Literature Review

Adam, J. H. and C. C. Wilcock. A new *Nepenthes* from Gunong Besar, Kalimantan Selata, Borneo (Indonesia). Gard Bull. (Singapore) 42 (1/2):25-28. 1989.

The new species, *Nepenthes borneensis*, from the above area is described in this paper.

Anonymous. 1991. Rescue mission saves rare carnivorous plants from extinction in Georgia. Clippings (Atlanta Botanical Garden Newsletter)14:2.

This little newsbit summarized in the ABG's bimonthly news publication is a welcome sight since it is the first aggressive program in the United States to reclaim a CP site through the activities of multiple organizations. It is particularly refreshing in light of the US Government's failure to establish a viable, ongoing realistic reclamation plan for *Sarracenia oreophila,* for example, in spite of a meeting of "experts" (there were many present) about fifteen years ago in North Carolina. The only thing we see or hear is continued moaning about failing sites which have many counting stakes, while everyone stands around scratching or something. By taking charge, many *S. oreophila* locations can be reclaimed.

Considering the above, we are presenting a slightly longer review than usual. *S. purpurea* ssp. *venosa* has a break in its range through most of Georgia, as one can see by examining any of several range maps. As noted in the article, the old coastal plain locations are no longer extant (although with further searches and working through local peoples, more might be found). Hence, the concept "rare" for the state even though nationwide the ssp. is not yet rare. However, a couple of unusual montane locations are still viable in Georgia.

A joint effort of the Atlanta Botanical Garden (led by Ron Determann), the Department of Natural Resources, the US Forest Service and the Chattahoochee Nature Center, resulted in a large party descending on one of the montane locations. They counted 24 plants in heavy overgrowth (this is the point where most *oreophila* efforts stall), and opened 900 square feet of area to sunlight with saws and machetes.

Ten small rhizome divisions from ten different plants were taken by Ron to the Botanical Garden where a two-pronged effort is really being accomplished to multiply them. The divisions will be grown to maturity, flower, set seed, and seedlings and divisions replanted in the reclaimed area in winter, when the water table is higher). More division of the plants still in situ will be made and set out in the reclaimed and recleared area along with the seedlings of the same gene pool acclimated to that area.

The divisions moved to the Garden are already vigorously producing new, deeply colored pitchers, contrasted with the pale, etiolated leaves in the overgrown area. Faster and better growth and propagation will speed and optimize the process.

Good luck to this group's sound efforts! (DES)

Bender, Steve. 1990. Beauty in the bog. Southern Living Magazine 25: 42-44.

This popular article in a southern magazine describes how some people discovered a savanna bog on their property near Fairhope, Alabama. They had moved there with the intent to raise cattle. After clearing and burning off a wooded area one autumn with the intent of extending their pasture, the following spring they observed a heavy growth of beautiful bog plants, including *Sarracenia leucophylla.* They decided to preserve the area and have been burning it off every year since. They have now built a boardwalk for visitors to observe the very fine mix of plants. Three color photos show a very nice display over several acres. To visit the site if you are in southern Baldwin County, Alabama between April and September, call 205/947-3044 for an appointment and directions. There is a nominal admission charge of $2.00 to help cover expenses. (DES)

Bennett, Simon T. and **Martin Cheek.** 1990. The cytology and morphology of *Drosera slackii* and its relatives in South Africa. Kew Bull. 45:375-381.

Drosera slackii (named in honor of the late Adrian Slack) was briefly described by Cheek in 1987. This paper presents a comparative morphologic description of it and closely related species along with updated chromosome counts. The closest relatives are *D. cuneifolia* and *D. aliciae*. In 1970, *D. aliciae* was listed as 2n=80. However, the present study shows a sample with a chromosome number of 2n=40, as does *D. slackii*, and two newly named (1988, Debbert) droseras in the same geographical area, *D. admirabilis* and *D. venusta* (2n=40 reported by Debbert in literature and not repeated here).

The paper also includes a geographic map showing rough locations, and a full page drawing of *D. slackii* intact and in parts, along with various structures of the other closely related species for comparison. *D. slackii* is described of commercial value in that it is a very attractive rosetted Cape sundew that is easy to grow, and this reviewer is certainly in agreement.

Earley, Lawrence S. 1991. Stew in Brunswick. Wildlife in North Carolina 55:14-21.

This article discusses the downturn in plant and animal species in Brunswick County, North Carolina as development and population growth take an upturn. For those not familiar with this county, it is the location of the legendary Green Swamp and has been called the most ecologically diverse county in North Carolina, and having the most threatened or endangered species. In the last ten years, the population of this previously rural county has doubled, as it did the ten years before that, and as it is expected to at least do in the next ten years. The main problem is exponential growth of retirement homes and golf courses and services to serve the increasing population. There are no zoning laws to protect wild areas, although enactment of these is being contemplated. Several biologists are quoted regarding decreasing plant and animal wild areas, and most of us who have been visiting the area for 25-30 years would readily concur. The article is considered and well written. There are many color photos among which are the following CP: A very nice full cover of *Sarracenia minor,* a savanna in moderate shape showing *S. flava,* and a photo containing both *Drosera filiformis* and *Utricularia cornuta.* There is also a semi-diagrammatic map of the county showing sample ecosystem locations. (DES)

Fagerberg, W.R .and **D. Allain.** 1991. A quantitative study of tissue dynamics during closure in the traps of Venus's Flytrap *Dionaea muscipula* Ellis. Am. J. Bot. 78:647-657.

This is a very good paper discussing research work done by the authors in extending what work had already been done on leaf movement in *Dionaea.* The paper opens with a brief but complete review of work done since Darwin to this day. They summarize closure into three phases, the first and third having been recognized before, but the second a new distinct category: Capture—The familiar quick phase which has been studied most; Appression—An approximately 30 minute phase that is slower and results in trap margin contact; and Sealing—Completed in about 1 hour post-stimulation and characterized by tighter sealing of the trap margins just internal to the edges with the actual edges somewhat everted.

The authors very cleverly divide the trap into three zones (A,B and C) and excise these from several plants during the above mentioned phases. Excision was quick and smooth and fixation immediate so as to arrest any anatomic changes for study by light and electron microscopy. The article should be read for details and completeness, but in summary they found a very complex inter-related sequence of cellular enlargement changes in each of the three regions that collated with what would be expected physically to result in the gross observable three closure phases.

The authors conclude with some paragraphs of theoretical discussion on physiological control of this process which may be related to pH and calcium transport across cell membranes as extrapolated from Japanese research on these ions and their effects on *Aldrovanda*, and the fact that traps can be successfully anesthetized by pH buffer variations and use of calcium channel blocker compounds. (DES)

Folkerts, G.W. 1990. The white-topped pitcher plant— A case of precarious abundance. Oryx 24:201-207.

This is a well written and conceived popular conservation article with four photos (including one ironic one of buckets of clipped *S. leucophylla* pitchers awaiting packing) and some references.

After a brief introduction on the nature of pitcher plants and their habitats, the article focuses to the Gulf coast where, at the moment, there is still a greater abundance of pitcher plant habitat compared to disastrously rapid destruction of sites on the Atlantic coastal plain. Here, the author also sees the beginning of a precipitous decline.

He describes the main roles of decreasing fire at appropriate times of the year (most natural fires are spring and summer and some research indicates better response than with the traditionally accepted winter fires), land use changes with drainage and destruction of habitat, horticultural collecting (personal and commercial) of taxa or variants whose numbers have become critical, and lately the growing fad of using *S. leucophylla* pitchers in flower arrangements here and abroad. Because CITES has regulated international trade in sarracenias and their parts, we have a number of 500,000 pitchers of *leucophylla* per year in international trade, and an unknown number in unregulated interstate trade. The author disscusses the harm of uninformed harvesting of massive numbers of pitchers from a stand at anytime, and effects on longterm plant health and productivity. (DES)

Hay, Stuart G., et. al. 1990. Additions to the flora of the Island of Newfoundland. Rhodora 92:277-293.

On page 286 of this paper, it is mentioned that *Utricularia purpurea* had been considered rare in the area under consideration since there was only one recorded collection. However, the authors list many more collections in Newfoundland, indicating that the species is far more widespread there than previously thought.

Hodgson, Larry. 1990. The body snatcher. Harrowsmith (Canadian edition) 15:66-71.

A popular article on carnivorous plants in general, but concentrating on those most adaptable to home growing and occurring in Canada. There are nice large photos, discussion of types of CP traps, growing tips, and sources of plants (in Canada, along with CITES and Canadian import information) and some books. The general descriptions and culture hints are sound.

Karlsson, P.S., K.O. Nordell, B.A. Carlsson & B.M. Svensson. The effect of soil nutrient status on prey utilization in four carnivorous plants. Oecologia (Heidelb) 86(1):1-7 1991.

The authors tested the hypothesis that carnivorous plants are less responsive to prey when grown in nutrient-rich soil. Four plant species, *Drosera rotundifolia*, *Pinguicula alpina*, *P. villosa* and *P. vulgaris* were tested and seven characteristics were measured. The results were that 75% of the tests showed no significant difference and therefore the hypothesis was not supported by the data. An alternate modification of this idea is that CP can grow in nutrient poor or rich soils provided that competition from other plants is low.

Krafft, C.C. and **S.N. Handel**. 1991. The role of carnivory in the growth and reproduction of *Drosera filiformis* and *D. rotundifolia*. Bull. Torrey Bot. Club 118:12-19.

The authors collected plants of the above two species, potted them up in nutrient poor media under screening outdoors, and fed varying numbers of fruit flies to half the plants, the other half being unfed and acting as controls. Growing the plants over a season disclosed that the fed plants in general had enhanced growth during the feeding period. The "feeds" carried over winter hibernaculum stage with increased flowering and seed production the following spring in those plants that were fed. They conclude that feeding in a nutrient poor environment has immediate as well as long lasting benefits. The discussion was interesting in trying to collate results of conflicting experiments in other papers in the bibliography, particularly with field experiments. One interesting experiment suggested that in the case of sundews growing in moderately rich fields with other competing plants, carnivory gave a competitive edge to the sundews as a source of nutrients other than the soil. (DES)

Krause, Jeannie. 1990. *Sarracenia leucophylla* in the Croatan? North Carolina Wild Flower Preservation Society Newsletter 11:4.

The Croatan National Forest is located in northeastern coastal North Carolina. The author of this note was initially pleased to see what she thought were small plants of *S. rubra* in an unrecorded area of the Forest for that species, although it had been found elsewhere. As the plants matured, however, it became evident that these were *S. leucophylla* in an area literally many states disjunct from its range and obviously disseminated into the Croatan by seed since the location was near a road frequented by *Dionaea* collectors (collecting plant or animal material without permits is illegal in a US National Forest). While the individual who sowed the seeds was undoubtedly well-intentioned, such actions is an active sarracenia area are to be condemned since material not native to the area can easily enter the gene pool of other species of a genus in which interspecific hybridization is so easily accomplished.

Lamb, Randy. 1990. Those sinister sundews. TLC For Plants 3:22-23.

Randy Lamb is a Canadian member from British Columbia and has written this good article for this Canadian plant magazine. It includes a surprising number of color photos in two pages, all sharp and clear, and a sound text describing sundews in general and also hints on culture, particularly at home.

Lowrie, Allen and **Sherwin Carlquist**. 1990. A new species of tuberous *Drosera* from Western Australia. Phytologia 69:160-162.

Drosera prostratoscaposa is herein described. It is in the section *Erythrorhiza* and is distinct by virtue of its prostrate many- flowered inflorescences. It occurs on the southern coast of Western Australia in Fitzgerald National Park. The paper includes Latin and English descriptions, type information as well as an excellent composite line drawing plate of plant parts and its habit. The plant tends to occur in dry, sandy or lateritic soils. (DES)

Nelson, E. Charles. 1991. The waxing of a glorious rajah. Kew Magazine 8:81-89.
Simpson, Rosemary. 1991. Plants in peril, 15. *Nepenthes rajah*. Kew Magazine 8.89-94.

These two articles are reviewed together since the second directly follows the first in the same magazine and both cover the same subject, *Nepenthes rajah*.

Nelson's article recounts some of the difficulties growers had with the species in the latter 19th century in the U. K. The greatest success was achieved by the Royal

Botanic Gardens, Glasnevin (Ireland) which was under the direction of Frederick Moore. Moore brought a pitcher of a plant successfully grown by him to a meeting in England and totally bedazzled the attenders. Rather than consign the pitcher to the usual crushing and drying in the herbarium, Kew commissioned a reproduction of the pitcher in wax, a popular activity by skilled artisans with flowers. The job was done by a Miss Emett, and the wax model still exists— a black and white photo is included in the article. Nelson tells a great deal of the story of the discovery, import and attempts to grow the species through letters between the principles. At one point, the famous Veitch nurseries had "hundreds" of seedlings and advised buyers to grow them as hot and as wet as possible. After losing several to those conditions, Moore tried a last specimen in the cool orchid greenhouse and was very successful.

The second artlcle's author is with the Kew Conservation Unit. Her article overlaps in history and botanical and ecological description with the first, but in the last third or so gives a summary of conservation efforts. The species is becoming increasingly difficult to find on Kinabalu, and was one of the first species to be placed in Appendix I of CITES in 1981. Since that date, only six recorded CITES transactions have taken place, but a whole plant can still command a price of $1000 US on the black market. (DES)

Sattler, R. and R. Rutishauser. 1990. Structural and dynamic descriptions of the development of *Utricularia foliosa* and U. *australis,* Can. J. Bot. 68:1989-2003.

In traditional taxonomy, morphologic structures are usually described in static terms for purposes of classification and identification. One might say, "A leaf is a leaf is a leaf... ". However, the utricularias offer good models supporting a case for a dynamic approach, at least theoretically, since there is much discussion over what constitutes leaves, stems, roots (if any), shoots, etc., and what the traps are in traditional terms. The authors document development of shoots by means of SEM and make a proposal of how such studies and dynamic intermediate stages may in the future be useful in taxonomy.

Sieren, D.J., et. al. 1990. Noteworthy additions to the vascular flora of eastern North Carolina. J. Elisha Mit. Sci. Soc.. 106:7-9.

The only CP mentioned is a new county record for *Drosera brevifolia* in New Hanover County which is one of the counties immediately adjacent to Wilmington. (DES)

Venters, Vic. 1991. Stiffer penalties may deter poaching: Law strengthened to protect rare Venus's-flytraps. Wildlife in North Carolina 55:2 (Aug).

This is a full page informational article with a black and white photo of *Dionaea.* In spring, 1991, stiffer penalties went into effect for poaching this species. By poaching, the law determines that the term applies if the plants are collected from state lands (including roadsides and ditches to the extent claimed by the state), parks, federal lands, wildlife and nature preserves, and private lands without written permission of the owner. Owners may collect and sell from their own lands at will. Formerly, the penalty for poaching was a paltry $10.00 per arrest—Hardly a deterrent! The new penalty is a minimum of $100 and a maximum of $500 for first offenders. Repeaters may be fined $1000. This could still be little deterrent for the professional poacher collecting by the truckload, if it were not that the thief can actually be fined these amounts **per plant**!

It is estimated that over 500,000 *Dionaea* are removed from the wild each year. Most of these are sold to Holland, Germany and Japan. Besides plant removal, habitat destruction is also stressed as a very important factor in decreasing the genus in the wild.

(Editorial comment: The article mentions that this spring, someone was apprehended in the Green Swamp sanctuary with 1000 plants in possession, so the process can work. The article also states that there are probably fewer than 50 sites left with *Dionaea* in the Carolinas, and that the original 100 mile radius of range out of Wilmington has been reduced by half. I would question both these estimates, but not for the purpose of contradicting the intent of enforcement. *Dionaea*, as range examples, is still found easily in the Croatan National Forest's northern border, and on the Fort Bragg military reservation near Fayetteville, NC, where it can be found in a wet area near a cemetery as well as elsewhere. Good, or large stands are probably reduced, but I can easily find 50 locations alone in Brunswick and Columbus Counties, considering the thousands of miles of drainage ditches and margins in the coastal plain, and small locations on roadsides and in remaining low places in pine plantations. Indeed, the state itself contributes to habitat destruction by scraping berms and renewing drainage ditches uncritically. Places in many drainage ditches where the water is slower and deeper locally, support water lilies, utricularias and many CP on their margins until drainage is "facilitated".

Dionaea may be fast approaching the critical point where we are with *Sarracenia oreophila:* Originally, habitat destruction is a larger destructive force until plant populations become so small and few that even hobbyist collection of a few plants is a significant reducing process. Furthermore, I am disappointed in the timidity of NC legislators in doing more about mass collections—legal or otherwise—for shipment to the apparently insatiable gullet of Europe, particularly through the "Netherlands Connection" where we were initially fooled into believing that vast glasshouse ranges of various CP in photos from Holland were of propagated plants until keen eyes clearly disclosed that these were collected and potted up. Recall the entrepreneur written about in the Greensboro, NC newspaper a year or so ago who bragged about dumptruck-loads of CP collected legally shipped from Wilmington ports to Holland. I clearly recall about two years ago being awakened by a phone call at 4 AM and a gruff foreign voice over long distance demanding—not asking about—250,000 flytraps "right away", and did I know anyone who could do it! The caller identified his location as the Netherlands. (DES)

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