could take a full year off, I still wouldn’t have enough time to take all of you up on your offers to visit and/or explore plant sites with you.

It’s difficult to express my excitement for and anticipation of what’s to come for the society and community. I’ve only been involved in the OCPC and ICPS, as well as meeting other growers, for a couple years now (though I’ve been growing off and on since I was a kid) but I’m inclined to agree with the sentiment expressed during the conference: it is the Golden Age of Carnivorous Plants, and I’m humbled and overjoyed to be a part of it.

—PATRICK QUINN • OCPC • Vancouver • Washington • patrickjamesquinn@gmail.com



Patrick Quinn enjoying, or being enjoyed by a flytrap. Photo by Christina Toole.

The 2018 ICPS Conference was a total success in my experience. I had hoped to hear cutting-edge information about CP's, meet people that I have been seeing online for a long time and generally be immersed in all that is our hobby of growing carnivorous plants. And this is what I got! The field trip to California Carnivores demonstrated how they have one of the most amazing collections of CP's in the world and that so much of what they have is set up almost like a botanical garden for the purpose of simply viewing. Beyond amazing. The talks were informative and often very entertaining and to have it all dovetailed with the BACPS plant show and sale added a lot to what else was going on. I am indebted to Damon Collingsworth, Peter D'Amato, and all the gang at California Carnivores and the Bay Area Carnivorous Plant Society for a wonderful time.

—MARK S. ANDERSON • OCPC

I wanted to be sure to post a huge thank you for those who worked on the conference and the Trip to *Darlingtonia* country. The show/sale/conference was so well organized that I really didn't think it could be topped. But I soon found out what a fabulous trip was ahead! I heard people saying months before that the trip was very costly. I thought \$1k was a lot for me as well but I had a feeling I would regret not going. Am I ever glad I went!! I have never taken any excursions/trips to the great outdoors where I literally had no worries of any kind. The itinerary was perfect, the amount of wildlife in addition to the plants we saw was just outstanding! To have so many experts amongst us was so educational and enriching!! Just as I was finished listening to one professor's explanation on midge fly larvae of *Darlingtonia*, another was starting up talk of why that frog was totally still, yet another was explaining why *Darlingtonia* seeds are the way they are, and yet another expert was talking photography techniques for the field! I literally could not take it all in and journaled furiously to get as much as possible! Many may not see all the behind the scenes hard work of Damon, Daniella, Luke (CA CARN), Gina and Arthur (BACPS), and Barry and Beth (more experts) and our local expert Harry. But it was so clear that I had this once in a lifetime chance because these folks sacrificed sleep, free time, and energy to make the trip perfect. Of course, there's no way to really thank them but just to say I promise to keep my inspiration alive and to help others understand how precious these plants are! It was worth every penny and more...I'm already saving for two years from now!

—MAGGIE CHEN (SEE FRONT COVER)

The ICPS 2018 conference was the first carnivorous plant event I have attended, having only joined the hobby about 5 years ago. Luckily for me, it was pretty close (as I live in Oregon) and also being hosted by California Carnivores, which I have wanted to visit for years. The conference itself exceeded my expectations, being not only a conference and hobby gathering, but ending up as a major social event. Being able to meet so many people I'd only spoken to online previously, and many new faces as well, was a true delight. It really stands out how friendly everyone in the hobby is, and even our "celebrities" like Jeremiah Harris and Peter D'Amato are easy to approach and willing to talk to anyone.

I particularly enjoyed Ulrike Bauer's presentation about pitcher plant trapping mechanisms and Ulrike Muller's presentation on *Utricularia* fluid physics. These presentations contained interesting, detailed, and brand-new research into how carnivorous plants work, as well as a healthy portion of humor.

Next door at the sale, it was incredibly crowded but there were a lot of impressive plants on display and a lot being sold. Several tables full of *Sarracenia* from Jerry Addington's Courting Frogs

Nursery really stood out from the rest. I personally was a bit disappointed that there was very little in the way of unusual/rare plants (i.e. tuberous sundews, *Genlisea*, epiphytic *Utricularia*, etc.). Just down the hall, the CP show was very impressive, including many immaculate displays of all varieties of carnivorous plants.

—JOHN CHRISTMANN • OCPC

Attending the ICPS conference in Santa Rosa was the best conference experience I have had. The pace of the conference was great with talks throughout the day and enough time around the talks to meet new people. Everyone I met at the conference was extremely friendly and I had a fantastic time talking with everyone about the plants they grow and how they grow them. I also really enjoyed attending the talks and was impressed at the variety and quality of the presentations. I especially enjoyed Ulrike Muller's talk focusing on why bladderwort traps are so fast when their prey move slower. She presented detailed photos and videos of a capture event which were very interesting to see. The conference was a great opportunity to learn about carnivorous plants both in the wild and in cultivation and I hope to attend the next one!

—REBECCA ROBINSON • BACPS • Santa Cruz • California

The 2018 ICPS conference is a confluence of many minds coming together to help solve our CP questions – from the scientific to the practical. Every ICPS conference, however, is unique, differing in attendance, location, and of course, the time in which it happens. This one, held in the hazy dog days of the first week of August, claimed a special sort of significance for our community, a significance comprised of change and development, of learnings, successes, retirement, and the inevitable promise of rebirth.

The context of ICPS 2018 is worth considering. As we all know, Adrian Slack passed away earlier this year, and when I read through comments on social media, the odes to his life and practice seemed to emanate with a very particular sort of social introspection. Because one of the iconic greats of our beloved infatuation is gone, so an era of sorts has come to an end. Slack passed not before this “Golden Age of Carnivorous Plants” (as Damon Collingsworth puts it), but during it, and before its completion. I am honored that at least my career in CPs overlapped with his lifetime.

I observed the 2018 conference in this spirit of transition. Old friends, former ICPS founders, and early CP growers, saw each other once again, sometimes for the first time in decades. Many have retired. A few did not live long enough to attend, and their absence was poignant. While our own Peter D'Amato was celebrated, as he ought to be, as the symbolic center for the event, I heard some of the older scientists and horticulturalists muse together as to what the ambitious future may bring. Tellingly, Peter was awarded an ICPS Lifetime Achievement Award by none other than his successors. I have nothing but praise.

The ICPS and its membership still grows. New ideas, goals, and theories are waiting dormant and undeveloped in the minds of future enthusiasts. New identities too, for those who will bring the passion of carnivorous plants and their societies into a new decade.

—CARSON TREXLER • OCPC • Portland • Oregon • trexler@pdx.edu

Having the privilege of being able to attend the ICPS conference was a complete and utter dream come true. However, having the privilege of meeting countless individuals, scientists, cultivators,

and everyone in between, from childhood heroes to university professors was paramount to my ICPS experience; every single person at the conference was there because they are passionate and share a common passion for these miraculous plants. Sure, there were beautiful plants everywhere you turned at the conference, but meeting people was the truly amazing part about this event.

The ICPS conference event has had a profound and deep impact on me, unlike any other plant-related activity I've been to. It showed to me that first of all, there are (at least 200) others that are crazy enough to love these plants wholeheartedly, and that through carnivorous plants, people get excited about the natural world. It grows interest in children, like the one that went to a hardware store with his grandmother when he was 11 (me), or even adults, who all collectively group together to form a community unique unto itself. Learning about the cutting-edge science happening all across the globe with carnivorous plants, be it *Utricularia* hydrodynamics, *Drosera* phylogeny, or *Nepenthes* peristome microstructures was priceless. Attending the ICPS conference was not only a privilege, but allowed me personally to steady, even if just a little bit, my own personal passions for all genera of carnivorous plants, and plants overall. My utmost gratitude goes to every amazing individual and organization that helped throw this fantastic event together. I cannot wait to see what the future holds for carnivorous plants!

—NOAH YAWN • Birmingham • Alabama

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JOE GRIFFIN, Seed Bank Manager, joe@carnivorousplants.org

THE 2018 ICPS GRAND EXPEDITION IN CALIFORNIA AND OREGON

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Keywords: ICPS field trip, *Darlingtonia californica*, *Pinguicula macroceras*, *Drosera rotundifolia*.

Introduction—the group assembles

This year's ICPS Conference—in California, USA—was conceived, designed, and organized by the Bay Area Carnivorous Plant Society and the staff and employees of California Carnivores, and in particular by Damon Collingsworth. Unfortunately, I was unable to attend the conference, but I was able to help co-lead the field trips. This is a description of a few of the highlights from that portion of the event.

The first day of the trip was 7 August—a Tuesday. The participants piled into two snugly-packed vans and a few passenger cars, and headed from the conference area towards the California-Oregon border. En route, the caravan stopped at Bob Ziemer's house (the managing editor of Carnivorous Plant Newsletter) to ooh and aah over his extensive collection. Then, they travelled still farther north to Crescent City, for a nice restaurant dinner.

While all this was happening, my wife (Beth Salvia) and I were flying from a Star Trek convention in Las Vegas to Sacramento—stopping at home long enough to repack the car with field trip gear and water the plants—then driving the several hours to Crescent City. We joined the crew around 8 pm, just in time for beers.

Our crew consisted of trip co-leaders Damon Collingsworth and Gina Morimoto, vehicle drivers Luke Basulto and Arthur Yin. Beth and I were largely just there as crowd control. Unfortunately, Daniela Ribbecke—who helped so much in organizing the field trip—was unable to attend. Gasquet local Harry Tryon was also frequently present, and helped provide color and context to what we were seeing. The field trip attendees stayed in a simple but clean motel in the town of Hiouchi, while the co-leaders stayed in the nearby town of Gasquet.

Field Day #1

Wednesday morning we met at a small restaurant in Hiouchi (all restaurants in this remote part of California are small) and overwhelmed the staff with our ravenous breakfast appetites. After a very long time getting everyone fed, we decontaminated our boots with bleach to prevent the spread of *Batrachochytrium dendrobatidis* (non-native chytrid fungus devastating frog populations worldwide) and *Phytophthora lateralis* (non-native pathogen killing Port-Orford-cedar, *Chamaecyparis lawsoniana*). This was the first time I saw how the field trip vans were filled to capacity. Fortunately, most of our travel was short. Most of it.

Our first site was a location known to many as the “covered bridge” site, because of the nearby...covered bridge. Since the site was along a curving mountain road, we co-leaders donned attractive fluorescent green safety vests. Here we all observed water dripping over rocks and scree slope, adorned with many *Pinguicula macroceras* plants. This site is notable for having “chocolate” plants—that is, *Pinguicula* with purplish to brown leaves. It was late in the season, but we did manage to find a single plant in flower—our only one for the entire field trip. We also saw our first *Darlingtonia*—and the first viewing of this plant in the wild for several of the field trip attendees!

After memory cards accumulated many pictures, we repacked the vans with humans and headed to one of my favorite sites—here, the water seeped, trickled, and tumbled down a vertical serpentine wall, to the mountain road below (Fig. 1). The *Darlingtonia* ranged from lightly pigmented to nearly complete red. Strange, snakelike clusters of juvenile pitchers clung to the wet vertical rock face in defiance of physics and probability. Meanwhile, the *Pinguicula* also thrived, and seedling activity was vigorous. We all photographed madly, interrupted only by group calls of “Car! Car!” by trip leaders whenever curious locals drove past.

After a long time, we drove to a site right on Hwy 199, where the *Darlingtonia* grew in a moderately dense pine forest. I am quite fond of this site, as it often has wonderfully pigmented plants (Front Cover), including my favorite morph—the red-fanged plants. A

few straggly *Pinguicula* were here too, along with one of our only sightings of *Drosera rotundifolia*. Unfortunately, far more common were weedy *Drosera capensis* that were introduced by some fool horticulturist years ago. Orchids were well represented, including past-flowering *Cypripedium californicum*, *Platanthera dilatata* var. *leucostachys*, and *Piperia elongata* (the latter, in prime flowering shape). Harry and Damon talked to us about *Darlingtonia* dispersal, and a few pitchers were dissected to look at the midges (*Metriocnemus edwardsii*) that do much of the digestive work in these pitcher plants.

A few km down the road was our next site—a famous *Darlingtonia* botanical trail, where we had lunch and walked the ten-minute-trail to look at plants. While the site is superb, I smugly noted that folks were in general not too impressed. As nice as it is, it did not hold a candle to the sites we had visited earlier in the day!

But there was little time to rest! We repacked the vans and drove west, towards the coast, via a winding, winding, winding gravel road that rewarded us a chance to tour Stout Grove and see coast redwoods (*Sequoia sempervirens*). These enormous, ancient trees are truly awe-inspiring. Visitors walking the trails through these groves always speak in reverential, hushed tones. You feel very much like a visitor in a giant’s home.

After trying (mostly unsuccessfully) to capture the grandeur of the site on our cameras, we headed to Crescent City for a fine seafood-themed restaurant. Friendships were reinforced after a day of exciting field experiences, and shared duress in the packed vans, and many toasts were made.



Figure 1: *Darlingtonia californica* and *Pinguicula macroceras* on a sheer rock wall.

After dinner, Beth and I enjoyed a pitch-black walk among the redwoods, before we all returned to our hotel rooms.

Field Day #2

Our second day, after a very long breakfast (our little restaurant's staff had not yet adapted to being overwhelmed by the arrival of thirty naturalists), we took a short drive to our first site—a small rocky seepage right in the middle of Gasquet. This sparsely forested site supports *Darlingtonia*, *Pinguicula*, and *Drosera rotundifolia*. It is the best place I know for photographers to try to achieve what we called the trifecta—all three native species in a single photograph. After searching about, we found three such occurrences...hurrah!

I was also happy to see no non-native carnivorous plants there. Many years ago, I visited the site with Peter D'Amato and others, and we found a *Sarracenia purpurea* hybrid inserted by some horticulturist. I dug it out and unwittingly gave it to Peter—for the rest of that trip, so long ago, every time we reached a new site Peter playfully tucked the plant in the ground for me to find...again... and again...and again. Peter has a devious sense of humor!

In case people had recovered from the ordeal of the road to Stout Grove the previous day, we squeezed into our vans and ventured onto another narrow dirt road that wound its way through the mountains near Gasquet, and passed several *Darlingtonia* seepages. Instead of stopping at each, we visited only the best.

The first was a small cataract site, where water tumbled over a vertical rock wall, and amazingly *Darlingtonia* managed to cling to the slippery sheer surfaces. I was particularly struck by some beautiful *Gentiana affinis* var. *ovata*, with blue petals decorated with light green dots. The second site was much larger, and included gentle seepage and large field of *Darlingtonia*. A third had several small ponds bordered by intensely colored plants, as well as *Lilium pardalinum* and *Rudbeckia californica*. Unfortunately, we also observed indications of poaching, where someone had messily spaded out several clumps of plants, and didn't even bother to try repair the damaged soil structure where they dug the plants. (I spent some time cleaning up after their crime, including trying to reseat some seedling plants they carelessly dug out and left to dry.)

Our time on the road complete, we were all very dry and dusty—in fact some of us took to drawing carnivorous plants in the thick dust coating our vehicles! Indeed, we were so dry that the thought of the nearby Patrick Creek was so overwhelming that we drove there for a rest and a swim. The water was simply perfect—chilly but not overly so, and clear as glass. If you see any photos from the trip showing us swimming and cavorting, that's the place!

Gina and Damon were keeping us on schedule, but somehow we ended up getting distracted by one unscheduled site where we stopped in a gravel parking area to look at the sheer, exposed mountains above us, where in several places had water seepages. Of course, those places were heavily colonized by *Pinguicula*, but these could only be observed through our binoculars.

The day drawing to a close, we drove at a mad pace to the ocean to walk on the beach for 11 minutes (that's what Gina gave us), and then another fine dinner.

Field Day #3

Our last full day in the field had a slightly different flavor. We were to drive northeast, into Oregon, to see *Darlingtonia* in a different part of its range. However, we had a new hazard—forest fires. In particular, we were heading into areas very near the active Taylor Creek Fire and Klondike

Fire, neither of which had been controlled. Because of the extremely hot dry weather—conditions exacerbated by climate change—we were heading into an area with explosive fire conditions.

While we re-disinfected our boots, Beth and I gave the group a few tips on being fire-wise, since we had—at least in the past—been certified for working on prescribed fires and had experience on fire lines. I had spoken with other naturalists in the area, and they told me the region was open for visitation, but that many fire crews were mobilized in the area. We warned the attendees that, despite our hopes, we might be turned back by fire crew, and even if we reached our destination sites, we had to be ready to evacuate at a moment's notice.

After a relatively short highway drive, we turned onto successively small roads until we began observing *Darlingtonia* patches. We stopped at a few along the way, enjoying the spectacularly colored plants that grew in gentle broad seepages. *Gentiana setigera* and other wildflowers were visible here and there, despite the lateness of the season. This road trip terminated at one of my favorite sites—a very large, nearly flat site filled with *Darlingtonia*, including many red-keeled plants and red-fanged plants. As on other trips, I marveled that no *Utricularia* occurred at the site, despite the fact that the slow, wet seepage seemed absolutely ideal for *Utricularia minor*.

I could tell, by the way that some of our trip participants were clumsily stumbling about, that some folks were getting dehydrated in the heat, so our long lunch by a cool stream provided an excellent rest (Fig. 2). It also gave us time to appreciate and enjoy the company given by a rare foothills yellow-legged frog (*Rana boylei*) in the stream, a frog that was inexplicably given the name Carl.



Figure 2: Long lunch by a cool stream.

Back in our vehicles, we headed towards our final site for the day—a location near Eight Dollar Mountain, Oregon. This is a favorite site for many, but we were not sure we would be able to make it—the problem, of course, were the fires.

Driving towards the site, we encountered an incident control station (a checkpoint for fire crew). Discussing the situation with them we concluded we were in a safe situation—although we were to remain vigilant. We drove the dusty road higher into the mountains—passing a few small *Darlingtonia* patches, until we reached our destination.

I was one of the first to step out of our air-conditioned vehicles, and the heat hit me in the face like a punch. I have never experienced such dry, hot conditions at a carnivorous plant site before. We were at the base of a huge, grassy hill, with a broad ribbon of *Darlingtonia* that snaked up the slope, to nearly out of sight (Fig. 3). It is indeed a spectacular view. And as an added gift, on the steep slope *Pinguicula* could be found here and there—not in huge numbers, but just a little extra seasoning.

After a quick reminder to all the field trip attendees that they had to return to the car immediately if they heard us honking our horns, the excited naturalists streamed up the slope like children in a candy store. It was a gratifying vision for us trip leaders—I had been hoping that folks would not be tired of *Darlingtonia* by now, and I was reassured by the occasional whoops of excitement that I heard.

I stayed at the hill's base, helping the drivers turn the vehicles around on the very narrow road, and generally fretted as I watched the nearby fire smoke plume gradually enlarge. Heat stroke was also a concern in these extreme conditions, and I didn't like the fact that few folks seemed interested in seeking a bathroom. However, my concerns were—it turned out—unfounded as no one seemed much worse after the hour or two we spent there.

In time, we concluded it was time to leave, so we took a group photo of all the trip participants (Fig. 4), piled AGAIN into our vans, and hustled out of the fire area. When we reached a nearby town for dinner, many of us were shocked to look back in the direction of the *Darlingtonia* site—what was previously a simple smoke plume had exploded into a giant pyrocumulus cloud of enormous dimensions. As I write this, reports indicate that the fire did sweep over the region, and I intend to return in a few weeks to survey the impact.



Figure 3: A *Darlingtonia* site, just a few days before being burned over, in Oregon.

Last Day

The last morning—a Saturday—found us all back at our usual Hiouchi diner for one last big breakfast together. Folks furiously exchanged contact information on social media platforms, and



Figure 4: Our hardy group of naturalists.

took photo after photo—this time of each other, instead of plants. Thanks were given to all who designed and executed this perfect field trip. Then sadly—oh so forlornly—we bade each other farewell.

One little secret, though... As Beth and I drove away, we couldn't resist the temptation of... just...one...more...site! So we parked our car, hiked for a bit, until we reached my favorite *Pinguicula* site of all. (It involves technical bouldering to reach, so it was an inappropriate destination for the field trip group.) It is right along a river, where *Pinguicula* grow on sheer rock faces at the water's edge. Not only do the rock walls provide habitat, they also assure complete privacy on the river, so the swimming (uh, clothing optional swimming) is secluded, isolated, and refreshing.

Yes, it was a great trip for all!



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ADRIAN SLACK (1933-2018)

“Nigel, it is obvious you share my passion and knowledge of the species. Long may you continue to do so.”

The day I received these words for inclusion in my book, was one of those you consider to be humbling. I never met Adrian in person, though he lived less than five miles away, but I do know his sister, Julia, and it was via her that, despite Adrian’s inability to communicate well, he managed to put this small passage together.

My first encounter with Adrian came about in the early eighties. The hobby then was in its infancy, certainly in the UK, and his first title, *Carnivorous Plants* (1979), became the first book in the English language to include not only an in-depth precis of the species and their varied trap mechanisms, but also touched on their wider cultivation. For me, and I believe many others, this was that pivotal moment when we realised, through the ground-breaking work of Adrian, that these plants could be cultivated by the hobbyist. Of course, back then there was no Internet, and we take that particular resource for granted. Nowadays, information, contacts, and knowledge, can be made and swapped instantly anywhere in the world, and with forty years of cultivation experience, that information is now vast. For me though, it all goes back to the one point when I opened that book for the first time to a world of wonder, one that set my eight-year-old mind alight with an obsession that has remained with me since.

Revolutionary in his desire to bring these plants to a wider audience, he was one of only a couple of contributors in the very first *Carnivorous Plant Society* journal in the autumn of 1978, describing his ‘Slack method’ of growing *Drosophyllum*, proving he was already yards ahead of other growers in the UK at the time.

1986 saw the publication of his second book, *Insect Eating Plants and How to Grow Them*. As the title suggests, this book was purely a growing guide, and brought together the wealth of experience Adrian had amassed over the previous two decades. By this time his nursery, Marston Exotics, based in Somerset, was the primary source for many growers, and it was one of life’s cruel twists that robbed Adrian not only of his business, but also his independence later that year when he suffered a major stroke, something he never recovered from. It was a sad way for his limelight to be taken away, but his enduring reputation as the father of the hobby, certainly in the UK, and I rather suspect further afield as well, served to keep him in the minds of many.

It was pure coincidence I washed up in Somerset, near to Adrian, having grown up in London, and I was honoured to have attended his funeral in the small village of Barton St David where he lived.



I can see Adrian's enduring legacy everywhere; in books and later publications where he is referenced, in Facebook groups and forums, and of course in the many cultivars he named which are still in cultivation today.

It was an honour to know Adrian, albeit in a roundabout fashion, and know he will be sorely missed by those for whom our hobby became richer as a result of his work.

—NIGEL HEWITT-COOPER • Hewitt-Cooper Carnivorous Plants • Somerset BA6 8NN • UK • sales@hccarnivorousplants.co.uk

Over the 30 years I have had the privilege of growing *Sarracenia* as a result of buying Marston Exotics from Adrian and continuing growing his amazing cultivars.

Although tissue culture is the norm these days, Adrian's dedication and hard work in the 1970's developing the business has paid off.

I have a 1977 mail order catalogue in which he lists 8 hybrids which were raised by him including *S. × mitchelliana* (*S. leucophylla* × *purpurea*), *S. × popei* (*S. flava* × *rubra*), and *S. × excellens* (*S. leucophylla* × *minor*).

By 1982, he had developed 14 hybrids, some of the new ones were: *S. × chelsonii* (*S. purpurea* × *rubra*), *S. "Comptonensis"* (*S. alata* × *willsii*), *S. × miniata* (*S. minor* × *alata*), *S. × mooreana* 'Marston Clone' (*S. leucophylla* × *flava* "Maxima", *S. × rehderi* (*S. rubra* × *minor*), *S. × 'Marston Mill'* (*S. × (leucophylla* × *× catesbaei*) × *flava*) and *S. × excellens* 'Loch Ness' (*S. leucophylla* × *minor*).

When I bought the business in 1987, he had by then raised over 40 hybrids which we still grow and sell today. All the stock has been regularly split and potted; some are in 6-liter pots (the more vigorous ones), mostly they are in 4-liter. I have the National Collection at our nursery. Over the years great strides have been made into more colour, interesting shapes in the hoods, etc. One thing about Adrian's hybrids, they are all vigorous and fairly hardy.

One of my favorite hybrids of his is *S. × popei*, it's a neat plant, great flowers buff/orange and very bushy – a photo is on our web site gallery (www.pj-plants.co.uk).

Adrian Slack will live on in his books and plants all over the world.

He is the FATHER of Carnivorous Plants in the Western World.

—PAUL GARDNER • P and J plants (formerly Marston Exotics) • pj_gardner@btopenworld.com

Without doubt, Adrian Slack has been one of the best known names associated with carnivorous plant celebrities, known for his books, appearances (flower shows, lectures, and TV). However, for those of us living in Britain, there were multiple opportunities to meet the man himself, a legend in his own lifetime. I count myself fortunate to be one of those who not only met him but chatted with him on various occasions, especially at the Chelsea Flower Show in London, where Adrian would take breaks from his Marston Exotics stand.

Those chats and, especially, observations when Adrian was talking with others would easily reveal a jovial man, a slightly portly figure prone to smiling and laughing (Santa Claus comes to mind). Where ladies were concerned, he would readily attempt to use CPs to shock, verbally painting unnecessarily gruesome images with tales of how insects meet their doom. And when Adrian had other free time, his penchant for red wine would be transparent. Superficially, one could be forgiven for thinking Adrian to be not too serious, slightly eccentric and a flirt but that would have been a shallow view of the man.

Of his wine, he was by choice, particular in what he drank. Anybody can slosh back a bottle of plonk but Adrian had more refined tastes. He also participated in English Civil War re-enactments. This may look boyish from afar but to the participant, seriousness drove the level of research that allows an accurate depiction of the period's clothes, guns and battles. Similarly, he may, occasionally, have been limited in what he thought plants could tolerate but, generally, he wrote a meticulous description of what he had very carefully experienced. Even his attire was fastidiously considered, a yesteryear's gentleman who stood out in any crowd.

Underneath the flamboyant showman, the real Adrian was a man who dedicatedly immersed himself in the things he adored. He had an eye (and mind) for detail and a lust to study, enjoy and share his passions, all with gentle (though occasionally dark) humour and the enthusiasm that can only come from someone driven by his passions.

—PAUL TEMPLE • paulindr@gmail.com

It is difficult to think of someone who had a greater influence on promoting public awareness across the world of carnivorous plants and how to grow them than Adrian.

What follows relies heavily on a monograph produced by Denise Goodman of the Barton History Club who kindly gave permission for extracts to be included in this memorial.

His family moved to Barton St David in Somerset when he was 14 and he remained in the area until his death in May this year. He was educated at Edgarley Hall in Glastonbury and at Millfield School in Street before studying art in London and becoming a garden designer. In the 1950s his developing interest in carnivorous plants supplanted garden design.

He spent 3 years in Cumberland in the 1960s where he had access to the Bishop of Penrith's walled garden which had many Victorian glasshouses. It was here that his early *Sarracenia* hybridisation trials began and tests of their hardiness in the UK were made. He subsequently produced many *Sarracenia* hybrids including, 'Lynda Butt', 'Daniel Rudd', and 'Lochness'. He also produced many *Pinguicula* hybrids including 'George Sargent', 'Weser', 'Sethos', and 'Tina'. Most of us will have Adrian's hybrids and cultivars in our collections.

Subsequently he moved to Frome where at an old mill and garden he started Marston Exotics together with Tim Heneage, a master at Millfield School. This became a very successful business selling plants by mail order and latterly to garden centres. He amassed the largest collection of carnivorous plants in Europe.

He exhibited regularly at the Chelsea Flower Show and was awarded the RHS Lindley Silver Medal in 1981, followed by 5 gold medals.

Adrian was a well-known broadcaster on both radio and television and was featured in many newspaper articles. In 1979, he published his book "Carnivorous Plants" which became the seminal work on growing carnivorous plants. His later book "Insectivorous Plants and How to Grow Them" was published in 1986. It was these books that inspired many people around the world to develop an interest in carnivorous plants and start their own collections. Many a discussion on cultivation techniques included the words "Slack says ...".

He was instrumental in the formation of the Carnivorous Plant Society in the UK in the late 1970s and was a founder member. He supported the society throughout its early years by writing articles for the journal and providing plants for our stands at the Chelsea Flower Show. In later years, societies were formed in many European countries and elsewhere across the world.

In 1986, he suffered a catastrophic stroke which forced his retirement. Marston Exotics was taken over by Paul Gardner and moved to Herefordshire.

In 2000, the International Carnivorous Plant Society awarded him lifetime honorary membership and the December 2000 edition of their Newsletter was dedicated to him.

Adrian was a larger than life plant enthusiast with many other interests ranging from his great enthusiasm for French wines and tomato sauce (not together), art, 16th century English history, and violin playing.

Members may wish to read some “Favourite Anecdotes on Adrian Slack” by such luminaries of the CP community as Rob Cantley, Martin Cheek, Paul Gardner, Phil Mann, Barry Meyers-Rice, and Paul Temple which can be found at https://en.wikipedia.org/wiki/Adrian_Slack.

One anecdote recalled by his cousin Count Nikolai Tolstoy at Adrian’s very well attended memorial service was as follows:

Adrian and Nikolai planned to attend a Burn’s night event at his favourite pub. While Nikolai had a kilt to wear, Adrian did not and decided to wear his Sealed Knot uniform. In the early hours Adrian unwisely decided that it would be OK to drive back to his house through the leafy lanes of Somerset and inevitably crashed into a ditch miles from anywhere. This being before the advent of mobile phones, they were unable to call for help. Seeing a distant light they walked across several fields to reach a farm house. They knocked and the door was opened by the farmer’s wife who was startled to be confronted by two men, one dressed as a Cavalier Officer and the other as a Scot both of whom were heavily under the weather.

RIP Adrian.

—DENNIS BALSDON • The Carnivorous Plant Society • UK • dennisbalsdon@blueyonder.co.uk

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THE LONG OVERDUE RECOGNITION OF *SARRACENIA RUBRA* SUBSP. *VIATORUM*

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Keywords: Taxonomy: *Sarracenia rubra* subsp. *viatorum*.

Introduction

The complex of taxa associated with *Sarracenia rubra* Walter has long been embroiled in controversy, with many scientists having different perspectives on how the plant should be interpreted. In part, this is because the plants have an interesting, patchy distribution throughout the southeastern USA. An early classification scheme of the plants under discussion was promoted by Case & Case (1974, 1976):

Sarracenia rubra Walter

Sarracenia jonesii Wherry

Sarracenia alabamensis Case & R.B.Case

Sarracenia alabamensis subsp. *wherryi* Case & R.B.Case

Don Schnell, who I candidly observe was highly influential in my own thoughts on this, introduced a new name to recognize the plants along the Florida Gulf Coast:

Sarracenia rubra Walter

Sarracenia rubra subsp. *jonesii* (Wherry) Wherry

Sarracenia rubra subsp. *alabamensis* (Case & R.B.Case) D.E.Schnell

Sarracenia rubra subsp. *wherryi* (Case & R.B.Case) D.E.Schnell

Sarracenia rubra subsp. *gulfensis* D.E.Schnell

Looking at the names of scientists after the epithets, you see he did this by reducing the Case & Case “*S. alabamensis*” to subspecies status under *S. rubra*, and also transferred *S. alabamensis* subsp. *wherryi* to *S. rubra*. You can also see how even Wherry was uncertain how to deal with the *S. rubra* subsp. *jonesii* taxon, first having treated it as a species, and then as a subspecies. This is the system that Schnell has promoted throughout his career in his various popular and technical publications (Schnell 1976, 2002a; McPherson & Schnell 2011, 2013; and others).

For many years I worked for The Nature Conservancy, and during this time I founded the Conservation Program for the ICPS. While working with these organizations, I found it convenient to adopt the taxonomy widely used by many conservationists within the USA:

Sarracenia rubra Walter

Sarracenia jonesii Wherry

Sarracenia alabamensis Case & R.B.Case

Sarracenia rubra subsp. *wherryi* (Case & R.B.Case) D.E.Schnell

Sarracenia rubra subsp. *gulfensis* D.E.Schnell

This system suited me well for many years in my own publications (e.g., Rice 2006, 2018; and others). After leaving my position as the ICPS Director of Conservation Programs, as I no longer had to regularly liaise with conservation organizations, I began to use a hybrid system of classification, i.e.,

Sarracenia rubra Walter

Sarracenia jonesii Wherry

Sarracenia alabamensis Case & R.B.Case

Sarracenia alabamensis subsp. *wherryi* Case & R.B.Case

Sarracenia rubra subsp. *gulfensis* D.E.Schnell

This change in how I viewed *S. alabamensis* subsp. *wherryi* was inspired by field work during which I was impressed by how similar that taxon is to *S. alabamensis sensu stricto*. Furthermore, much of the range of *S. alabamensis* subsp. *wherryi* occurs, in broad terms, downriver of *S. alabamensis*, and that migration of propagules towards the coast is feasible. This is the system that Mellichamp & Case use in their treatment of *Sarracenia* in the eFlora of North America (Mellichamp & Case 2009).

The only additions to the nomenclature of the plants in the complex were made by McPherson & Schnell (2011), who added names to denote two anthocyanin-free forms (i.e., *S. rubra* Walter f. *luteoviridis* S.McPherson & D.E.Schnell, and *S. rubra* Walter f. *viridescens* S.McPherson & D.E.Schnell). In this work, the authors also corrected an error of protocol which required the change of “*Sarracenia rubra* subsp. *alabamensis* (Case & R.B.Case) D.E.Schnell” to “*Sarracenia rubra* subsp. *alabamensis* (Case & R.B.Case) S.McPherson & D.E.Schnell”.

The History of an Unresolved Issue

A final, long unresolved issue remains unaddressed regarding the *S. rubra* complex. In central Georgia, there are disjunct populations of the plant that seem to defy easy classification. Case & Case (1976) noted this group but concluded the plants fell into their concept of *S. rubra*. Sheridan & Scholl (1993) showed an image captioned “Robust colony of *S. rubra* (possibly ancestral *S. rubra* ssp. *gulfensis*) growing in hillside seepage bog of Marion County, Georgia 11/2/91”, but without supporting commentary in their text. Over several years, Sheridan and colleagues discussed this plant further (Sheridan *et al.* 1997; Sheridan & Patrick 2000), describing the communities in which it occurs, and recommended further evaluation of plants in the *Sarracenia rubra* complex.

In 2002, Schnell summarized the situation regarding the *S. rubra* complex in his authoritative treatment of carnivorous plants in the USA and Canada. In doing so, he noted in a range map (see Schnell 2002a page 165) a discontinuous population of plants in central Georgia, specifically in “Taylor County and environs.” Schnell notes that these plants “have the closest affinity to subspecies *gulfensis*, which is where I place them unless or until further studies indicate otherwise.” In their eFlora, Mellichamp & Case (2009) noted that the plants from Taylor County (and presumably elsewhere in the range segment) are “very dark maroon and very hairy externally”; they also recommended that these plants should be placed within *S. rubra* subsp. *gulfensis*.

Horticulturists—always on the lookout for something interesting and different—have long had interest in these plants, in particular those from Taylor County and Crawford County. Such plants are grown with a variety of unofficial names such as *Sarracenia rubra* “ancestral form,” *Sarracenia rubra* subsp. *gulfensis* “ancestor,” or *Sarracenia rubra* “Flint River drainage.”

The most complete treatment of these plants appeared in McPherson & Schnell (2011). In this work, the authors summarized what we know about this taxon, and compellingly argue that it displays distinct, if complicated, attributes. Despite the excellent summary on this plant’s distinguishing characteristics and range, McPherson & Schnell did not establish a name for the plant. This is particularly surprising, especially since the book (including my own *Darlingtonia* contribution in it) included names of nineteen new varieties and forms! Instead, the authors chose to use the somewhat cumbersome name “*Sarracenia rubra* ‘Incompletely diagnosed taxon from Georgia and South Carolina’” throughout the six-page treatment of the plant. This terminology has not been adopted by the

community of carnivorous plant horticulturists; however, McPherson & Schnell continued to use it in their next work (McPherson & Schnell 2013), which is essentially a distillation of McPherson & Schnell (2011). The use of single quotes in their terminology could be confusing, because in horticulture, single quotes is reserved for officially established cultivar names. However, for consistency with them, I will use it in this article despite its illegality. I ask forgiveness.

A Step Long Overdue

Frankly speaking, there are three perspectives on how to move forward. The first is to be satisfied with current taxonomy, and simply classify *Sarracenia rubra* ‘Incompletely diagnosed taxon from Georgia and South Carolina’ as a population of a plant taxon with an existing name. This is the route taken by, for examples, Mellichamp & Case (2009) or Schnell (prior to 2011). Similarly, it might be concluded that these plants simply represents some kind of hybrid swarm—an intermediate population caused by the intermingling of other subspecies, but one that has not stabilized itself into a evolutionarily significant entity. I do not think that these plants fit these scenarios.

A second approach is to study the plants until enough data are amassed to clearly—perhaps by statistical or molecular means—be able to develop some complete and clear metric for characterizing this taxon. In this way, for example, Schnell (2002b) elevated the under-described entity, known previously as *S. minor* ‘Okee Giant’, to *S. minor* Walter var. *okefenokeensis* D.E.Schnell. Unfortunately, there is no indication that this will happen for our case in *S. rubra*. The name “*S. rubra* ‘Incompletely diagnosed taxon from Georgia and South Carolina’” has been in circulation since 2011, and “*Sarracenia rubra* ‘Ancestral’” has arguably been in use since 1993, with no resolution yet!

A third approach is that which has long been used in botany, and that is to simply construct an appropriate Latin name, select a type specimen as a voucher, describe the plant as best as is possible at the time, and let history sort out the details. Obviously, the point is not to litter the history of plant research with outmoded synonyms. However, the role of nomenclature is to serve science, and in this case, it seems that some sort of name—more clearly defined than those previously in use—could and should be coined for use.

Furthermore, I note that—from a conservation standpoint—having a plant with a name on it can be far more useful for conservation workers in their attempts to protect plants. As an example, it is far more compelling to try to promote the protection of *S. purpurea* var. *montana*, than it would be if the plant were called *S. purpurea* ‘Incompletely diagnosed taxon from Georgia and the Carolinas’!

***Sarracenia rubra* Walter subsp. *viatorum* B.Rice, subsp. nov.**

LATIN DIAGNOSIS. *Sarracenia rubra* subsp. *gulfensis* similis. Imprimis ascidiorum magnitudine parviore, operculo hiantiore vel sursum versus plus obliquato ascidiorumque facie externa dense pubescente differt. Planta e regione collina “Fall Line” Georgiae Carolinaeque Meridionalis adiacente.

ENGLISH DIAGNOSIS. Similar to *Sarracenia rubra* subsp. *gulfensis*. Differs primarily in smaller pitcher size, a lid that is more gaping or slanted upwards, and densely pubescent pitcher exteriors. A plant of the fall line of Georgia and adjacent South Carolina.

TYPE. Georgia, Taylor County, 7 km N of Butler near Beaver Creek, 13 September 2003, Collector: Lisa M. Krueger, Coll. # 113 (GA 221861, accession #272913 – holotype). See Figure 1.



Figure 1: *Sarracenia rubra* subsp. *viatorum* specimen at the University of Georgia Herbarium. Some portions of the image blurred for security reasons.

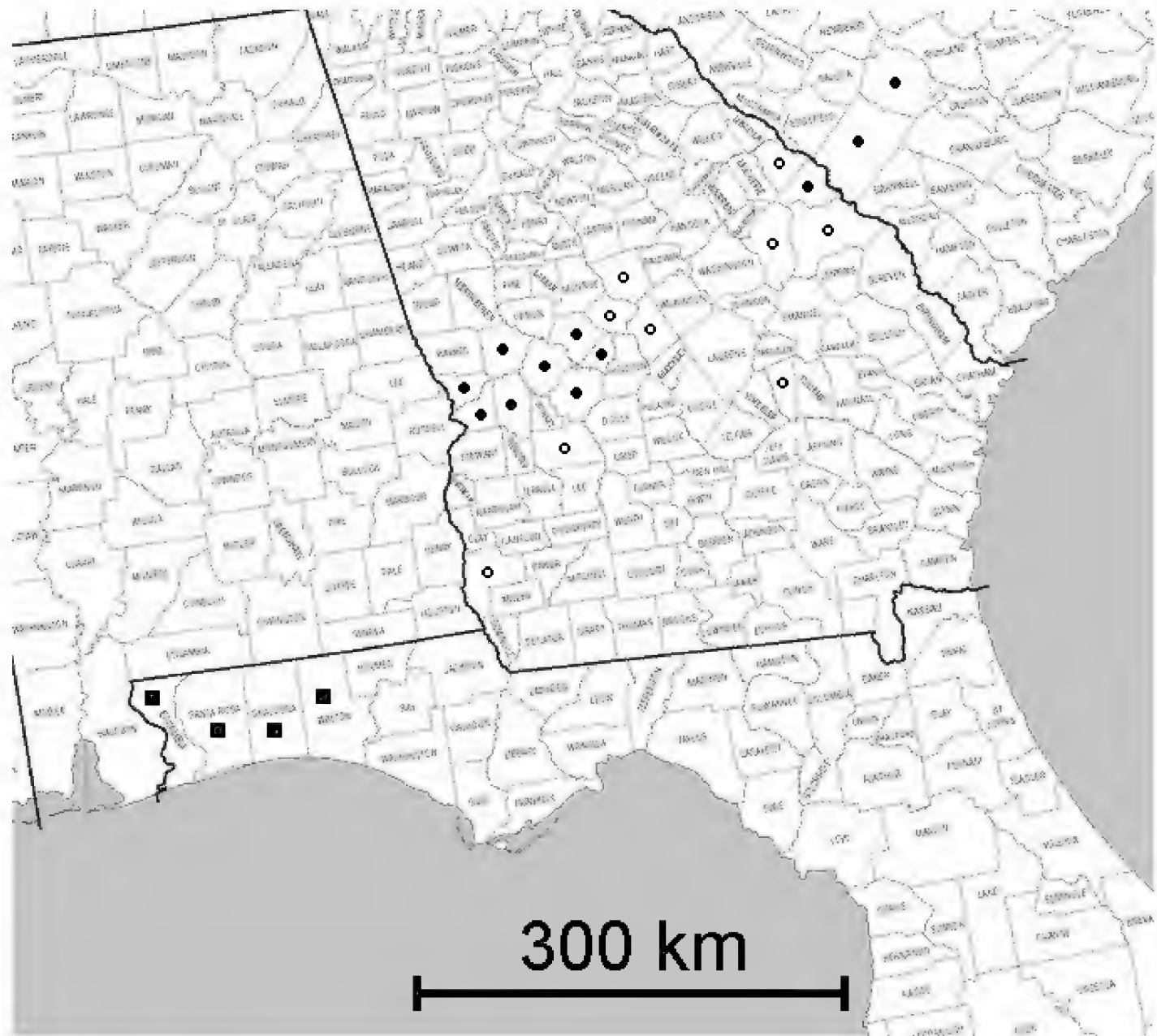


Figure 2: Range for *Sarracenia rubra* subsp. *viatorum* indicated for current (filled circles) and former (empty circles) populations. Filled squares indicate counties with *Sarracenia rubra* subsp. *gulfensis*.

HABITAT AND RANGE. Found primarily along the fall line sandhills of the southeast USA, ranging from far western Georgia, northeastwards approximately 400 km to Lexington County, South Carolina. Figure 2 shows the counties with extant populations (filled circles) and counties that once, but no longer have surviving populations (empty circles). It is not clear if the far northeast site in Lexington County South Carolina is *S. rubra* subsp. *viatorum*, or an intergrade with some other *Sarracenia rubra* subspecies.

DISCUSSION. There are several differences which separate *S. rubra* subsp. *viatorum* from the other plants in the *S. rubra* complex. In general, *S. rubra* subsp. *viatorum* is most similar to *S. rubra* subsp. *gulfensis*.

From both other *S. rubra* subspecies, *S. rubra* subsp. *viatorum* can be distinguished by the strong pubescence of the outer pitcher surface; in the other subspecies, the pitcher surfaces are at most weakly puberulent. In the field, of course, plant location is in most cases a useful tool in identifying this subspecies.

From *S. rubra* subsp. *rubra*, it differs by having pitchers that expand slowly in diameter from the ground to pitcher mouth, as opposed to having narrowly cylindrical pitchers that are of constant diameter over most of the pitcher body. The lid gapes upward at a dramatic angle of 45° or more, and is quite broad, while the lid of *S. rubra* subsp. *rubra* is closely held over the pitcher mouth, and tends to be more narrow or even straplike.

From *S. rubra* subsp. *gulfensis*—which, contrary to popular belief, is actually a very tall species—it can be distinguished by a smaller overall size (only 45 cm tall for *S. rubra* subsp. *viatorum*, instead of 60-80 cm for *S. rubra* subsp. *gulfensis*). The pitchers often tend to have a deeper maroon (i.e., brownish-red to purplish-red) coloration than those of *S. rubra* subsp. *gulfensis*.

In naming this species, the rank subspecies was chosen because the populations of this plant, in general terms, are far enough from the other occurrences of the species so that interbreeding is expected to be very low.

The name *viatorum* (“of the travelers”) denotes the separated range of this plant from the others in the species. There is no agreed-upon common name for this plant. However, in deference to horticultural usage, I propose “Ancestral pitcher plant”, in the spirit of the descriptor Sheridan used in 1993. That this plant really is ancestral to any other pitcher plant is highly speculative, at best. However, common names are a product of history and community usage, and do not necessarily reflect the best science!

CONSERVATION ASSESSMENT. The overall outlook for this plant in the long term is not very bright. It currently occurs in 10-11 counties in Georgia and South Carolina, while historical records place it at 9 additional counties—this does not include counties where it might have occurred, but where it simply was not collected.

In preparing a conservation review for a different work (Clarke *et al.* 2018), I surveyed conservationists across the USA and Canada, asking what their top threats to carnivorous plants were. In Georgia, conservation staff working with *Sarracenia* ranked as “very harmful threats” habitat development, exclusion of fire, changes in hydrology, invasive species; as “moderately harmful threats”, they included poaching and changes in management in right-of-way habitats. Climate change was noted as being an enormous multiplier of stresses, in particular regarding changes in fire, hydrology, and invasive species.

Key for *Sarracenia rubra* Subspecies

Note: writing a key for *Sarracenia* is always difficult, because there is so much variability in plant populations. I encourage the user of this key to examine all the phrases in the couplets, instead of just one, when keying their plants. This key is intended to identify plants in the wild. It will be less reliable for cultivated plants, because the appearance of cultivated plants is often modified by cultural conditions. Furthermore, plant collectors tend to select and value abnormal plants (particularly large or pigmented leaves, etc.).

1a—Pitcher tube cylindrical over most of its length, typically up to 30 (-40) cm tall; pitcher lid narrowly cordate to straplike, 1.5-2(2+)× as long as wide; pitcher lid usually positioned closely over the pitcher opening; a plant of the coastal plains of North Carolina, South Carolina, and southeastern Georgia.....*Sarracenia rubra* Walter subsp. *rubra*

1b—Pitcher tube slowly increasing in diameter over most of its length, typically up to 60 (-80) cm tall; pitcher lid broadly cordate, less than or equal to 1.5× as long as wide; pitcher lid not closely positioned closely over the pitcher opening; a plant of Florida, or the fall line region of Georgia up to central South Carolina.

- 2a**—Pitcher usually up to 60-80 cm tall; pitchers externally glabrous or weakly puberulent; pitcher lid nearly horizontal or rising gently over the pitcher opening; a plant of the western panhandle of Florida (Escambia, Santa Rosa, Okaloosa, Walton Counties).
 *Sarracenia rubra* Walter subsp. *gulfensis* D.E.Schnell
- 2b**—Pitcher usually up to 45 cm tall; pitchers externally densely pubescent; pitcher lid gaping high above the pitcher mouth, often tilted upwards by 45° or more; a plant of the fall line of Georgia to central South Carolina.
 *Sarracenia rubra* Walter subsp. *viatorum* B.Rice

I have been very cautious about entering the discussion of *Sarracenia* nomenclature—my expertise is with species from the western United States. However, putting a name on this plant was long overdue. Of course, it will be interesting to see—will the name still be in use in 30 years? Or will it be discarded to the ranks of synonymy? In any event, at least now there is appropriate nomenclature. If there is controversy regarding my choice—and no doubt there will be—my hope is that it will spur further investigation into the plant’s relationships with other *Sarracenia*. Indeed, perhaps molecular methods will be able to help, much as it holds promise for detecting cryptic species in *Sarracenia alata* (Carstens & Satler 2013).

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References

- Carstens, B.C., and Satler, J.D. 2013. The carnivorous plants described as *Sarracenia alata* contains two cryptic species. *Biological Journal of the Linnean Society* 109: 737-746.
- Case, F.W., and Case, R.B. 1974. *Sarracenia alabamensis*, a newly recognized species from central Alabama. *Rhodora* 76: 650-665.
- Case, F.W., and Case, R.B. 1976. The *Sarracenia rubra* complex. *Rhodora* 78: 270-325.
- Clarke, C., Ross, A., and Rice, B.A. 2018. Chapter 27: Conservation of carnivorous plants. In: Ellison, A., and Adamec, L. (Eds.). *Carnivorous Plants: Physiology, Ecology, and Evolution*. Oxford University Press. Portland, Oregon.
- McPherson, S., and Schnell, D. 2011. *Sarraceniaceae of North America*. Redfern Natural History Productions. Poole, Dorset, England.
- McPherson, S., and Schnell, D. 2013. *Field Guide to the Pitcher Plants of the United States and Canada*. Redfern Natural History Productions. Poole, Dorset, England.
- Mellichamp, T.L., and Case, F.W. 2009. *Sarracenia*. In: *Flora of North America Editorial Committee, ed. 1993+. Flora of North America North of Mexico*. 20+ vols. New York and Oxford. Vol. 8: 350-363.
- Rice, B.A. 2006. *Growing Carnivorous Plants*. Timber Press. Portland, Oregon.
- Rice, B.A. 2018. The carnivorous plant FAQ v12, <http://www.sarracenia.com/faq.html>. Accessed 14 August 2018.
- Schnell, D.E. 1976. *Carnivorous Plants of the United States and Canada*. John F. Blair, Publisher: Winston-Salem, North Carolina.

- Schnell, D.E. 2002a. Carnivorous Plants of the United States and Canada, 2nd ed. Timber Press, Portland, Oregon.
- Schnell, D.E. 2002b. *Sarracenia minor* Walter var. *okefenokeensis* D.E. Schnell: a new variety. Carniv. Pl. Newslett. 31: 36-39.
- Sheridan, P., Orzell, S., and Bridges, E. 1997. Some noteworthy vascular plant records from Atlantic white-cedar, *Chamaecyparis thyoides* (L.) B.S.P., habitats of western Georgia. In: Proceedings: Atlantic white-cedar: ecology and management symposium; 1997 August 6-7; Newport News, Virginia. Gen. Tech. Rep. SRS-27. Asheville, North Carolina: U.S. Department of Agriculture, Forest Service, Southern Research Station. 49-60.
- Sheridan, P., and Patrick, T.S. 2000. A Rare Plant Survey of Atlantic White-Cedar, *Chamaecyparis thyoides* (L.) B.S.P., Habitats of the Georgia Westcentral Fall Line Sandhills. Christopher Newport University, Newport News, Virginia. 101-112.
- Sheridan, P., and Scholl, B. 1993. Noteworthy *Sarracenia* collections. Carniv. Pl. Newslett. 22: 58-61.



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CONTRIBUTION TO KNOWLEDGE OF *SARRACENIA* 'ADRIAN SLACK' GENETIC BACKGROUND

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Sarracenia hybridization and genetics have been my interest since early 1990s. A cultivar looking like *Sarracenia* 'Adrian Slack' was my dream plant for a long time; I wanted to create such a plant and name it after my wonderful wife. When I opened the envelope with December issue of CPN in 2000, my jaw just fell to the ground: "Somebody else made it!". I read immediately that this splendid cultivar was named after Adrian Slack and it is a natural creation in fact. Although it has been nearly 20 years since *Sarracenia* 'Adrian Slack' (ADS later in text) was described, it is still one of the most elegant *Sarracenia* cultivars. It was obvious to be a superior clone of natural hybrid between *Sarracenia flava* and *S. leucophylla*. According to its original description ADS has inherited its fenestration after *S. leucophylla* and deep red veins after *S. flava* (Hanrahan & Meyers-Rice 2000). Heavily veined types of *S. flava* (as putative donors of intense venation) are referred to as *Sarracenia flava* var. *ornata* (Hort. Bull ex W. Robinson).

Exceptional beauty and transatlantic origin (from my point of view) together made absolutely clear it will be very difficult and pretty expensive to get a piece of this cultivar into my personal collection. Although it took me 11 years to get my personal "copy" of ADS, my creative fingers got fulfilled a bit earlier. I visited United Kingdom and the great collection of my good friend Mike King in the end of April 2006. I immediately spotted the new jewel in his collection, although the pitchers were just opening. And it was just in bloom! Most likely the first flowering of ADS in Europe! Mike was so kind and he allowed me to collect all of its pollen into prepared microtubes. In my collection I pollinated several carefully chosen flowers in order to obtain an offspring of similar qualities like original ADS. Results of these first eight crossings were seriously surprising to me as the offspring segregated in many more color types than expected. Moreover, these color types were present in certain frequency patterns. Most of these findings were observed repeatedly in countless crosses and backcrosses I performed using ADS since that time. Therefore, I decided to share this experience with all the CP community in this article.

Results and Discussion

Sarracenia flava var. *rugelii* was genetically involved and entire *S.* 'Adrian Slack' genotype is *S. flava* dominant:

The very first published photographs didn't indicate genetic influence of any other taxa than heavy veined *S. flava* (= var. *ornata*) and *S. leucophylla*. Characters such as extremely massive peristome, very slim column and perfectly cordate lid reminded me of a shape typical for *Sarracenia flava* var. *rugelii*. Such idea of mine was supported by photographs published later, which had clearly shown darker coloration of the cultivar's column. This was supported as well by results of my first breeding experiments listed above. Approximately half of the seedlings exhibited typical *S. f.* var. *rugelii* throat patch even if it could not be inherited from the second parent used. Many of these red throat seedlings looked even like they were crossed not by \times *moorei* but just with pure *S. f.* var. *rugelii*. The influence of *S. f.* var. *rugelii* is clearly visible e.g. in offspring of *S.* 'Leah Wilkerson' \times ADS, famous combination that was repeatedly performed by several growers around the

globe. Aside of excellent cultivars like *S. 'Legacy'*, such a cross always provided a high portion (about 10-15%) of plants that were indistinguishable from pure *S. f. var. rugelii* (Fig. 1). On the other hand, it is surprising, that combination *S. 'Leah Wilkerson'* × ADS probably never led to a plant looking like pure *S. leucophylla*. (*Sarracenia leucophylla*-like seedlings should be present if the *flava:leucophylla* portion in ADS genome were close to 50:50.)

This was one of the signs which led me to a hypothesis that ADS is a greatly *S. flava* dominated genotype. Aside from the fact the offspring of ADS is biased to “*S. flava*” types in pitcher color and morphology, such a hypothesis can be supported by more phenotype markers. First of all, the offspring strongly tends to be yellow or orange flowered. Typical red tone and shape of *Sarracenia leucophylla* flowers are very rare even in crosses like *Sarracenia leucophylla* × ADS. Third evidence of *S. flava* dominance is morphology of the rhizomes of ADS offspring. The growth tip of most plants is bulbous like in *S. flava* and not same-sized compared to rhizome diameter like in *S. leucophylla*. The fourth and for me the strongest evidence is the year-round growth dynamics. The growth activity of ADS itself and all its offspring is strongly (but really strongly) spring-shifted, like in *Sarracenia flava* and its hybrids. The vigorous autumn growth typical for *Sarracenia leucophylla* is absent. The spring-shifted growth dynamics of ADS offspring is very uniform and so strong that ADS hybrids behave like they were crossed by pure *S. flava* and not by *S. × moorei*.



Figure 1: Selected seedling of *Sarracenia 'Leah Wilkerson'* × ‘Adrian Slack’ mimic of *S. flava* var. *rugelii*.

Sarracenia rubra subsp. *gulfensis* introgression:

Sarracenia × moorei (= *S. flava* × *leucophylla* hybrids *sensu lato*) are typically big monsters frequently reaching 1 meter tall. In some cases, ADS plants are not the tallest ones. The size of the pitchers is a tricky feature because size is greatly influenced by growth conditions. Moreover, it is controlled by quantitative genetics so the hybrid offspring diverges according to a Gaussian curve. It is hard to evaluate individual plants according to size therefore. I have several clones of *Sarracenia leucophylla* in my collection that typically provide very uniform offspring, including the height. I assume therefore, these “proven” clones have high level of homozygosity. When I crossed two of these clones with ADS, I obtained a very broad Gaussian curve of height in mature plants of both hybrid populations. For example, the plant shown in Figure 5c is nearly twice as tall as the plant in Figure 5b, although all of the plants in Figure 5 come from same cross and are grown side by side. Although pitcher height is problematic, it initiated my suspicion that one of the ADS ancestors was a small plant. *Sarracenia rubra* subsp. *gulfensis* came to my mind as a not very surprising “offender”. *Sarracenia* ADS comes from the Milton area, Santa Rosa Co., Florida. Genetic introgression of *S. rubra* subsp. *gulfensis* in *S. leucophylla* populations is quite frequent in that area, even if the *S. rubra* subsp. *gulfensis* is not present itself in all the introgressed populations.

Although size variation is definitely not a significant proof in itself, about 10% of the seedlings in all of the ADS crosses that I made exhibited more rigorous features. These typical *S. rubra* phenotype characteristics present in the minor portion of ADS offspring are as follows:

- 1) Very fine veining, sometimes even with brown color tone typical for *S. r. subsp. gulfensis* (Fig. 2d,e).



Figure 2: *Sarracenia rubra* subsp. *gulfensis* color patterns observed in selected seedlings of *S.* 'Adrian Slack' offspring: a) *S. rubra* subsp. *gulfensis*; b) *S.* (*purpurea* × *leucophylla*) × ADS; c) *S. leucophylla* × ADS; d) *S.* (*leucophylla* × *minor* var. *okefenokeensis*) × ADS; e) *S.* 'Rudolf II' × ADS.

- 2) Creamy fenestration of ADS itself. This is bit disputable characteristics, but maybe some of the *Sarracenia* active enthusiasts would agree with me. In the *S. leucophylla* + *rubra* and *S. alata* + *leucophylla* mixed populations there are frequent hybrid plants exhibiting a large area of creamy-toned fenestration on their pitchers accompanied by very fine veining. This is one of the possible phenotypes rising from segregation of higher generations of *S.* × *areolata* or *S.* × *readii*. According to my color vision, the tone of the fenestration in ADS is the same.
- 3) Multiple flowers. It is a feature that is not usually seen in ADS itself, but I have observed it many times in most of the hybrids derived from ADS (see Fig. 3). Typically, there is just a single flower on the apex of the *Sarracenia* rhizome in the spring. But it might happen in some hybrids, that they produce 2–4 flowers in the growing tip. Such a feature could be sometimes observed in plants from the *Sarracenia rubra* complex. I have observed this anomaly more frequently in *S. flava* × *rubra* hybrids or in other complex hybrids where *S. flava* and *S. rubra* meet.
- 4) Pinkish coloration of the lower surface of the lid. Strong red/pinkish coloration of the lower side of the lid is frequent and exclusive for some *S. alata* and *S. rubra* types. Also, in *S. rubra* subsp. *gulfensis* (see Fig. 2a). This pattern of pinkish pigmentation can be seen on the lower surface of

the ADS lid as well. In some descendants of ADS, the pigmentation pattern of the lid is enormously evoking the *S. rubra* subsp. *gulfensis* lid (see Fig. 2a, b, c)

- 5) Probably the nicest evidence of *S. rubra* introgression in the ADS genome provides nectary distribution on the top parts of the pitchers. Nectaries of *Sarracenia flava* are located around the lid rim and throat area (Fig. 4a). Nectaries of *Sarracenia leucophylla* are present on the lower surface of the lid, dispersed in the hairy area of the lid. The peristome of these two species is waxy, sugar free. Same in the *S. × moorei* peristome (Fig. 4c). Nectaries in *S. × moorei* typically demonstrate overlapping distribution of *S. flava* and *S. leucophylla*. But the peristome of ADS holds a lot of active nectaria! (Fig. 4e). This is a typical feature of the peristome of *S. rubra* (Fig. 4d).

Genetic linkage in color patterns:

Presence of a red throat in *Sarracenia* is encoded by a single locus (probably single gene?) according to my breeding experiments. (The extent of this article does not allow demonstration of the primary experimental data referring to this statement; a parallel article would be necessary.) I am not talking about size and shape of the red throat patch which is encoded independently in more complicated way. The character of the red throat itself demonstrates incomplete domination, which means in “negative” homozygotes the red throat is absent. In heterozygotes, it is present, but light red pigmented. A red throat is present and dark black in “positive” homozygotes.

Sarracenia ‘Adrian Slack’ appeared to be a heterozygote for this single locus character. Its offspring segregate exactly half to half when crossed with anything “red throat negative” like e.g. *S. leucophylla*. A classic single gene F2 pattern 1:2:1 was also proven in crosses of red throat heterozygotes, e.g. *S. (leucophylla × flava* var. *rugelii) × ADS* and other more complex crosses.

A surprising and very spectacular finding was a very frequent co-segregation of the overall color pattern of the pitchers together with presence/absence of a red throat patch in ADS offspring. That means most of the red throat positive seedlings of ADS are light colored (vein-less or pure veined) and the seedlings lacking a red throat are typically heavily veined (Fig. 5). Recombinant phenotypes like (red throat + heavy veins) or (absent red throat + light pitchers) are very rare, see Table 1. This indicate two conclusions:

- 1) “Red throat” locus is situated on the same chromosome of the ADS genome like the locus controlling pigmentation of veins of the pitchers. Both loci are situated quite close to each other as the power of genetic linkage can be estimated to about 4 centimorgans (cM). This value of chromosomal distance is calculated as ratio of recombined and non-recombined specimens; data presented in Table 1.
- 2) One parent of ADS needed to be red throat positive + light veined or more likely vein less. The second parent was heavily veined, lacking red throat. Alternative hypothesis of ADS heterozygote genotype originating from recombination of different looking parents would be $0.04 \times 0.04 = 0.0016$ (0.16%). Probability of primary hypothesis not taking recombination in count is therefore 99.84%.



Figure 3: Multiple flowers are frequent in some seedlings raised from *Sarracenia* ‘Adrian Slack’ offspring. Here is mature plant of *S. (leucophylla × minor* var. *okefenokeensis) × ADS*.



Figure 4: Distribution of nectaria in *Sarracenia* 'Adrian Slack' related taxa: a) *S. flava* (example var. *atropurpurea*); b) *S. leucophylla*; c) *S. x moorei*; d) *S. rubra* subsp. *gulfensis*; e) *S. 'Adrian Slack'*.

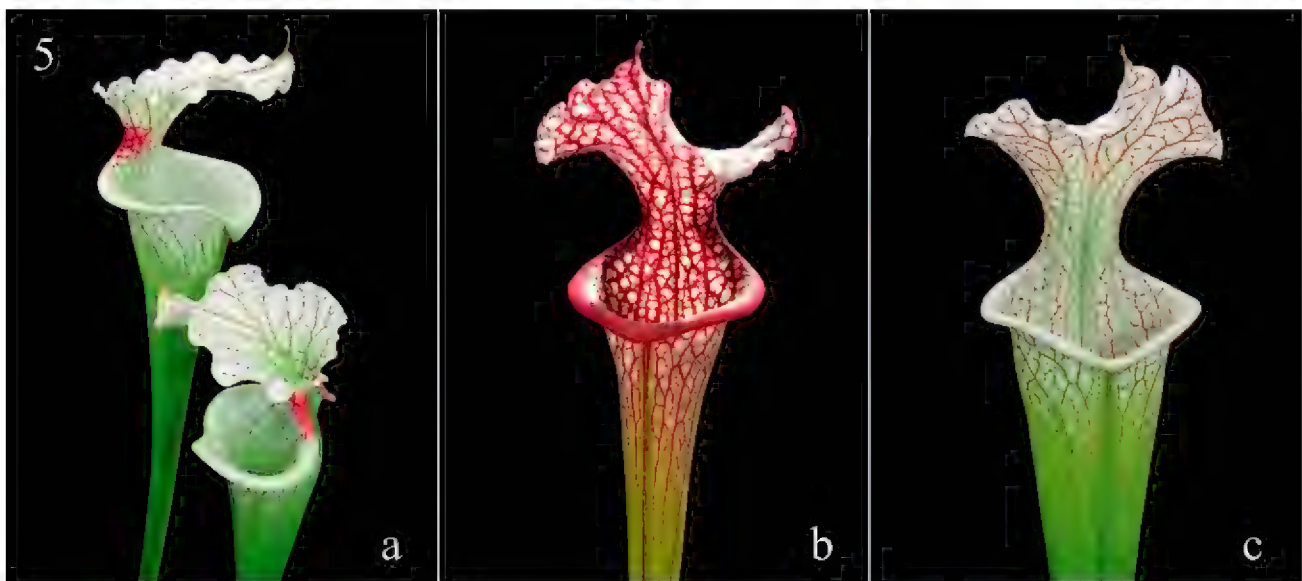


Figure 5: Example of phenotype segregation in *Sarracenia* 'Adrian Slack' offspring – *S. leucophylla* × ADS; a) frequent phenotype = light colored pitchers with red throat patch; b) frequent phenotype = red veined without red throat patch; c) example of rare recombinant phenotype = light pitcher without red throat patch.

Table 1. Counts of phenotypes in selected hybrids used for genetic linkage estimation.

Hybrid	Light pitchers + red throat	Heavy veined - red throat	Recombinants (all together)	cM estimation
<i>S. leucophylla</i> (white pitchers) × ADS	220	204	18	4.25
<i>S. leucophylla</i> (red veined) × ADS	131	148	12	4.30
<i>S. (leucophylla × flava</i> var. <i>ornata)</i> × ADS	67	78	6	4.13
<i>S. (leucophylla × minor</i> var. <i>okefenokeensis)</i> × ADS	106	98	7	3.43
Sum; cM estimation mean	524	528	43	4.03

What did the parents of *Sarracenia* ‘Adrian Slack’ look like?

This is a complete speculation, but we still have some more hints available. Due to the presented gene linkage we can assume one parent was light colored with throat patch, a second one was heavy veined, lacking throat patch. A second round of indications comes from the lid. The lid margin in ADS is straight; same in *S. flava*. According to results of my older experiments it seems, that the finest undulation of the lid rim of *Sarracenia leucophylla* is encoded also by a single gene and therefore inherited by the classic Mendelian model. Heterozygotes have lid undulation half prominent compared to fully undulated homozygotes e.g. *S. leucophylla*. As the lid of ADS has a straight rim (= homozygote for “flava – rim”), both parents must have carried at least one “flava - rim” allele for the straight lid. As I deduced in the beginning of the “Results and discussion” section, ADS is “flava” dominant. We can hypothesize one parent of the ADS might be *S. flava* var. *rugelii* itself. Although this could be possible according all the genetic evidence discussed above, I consider this case as not very likely. If one parent of ADS were pure *S. f.* var. *rugelii*, the result (ADS) would not have the rich fenestration that it has in the end. Therefore, I assume that the “light + red throat” parent was *S. × moorei* close to *S. f.* var. *rugelii* in its appearance. The second parent was likely a donor of the rich red vein pigmentation, had no red throat patch, and was most likely a dominant donor of the fenestration. We might hypothesize it could be “*S. leucophylla*” introgressed by *S. rubra* subsp. *gulfensis*. But the “red veined” parent must have been a more complex hybrid as we already know, both parents carried at least one allele of the straight “flava – rim” and the result (ADS) is a strongly “flava” dominant genotype. It is much more likely the “red veined” parent was a heavily veined “*S. × moorei*” with rich fenestration and some introgression of *S. rubra* subsp. *gulfensis*. Maybe something like the plants in Figures 2c or 5b.

Sarracenia flava var. *ornata* influence in *S.* ‘Adrian Slack’ genotype:

Honestly, after performing dozens of hybrids using ADS and evaluating countless number of seedlings, I cannot bring any clear proof that intense veining of ADS comes from *Sarracenia flava* as it was assumed in its original description (Hanrahan & Meyers-Rice 2000). It is very likely, as *Sarracenia flava* var. *ornata* types are frequent in the ADS native region. But on the other hand, prominent red veining could come from *Sarracenia leucophylla* or *S. rubra* subsp. *gulfensis* as discussed above. Obviously, there is a broad discussion on the origin of the heavy veined patterns in

Sarracenia flava as such. So... Although at first glance ADS is a hybrid coming from *S. flava* var. *ornata*, the presence of this variety in ADS genome remains an open question for me.

Conclusion

Sarracenia 'Adrian Slack' seems to be a striking example of natural breeding process involving *S. flava* var. *rugelii*, *S. flava* var. *ornata*, *S. leucophylla* and very likely *S. rubra* subsp. *gulfensis*. It has been proven many times to be an excellent parent for horticultural breeding providing unbelievable color combinations in its offspring. Aside from the extreme color variability the typical features of ADS offspring are elegant shape of the pitchers, broad peristome and very vigorous, spring dominated growth.

References

Hanrahan, B., and Meyers-Rice, B. 2000. New cultivars. *Carnivorous Plant Newsletter* 29(4): 116-117.



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POSSIBLE POLLINATORS FOR TWO JAPANESE *Pinguicula* SPECIES

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Keywords: Flower, Japanese *Pinguicula*, *P. macroceras*, *P. ramosa*, pollinator.

This short article documents floral visitors or possible pollinators for the flower of two Japanese *Pinguicula* species, *P. macroceras* Link and *P. ramosa* Miyoshi, presumably the first witness to be reported. It is widely believed that those *Pinguicula* flowers are basically pollinated by insects, but what kinds was previously unknown. The author has confirmed at some natural localities, floral visits of a sweat bee species on a flower of *P. macroceras* and of hoverflies and ocellate rove beetles on *P. ramosa* flowers.

The pollination of *Pinguicula* flowers is basically entomophilous (Wood & Godfrey 1957; Proctor *et al.* 1996; Fleischmann 2016) except a few species, e.g. *P. lusitanica* L. or *P. villosa* L., that might be autogamous (Torbjorn 2000; Heslop-Harrison 2004). Types of pollinators attracted may correlate with flower colors, spur length (Shimai 2017), or UV reflection patterns of the flowers (Gloßner 1992). However, only a few possible pollinators for *Pinguicula* have been reported; flies for *P. alpina* L. (Proctor *et al.* 1996), some butterfly species, bees, and a hoverfly for *P. moranensis* Kunth (Villegas & Alcalá 2017), thrips and beetles for *P. vallisneriifolia* Webb (Zamora 1999), bees for *P. vulgaris* L. (Heslop-Harrison 2004), bees (including bumble bees and honey bees) and hoverflies for some *Pinguicula* species from the southeastern U.S.A. (Annis *et al.* 2014; Fleischmann 2016), an empidid fly for *P. leptoceras* Rchb. (Fleischmann 2016), and for more information see Fleischmann (2016). Detailed studies on the Japanese *Pinguicula* species have been published by Komiya (1988) and Komiya and Shibata (1999), but no information on their pollinators is available today.

Studied localities

P. macroceras JAPAN. Saitama: Chichibu, wet rock wall beside the Nakatsu-gawa River in the Nakatsu-kyo Gorge, near Deai bus stop, ca. 680 m alt., 10:30 a.m. (Japan Standard Time), 26 May 2018.

P. ramosa JAPAN. Tochigi: [Site 1] Ashio (Nikko), volcanic rock wall below the summit of Mt. Koshin-zan, ca. 1,820 m alt., 11:00 a.m. (JST), 10 June 2017. [Site 2] Nikko, volcanic rock wall on the north-slope of Mt. Nantai-san, ca. 2,270 m alt., 10:30 a.m. (JST), 30 June 2018.

For *P. macroceras*, an unidentified sweat bee species of family Halictidae (pers. com., A. Fleischmann) visiting the flower was observed (Fig. 1 left). According to an entomologist, it is not possible to identify exact species due to a taxonomic issue (pers. com., T. Ide). In the case of *P. ramosa*, a hoverfly species, very likely *Eupeodes (Metasyrphus) bucculatus* (Rondani 1857), was observed at Mt. Koshin-zan (Fig. 1 right). Accurate identification of the species based on the captured image was, however, difficult since their heads and thoraxes had been partially covered by pollen grains (pers. com., T. Ide). Another possible pollinator for *P. ramosa* is an ocellate rove beetle (Staphylinidae subfamily Omaliinae), probably *Eusphalerum* sp. (identified by S. Nomura), observed at Mt. Nantai-san (Fig. 2). It seems that the beetle licks nectar in the spur without touching the stamen because of their small body size, but they pollinate by chance when crawling inside of the corolla. In general, it is not common to see insects visiting those *Pinguicula* flowers, suggesting that they

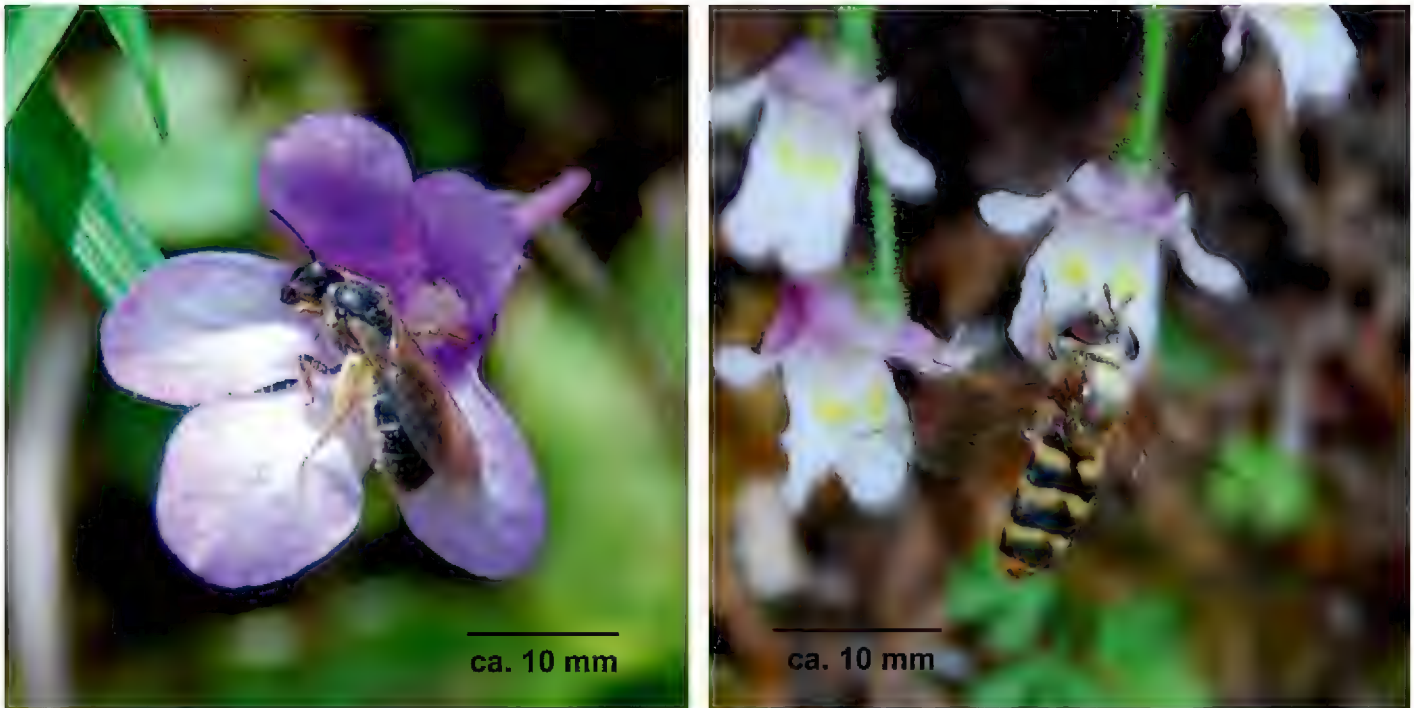


Figure 1: Unidentified sweat bee species on *P. macroceras* flower at Nakatsu-kyo Gorge (left); Hoverfly on *P. ramosa* flower at Mt. Koshin-zan (right).

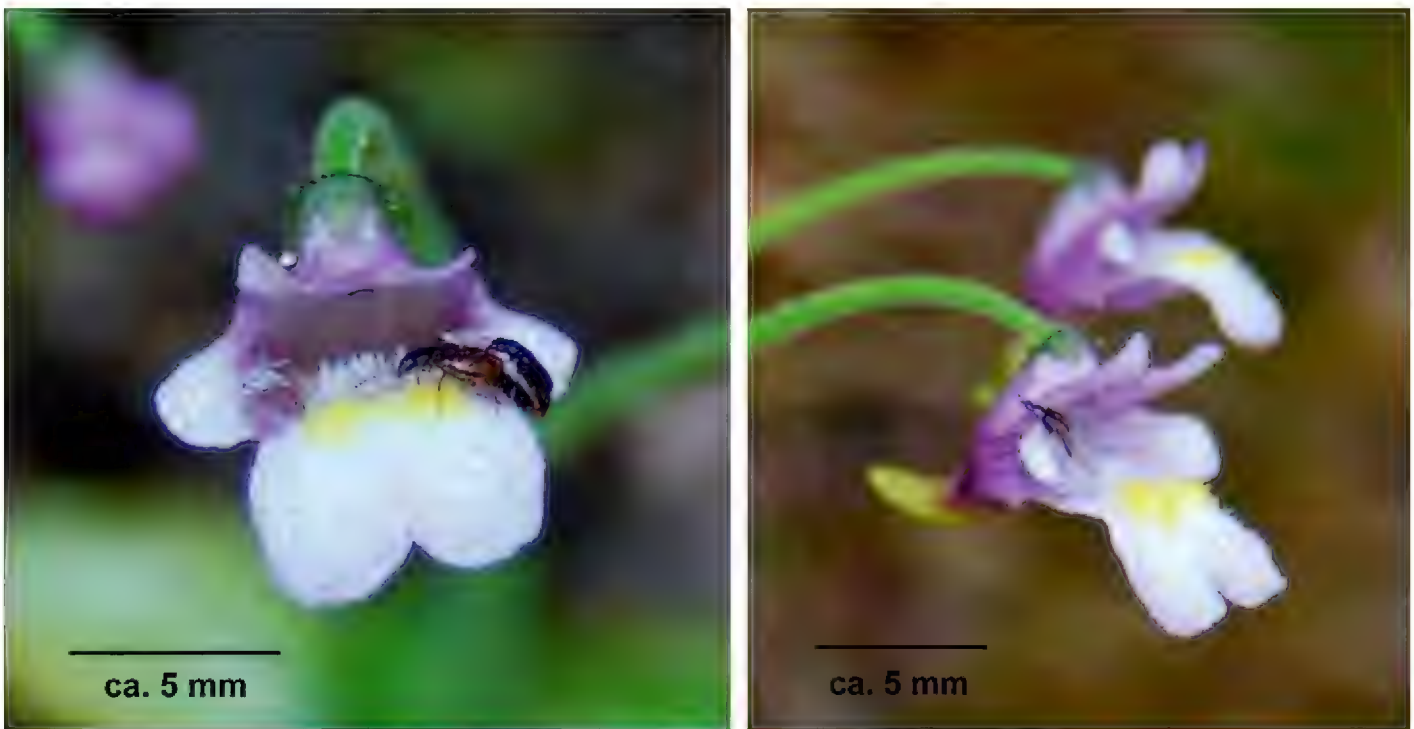


Figure 2: Mating ocellate rove beetles on *P. ramosa* flower at Mt. Nantai-san (left); ocellate rove beetle expanding wings on *P. ramosa* flower at Mt. Nantai-san (right).

are probably active only under specific conditions, e.g. weather, temperature, and the time of day, during a relatively short *Pinguicula* flowering season. The observed possible pollinators are seldom caught as prey by the plants (pers. obs., H. Shimai). It is possible that other insect species visit their flowers as reported by Shimai (2016). The localities of *Pinguicula* in Japan are mostly restricted to higher mountains or deep gorges (Komiya & Shibata 1999) normally difficult to access for periodical observations. Further studies are, however, required concerning the pollinators for *Pinguicula* as the entomological fauna changed at the locality, the author thinks that the *Pinguicula* population might possibly decline.

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References

- Annis, J., Primer, S.B., Molano-Flores, B., Coons, J., and Feist, M.A. 2014. Pollination requirements and self-compatibility of Godfrey's butterwort, *Pinguicula ionantha* (Lentibulariaceae). Poster presentation at Botany 2014 Conference, Boise, Idaho.
- Fleischmann, A. 2016. *Pinguicula* flowers with pollen imitations close at night - some observations on butterwort flower biology. Carnivorous Plant Newsletter 45: 84-92.
- Gloßner, F. 1992. Ultraviolet pattern in the traps and flowers of some carnivorous plants. Bot. Jahrb. Syst. 113: 577-587.
- Heslop-Harrison, J. 2004. *Pinguicula* L. Journal of Ecology 92: 1071-1118.
- Komiya, S. 1988. *Pinguicula ramosa* Miyoshi, a representative of Japanese carnivorous plants. [in Japanese.] The Natural History of Japan 2(6): 49-56.
- Komiya, S., and Shibata, C. 1999. Japanese *Pinguicula* (Lentibulariaceae). [in Japanese.] Bulletin of the Nippon Dental University General Education 28: 117-146.
- Proctor, M.C.F., Yeo, P., and Lack, A. 1996. The Natural History of Pollination. Portland: Timber Press.
- Shimai, H. 2016. *Pinguicula ramosa* Miyoshi - a botanical review. Carnivorous Plant Newsletter 45: 51-68.
- Shimai, H. 2017. Taxonomy and conservation ecology of the genus *Pinguicula* L. (Lentibulariaceae). PhD Thesis. University of Kent.
- Torbjorn, A. 2000. Flora of north Norway: *Pinguicula villosa* L. (Lentibulariaceae). Polarflokken 24: 193-205.
- Villegas, S.G., and Alcalá, R.E. 2018. Reproductive ecology of the carnivorous plant *Pinguicula moranensis* (Lentibulariaceae). Plant Biology 20: 205-212.
- Wood, C.E. Jr., and Godfrey, R.K. 1957. *Pinguicula* (Lentibulariaceae) in the southeastern United States. Rhodora 59: 217-230.
- Zamora, R. 1999. Conditional outcome of interactions: the pollinator-prey conflict of an insectivorous plant. Ecology 80: 786-795.



SAND WICK FOR *CEPHALOTUS*

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Cephalotus follicularis or the Albany Pitcher Plant, grows along the southern coastal districts of Western Australia from Augusta to Cheynes Beach, 65 km east of Albany (Lowrie 2013). Plants typically grow in peat-based soils in swamps, or in one case a coastal cliff face, where there is a constant flow of fresh water.

In the swamps, *Cephalotus* grows slightly above the water table and often at the base of *Melaleuca* species where the soil is elevated above the surrounding swamp through an accumulation of vegetative material (Fig. 1). When searching for *Cephalotus*, plants will usually be found on the up-stream side of the swamps where fresh water permeates from higher seeps and springs. These observations are important when cultivating *Cephalotus*, particularly when selecting which method is used to water potted plants.

The water tray method is a common method of supplying water to carnivorous plants as it allows many species to be grown together and allows a provision of stored water to plants whilst growers are away from their plants for a couple of days. The water tray method does have disadvantages in that the water temperature can increase significantly during hot weather and the water condition can become stagnant and high in dissolved salts if not flushed regularly; common factors in the death of many cultivated Albany Pitcher Plants.

Many growers combat the Albany Pitcher Plant's inherent Achilles' heel by regular overhead watering, self-watering pots, using a wick-based system, or potting plants into very aerated potting mixes. Whilst these methods are fine, I have developed a technique to allow *Cephalotus* to be grown with other swamp growing carnivorous plants using the water tray method for watering.



Figure 1: *Cephalotus follicularis* growing along the southern coast of Western Australia.



Figure 2: Illustration of the potting method used for growing *Cephalotus follicularis*.

The principle is simple and is based upon observations of how water moves through sand at a beach. A layer of peat or *Sphagnum* moss is placed in the bottom of the pot. This serves to block the drainage holes and prevent the sand from washing out of the pot. Coarse washed river sand is then added to the pot to about two thirds to three quarters of the height of the pot. Finally, a layer of peat moss is added on top of the sand to the rim of the pot. *Cephalotus* is then planted into this peat layer, with the addition of a small amount of pebbles added as a top dressing. This potting method is illustrated in Figure 2.

The pot may then be placed into the water tray. It does not matter too much if the water level gets halfway up the pot, however, the usual 2-5 cm of water is ideal.

The theory behind this method is two-fold. First, the top layer of peat is kept aerated and is never allowed to come into direct contact with the water and therefore will remain fresh. Secondly, the sand layer wicks up the required amount of water which is then transported to the peat and root zone.

This method allows me to grow *Cephalotus* with most of my *Drosera*, *Sarracenia*, etc., saving me space and the requirement to set up an alternate watering system for my plants. I developed this system two years ago and have now transferred all of my *Cephalotus* to it.

References

Lowrie, A. 2013. Carnivorous Plants of Australia, Magnum Opus, Volume 1. Poole, Dorset, England: Redfern Natural History Productions.

NEW CULTIVARS

Keywords: cultivar, *Sarracenia* 'Max Rawlings', *Dionaea* 'Cleopatra', *Sarracenia* 'Inspiration'.

Sarracenia 'Max Rawlings'

Submitted: 16 August 2018

Sarracenia 'Max Rawlings' is a cross between *S. leucophylla* and *S. × catesbaei* that I germinated in Spring 1990. I have named it after my first grandchild.

Both of the parents were purchased from Adrian Slack's Nursery, Marston Exotics. The height of the pitchers can reach at least 70 cm. The tubes of young pitchers are green at the base, gradually becoming red veined on a cream background near the mouth. As the pitcher ages, the red color can extend all the way to the base (Fig. 1).

The hood, which has downward pointing hairs on the interior, undulates around the edge and has a very pronounced upturned spur at the apex. In young pitchers, the hood has a cream background and very heavy red venation. As the pitchers age, the background color is a suffused beautiful pink and eventually red with deeper color red veins.

The flowers are an orange color with green umbrella and red petals, and are borne on a stem which often has a waviness near the top.

The plant should only be reproduced by vegetative means to ensure that its unique characteristics are maintained.

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Figure 1: *Sarracenia* 'Max Rawlings' young, intermediate, and old pitchers (right to left).

Dionaea 'Cleopatra'

Submitted: 2 September 2018

In August 2017, I bought this marvelous specimen of *Dionaea muscipula* in the supermarket garden-shop area, near the city of Ravenna (Italy). I do not know the origin of the carnivorous plants on the sales table. Many plants were dehydrated, almost dead, with leaves crumpled due to lack of water. Among these was a small *Dionaea* with three to four dry leaves. I could see some fused and colorless teeth.

I was taken by tenderness and purchased this plant at an extremely low cost.

After a year of proper cultivation, the plant shows itself in all its dazzling and overflowing splendor! Cultivated in pure peat and in an 8 cm deep polystyrene pot, in a greenhouse, slightly shaded, constantly in water, and frequently humidified with a rain system, the small dehydrated *Dionaea* is now in wonderful shape! As in the fairy tale of "Il Brutto Anatroccolo", this unique specimen can now show its truly extraordinary shapes and colors.

Dionaea 'Cleopatra' is a variation of *Dionaea* 'Fused Tooth'. The petiole of the trap is green with the central rib shaded red, the trap is a very dark red, tending to burgundy (Fig. 2). The edge of the trap, in the area at the base of the teeth, is so dark as to be black, incredibly black!

The bearing of the plant is rosette, prostrate. The leaves are 8-10 cm long and the traps have a rounded shape and reach 3 cm. All the leaves have a long life on the plant. The combination of all of these characteristics gives this unique specimen great charm.

This beautiful *Dionaea* risked dying, dehydrated in a supermarket, but she was lucky after that summer day. But I was very lucky too, now that every day I can enjoy this beauty and this charm.

The name, "Cleopatra", in honor and in memory of the sublime queen of ancient Egypt that fascinated men with her shape and large, black-lined eyes, as are the finest traps of this *Dionaea*.

Propagation by leaf or floral stem is necessary to maintain the unique characteristics of this plant.

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Figure 2: *Dionaea* 'Cleopatra' plant and traps.

Sarracenia 'Inspiration'

Submitted: 5 September 2018

If anybody asked us 15 years ago to create a plant looking like *Sarracenia flava* with black tube interior and white lid, we would simply say "Mission impossible!". But a plant exactly like this was obtained as a selection from a first generation of *Sarracenia* 'Adrian Slack' hybrids that we crossed in 2006. Mother parent and selection was performed by Miroslav Srba, pollen plant was from Michael King. This summer, when the sad report about Mr. Adrian Slack passing arrived, the growers' community discussed his contribution on social networks. All of us agreed, Adrian Slack made our hobby possible as he gave us a large amount of know-how and also great inspiration. Miroslav Srba contributed to the discussion with some photos of crosses that were derivative from *Sarracenia* 'Adrian Slack' with a comment that we would not have believed such plants were possible before. But the plant *S.* 'Adrian Slack' made it possible. Paul Young (UK) suggested therefore to dedicate one of the hybrids to Mr. Adrian Slack with epithet *Sarracenia* 'Inspiration'. So, do we.

Sarracenia 'Inspiration' (Fig. 3) is a seedling selected from the cross *S.* (*leucophylla* × *flava* var. *ornata*) × 'Adrian Slack'. This clone is labeled as clone "A" in Miroslav Srba's collection and also spread under his collection code *S.* HA19A.

Shape of the pitcher highly resembles *Sarracenia flava* with a typically narrow column and cordate lid. A massive, perfectly rounded peristome was inherited from *Sarracenia* 'Adrian Slack'. Although the initial coloration resembles the original coloration of *S.* 'Adrian Slack' (Fig. 4), the final coloration of fully matured pitchers turns far darker (Fig. 3a). Veins and the inside of the pitchers turn almost black under optimal conditions. Dark red veins are much stronger compared to *S.* 'Adrian Slack' (Fig. 4). The lid stays creamy white and is interwoven by very strong black veins (Fig. 3a). This is the typical appearance of the spring and summer pitchers. Late fall pitchers, if they appear, have usually a more diffused and less attractive color pattern (Fig. 3b). Size of the pitchers is slightly smaller compared to *S.* 'Adrian Slack', typically 45-60 cm tall, lid is 5-7 cm broad. The plant usually forms 3-5 pitchers during the growth season. The flower is yellow and looks almost like a pure *Sarracenia flava*, just the petals are slightly broader (Fig. 3c).

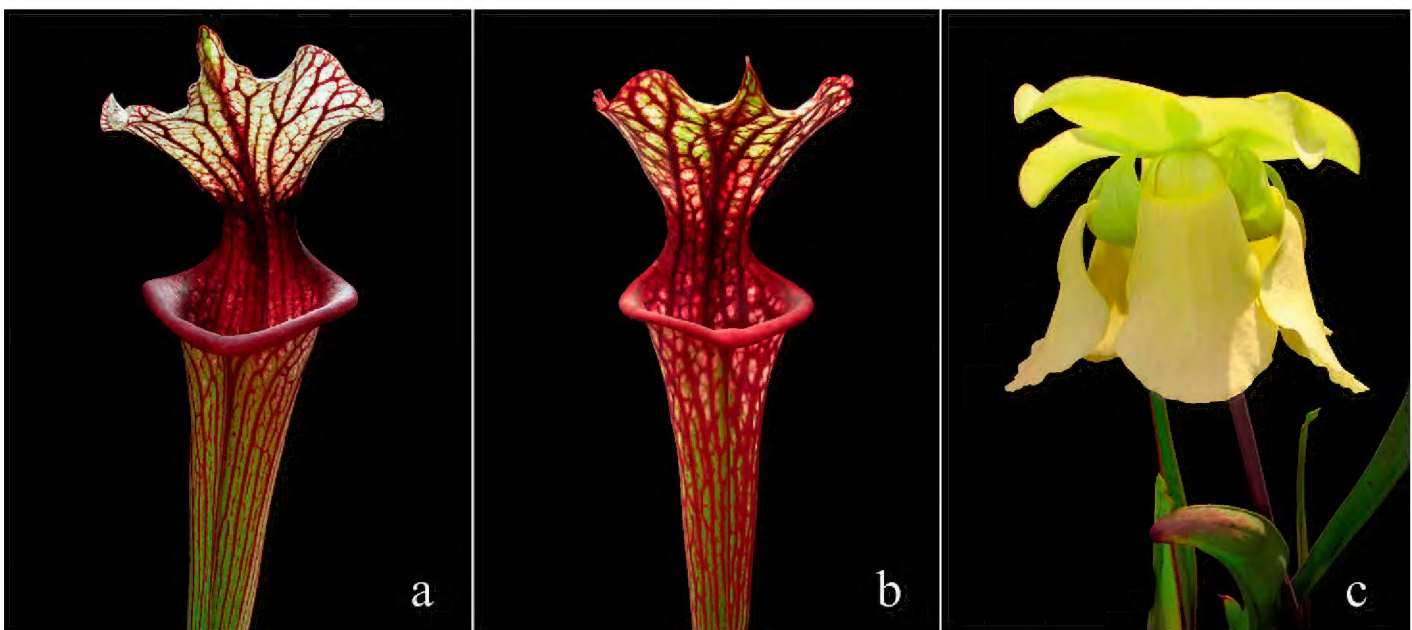


Figure 3: Typical features of *Sarracenia* 'Inspiration': a) typical coloration of spring and summer pitcher; b) rare late fall pitcher; c) flower.



Figure 4: Comparison of venation pattern and lid shape of a) *Sarracenia* 'Inspiration' and b) *Sarracenia* 'Adrian Slack'. Photo by Laurens Eggen.

Sarracenia 'Inspiration' does not require any specific growth conditions compared to other *Sarracenia*. Very sunny and hot conditions are required to obtain optimal coloration. To keep its original genotype, propagation must be by vegetative means only. *Sarracenia* 'Inspiration' is unfortunately not a very strong growing plant. Despite this, it is already well spread across European collections under its hybrid label or code mentioned above. A few specimens are also in circulation among U.S. growers.

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