Ratsirarson, J., and J.A. Silander, Jr. 1996, Structure and dynamics in *Nepenthes madagascariensis* pitcher plant micro-communities. Biotropica 28:2, pp. 218-227.

N. madagascariensis produces two types of pitchers—small, goblet-shaped lower pitchers and large, trumpet-shaped upper pitchers. The waters in these pitchers function as temporary habitats for a variety of mosquito larvae, mites, and fly larvae, and several arthropod and lizard species that prey upon them. The authors studied the two pitcher types and their arthropod denizens. Not surprisingly, the arthropods found in the upper pitchers are not quite the same as those found in the lower pitchers. Although this paper does not reveal any astounding new discoveries, it offers a view into the natural history and food web relationships that exist within *Nepenthes* pitchers.

Much of the paper's analysis focuses on two species of mosquito larvae. The first is exclusively a filter feeder while the second augments its diet with prey (including members of the first species). The filter feeder prefers the upper pitchers while the predator species lives exclusively in the lower pitchers. Several other creatures are described, including a crab spider which descends on a thread into traps to forage underwater for prey, ants that drain pitchers by drilling holes into them so they may safely steal their contents, and mites that ride on flies to be transported to new pitchers. Various correlations between populations and pitcher characteristics are explored, but the results of the hard science are not particularly conclusive. (BAMR)

Ruiz, S.Z., & A.T. Salinas. 1996, Una nueva especie de *Pinguicula* (Lentibulariaceae) del estado de Oaxaca, Mexico. Acta Botanica Mexicana 37, pp. 39-44.

The authors describe *Pinguicula mirandae* from the Tehuacan-Cuicatlan region in the state of Oaxaca, Mexico as a new species. It belongs to the section Heterophyllum in subgenus Isoloba and is most closely related to *P. acuminata* but the leaves of the "summer" rosette are not acute but completely rounded at the apex, thus very superficially resembling those of *P. macrophylla* or *P. colimensis*. The flowers, with a long sharply bent corolla tube and a short spur, do however readily identify it as a member of Isoloba (to which e.g. *P. agnata* and *P. acuminata* belong) and not Orcheosanthus (to which *P. macrophylla* and *P. colimensis* belong).

The new and rather spectacular (if one appreciates the details) species is distinguished from *P. rotundiflora* by the glandular pubescent (not glabrous) pedicels, the geniculate (not straight) corolla tube and the clavate (without berry-like heads) hairs on the palate. Surprisingly (and rather inexcusably), the latter comparison is missing in the article although the two species are almost indistinguishable if not in flower. (JS)

Chen, L., James, S.H., & H.M. Stace. 1997, Self-incompatibility, Seed Abortion and Clonality in the Breeding Systems of Several Western Australian *Drosera* Species (Droseraceae), Australian Journal of Botany 45, pp.191-201.

The authors have cultivated twenty species of Western Australian *Drosera* under greenhouse conditions, pollinated the flowers artificially (with pollen of the same individual or of a different individual), and checked self-compatibility by assessing seed set and pollen tube growth. All fifteen investigated taxa of subgenus *Ergaleium* ("tuberous" sundews) were self-incompatible. In subgenus *Bryastrum* (erroneously called "*Rorella*" in the paper, "pygmy" sundews with gemmae), *D. nitidula* and *D. pulchella* were self-compatible, while *D. eneabba* and *D. mannii* (misspelled "*manniana*" in the paper) were self-incompatible. *Drosera glanduligera* (which the authors transferred to section *Lasiocephala*— Type: *D. petiolaris*— without explanation) was self-compatible. Self-incompatibility was due to inhibition of self-pollen tubes at various sites in the pistil. Seed abortion was studied in the self-compatible taxa (and found to be negligible) *D. mannii* and five taxa of subgenus *Ergaleium*. The proportions of good seeds vs. aborted seeds in the self-incompatible taxa ranged between 95:5 and 36:64. The highest abortion rates were found in *D. tubaestylis*.

Several new chromosome counts are published on pp. 192-193 (under the authorship of James, Chen, Lowrie & Marchant). The counts of n=16 for *D. gigantea* and n=15 for *D. menziesii* deviate from those published earlier (14 and 13, respectively) by Kondo. This may indicate that these (assumedly rather young and not genetically "consolidated") species form aneuploid series.

Apart from some taxonomic oversights (v.s.), the paper is well researched, and it offers many new and interesting data, rendering this an obligatory reading for all students with a serious interest in this genus. (JS)

Conran, J.G., Jaudzems, V.G., & N.D. Hallam. 1997, Droseraceae Germination Patterns and their Taxonomic Significance, Botanical Journal of the Linnean Society 123, pp. 211-223.

In this paper, the germination types (cryptocotylar—with the cotyledons not emerging from the seed coat, hemicryptocotylar—as the intermediate condition, or phanerocotylar—with the cotyledons leaving the seed coat entirely) and some morphological and phenological features of 113 accessions (corresponding to approximately one hundred taxa) of Droseraceae are featured. The results may be summarized as follows (the classification proposed by Schlauer in Carniv. Pl. Newslett. 25:67-88, 1996 is used here for comparison).

Phanerocotylar or hemicryptocotylar germination is found in *Drosophyllum, Dionaea, Drosera* subgenera *Phycopsis* (as a section of subgenus *Drosera* in the paper), *Drosera* (sections *Ptycnostigma*—as a separate subgenus in the paper—*Arachnopus*—including section *Prolifera* in the paper—and *Drosera sensu lato*), *Thelocalyx* (as a section of subgenus *Drosera* in the paper), *Stelogyne* (as a section of the illegitimate subgenus "*Rorella*" in the paper), and *Arcturia* (as section *Psychophila* of the illegitimate subgenus "*Rorella*" in the paper). *Drosera neocaledonica* (with phanerocotylar germination) is retained in what is called *Drosera* subgenus *Drosera* section *Lasiocephala* in the paper, although all other species in this section have a cryptocotylar germination pattern. Cryptocotylar germination characterizes *Aldrovanda*, *Drosera* subgenera *Lasiocephala* (as a section of subgenus *Drosera* in the paper), *Ergaleium*, *Bryastrum* (called "*Rorella*" in the paper, with the exceptions noted above), and *Coelophylla* (as a section of the illegitimate subgenus "*Rorella*" in the paper).

Glandular cotyledons are found in *Drosera* subgenera *Drosera* (section *sensu lato* including *D. neocaledonica* but excluding "section" *Lasiocephala sensu stricto*, section *Ptycnostigma*, together with taxa with eglandular cotyledons), and *Thelocalyx*.

Non-carnivorous primary leaves are found in *Aldrovanda* and some taxa of *Drosera* subgenus *Ergaleium* section *Ergaleium*.

The discussion of the paper is proposing reconsiderations within a conservative systematic alignment that is questionable in some respects. Therefore (and because the recent reclassification cited above has been ignored entirely in the present paper), a new discussion of the results is presented here.

At generic level (*Aldrovanda* - cryptocotylar, *Dionaea* - phanerocotylar, *Drosera* - various conditions, *Drosophyllum* is not a member of Droseraceae, as proved by genetical, morphological and palynological data, cf. Schlauer in Carniv. Pl. Newslett. 26:34-38, 1997) the germination pattern is too inconsistent for phylogenetic considerations. The fact that it is constant within all sections of *Drosera* (if these are defined as in Schlauer 1996, not as in the present paper) shows that it has a high value as a taxonomic marker at infrageneric level. It clearly excludes *Lasiocephala* (without *D. neocaledonica*!) from subgenus *Drosera* and brings the subgenera *Phycopsis*, *Thelocalyx*, *Stelogyne*, *Arcturia*, and *Regiae* (most of which considered fairly "primitive") into some proximity with subgenus *Drosera*. The imperative transfers of *D. neocaledonica* and *Ptycnostigma* to subgenus *Drosera* have already been proposed earlier. Cryptocotylar germination is confined to the predominantly (and probably originally) Australian subgenera *Ergaleium* ("tuberous" sundews), *Bryastrum* ("pygmy" sundews), *Lasiocephala* (*D. petiolaris* group), and *Coelophylla* (*D. glanduligera*). So this feature may represent an advanced condition developed (perhaps several times independently) in these Australian taxa.

As a consequence, subgenera *Coelophylla* (with a more "primitive" pollen type, indicating a position between the apparently ancestral subgenus *Thelocalyx* and the possibly more derived subgenus *Lasiocephala*) and *Lasiocephala* should be removed from their position at the "base" of subgenus *Drosera* (in contrast to their respective positions assigned in Schlauer 1996:69) and rather shifted towards the proximity of subgenus *Bryastrum*. This is also supported by formerly overlooked/underestimated similarities in leaf morphology: The laminae (not the stipules as stated on p. 218 of the present paper) of the recently described *D. caduca* (*Lasiocephala*) that may be missing (shed?) are homologous to the likewise detached gemmae produced by all members of subgenus *Bryastrum*.

Although it shares phanerocotylar germination with other ("primitive") groups, subgenus *Phycopsis* (*D. binata*) should retain its position between subgenera *Drosera* (phanerocotylar) and *Ergaleium* (cryptocotylar).

While the data are new and very important, the numerous nomenclatural inadequacies (many invalid names are used) and taxonomic mistakes (some of which have been known for a long time and were already corrected in the literature) are detrimental to a work of such ambition. Thus, many avoidable shortcomings are perpetuated once again. Nevertheless, this paper is an indispensable source of information for future research in the systematics of Droseraceae. (JS)

Komiya, S., Shibata, C., Toyama, M., & K. Katsumata. 1997, Carnivorous Plants in Hokkaido, northern Japan, Bulletin of the Nippon Dental University, General Education, 26, pp. 153-188 (in Japanese, description of *Utricularia* × *bentensis* on pp. 164-166 by S. Komiya in Latin)

This is a comprehensive review of the carnivorous plant species found on the northernmost Japanese main island. It deals with the species *Drosera anglica*, *Pinguicula macroceras*, *Utricularia australis*, *U. caerulea*, *U. intermedia*, *U. macrorhiza*, *U. minor*, *U. ochroleuca*, and *U. uliginosa*. The hybrid *D.* × *obovata* is discussed, but without obvious reason there is no reference to *D. rotundifolia* (one parent species of this hybrid) Previously, Diels (Pflanzenreich 26:95, 1906) cites a specimen from Sapporo (collected by Faurie). The most interesting taxon of this review is what is assumed to be a hybrid between *Utricularia minor* and *U. intermedia* and described as a new hybrid, *U.* × *bentensis*. It has features which superficially really look like intermediate between the two supposed parents but a closer examination of the internal quadrifid trap glands shows almost no influence of *U. intermedia* (in which the two arms of each pair are almost strictly parallel to each other). Instead, the shorter pair is bent in the direction of the longer pair, a condition very similar to that found in *U. minor* and exactly the same as found in *U. bremii*, which was so far only known from Europe. The flowers and leaves of *U.* × *bentensis* are so similar to those of *U. bremii* that there remains almost no doubt that it is really the same taxon. Possibly *U. bremii* is in fact of hybridogenic origin as no ripe seeds are known of this species (the pollen is apparently always malformed and sterile). Whether hybrid or not, the older name *U. bremii* should be applied to the plants from Hokkaido. This is a substantial range extension for this species. No mention is made of *U. stygia* (which is known from Europe and North America), so it can unfortunately not be judged if this species is really absent from Hokkaido or if it was only ignored as was done by Taylor (The Genus *Utricularia*: 612-613, 1989). (JS)

Schnell, D.E. & R.O. Determann. 1997, *Sarracenia purpurea* L. ssp. *venosa* (Raf.) Wherry var. *montana* Schnell & Determann (Sarraceniaceae): A new Variety, Castanea 62:1, pp. 60-62

This new variety from sphagnous seep bogs of the southern Appalachians has the distal hood lobes of the pitchers incurved adaxially so that they almost touch, and the hairs lining the hood are shorter than in the two other varieties of *Sarracenia purpurea* subsp. *venosa*. As we know from the previous publications of the first author, careful long-term observations both in the field and in cultivation have led to the discovery of a new taxon in a species that some would consider well investigated and completely

known. (JS)

Shibata, C. 1997, Ecological and Taxonomical Studies on Carnivorous Plants in Venezuela, 1994-1996, Bulletin of the Nippon Dental University, General Education, 26, pp. 199-217 (text in Japanese, description of new taxa in Latin by S. Komiya and C. Shibata, List of specimens collected in English)

On pages 209 and 210, *Utricularia chiakiana* and *U. humboldtii* f. *albiflora* are described as new. *U. chiakiana* is very similar to *U. gibba*, and the single difference seems to be the upper lip of the corolla which is smaller than the lower (larger than lower in *U. gibba*). However, the dubious statement "Valde affinis *Utricularia gibba* L." (very close to *U. gibba*) without subsequent diagnosis, leaves space for speculation if the authors really accept their new taxon (cf. Art. 34.1. ICBN). (JS)

Silva, T.R. dos S. 1997, *Drosera graomogolensis* (Droseraceae), a New Species from the Campos Rupestres of Minas Gerais, Brazil, Novon 7, pp. 85-87.

A new species of *Drosera* is described. It was featured by Fernando Rivadavia under the invalid name of "D. villosa var. graomogolensis" in Carniv. Pl. Newslett. 25: 134-137 (1996). According to the author it is related to *D. villosa*. However, the obovoid (not fusiform as in *D. villosa*!) seeds and the stem densely covered with dead leaf remains readily separate this new species from any other known from eastern Brazil. This is an interesting parallel to the stem-forming *D. roraimae* and *D. hirticalyx* from the Guayana Highland. The latter species do have distinct petioles while the species described here has a leaf shape somewhat similar to *D. villosa* without a clear distinction between petiole and lamina. (JS)

Bayer, R.J., Hufford, L. & D.E. Soltis. 1996, Phylogenetic relationships in Sarraceniaceae based on rbcL and ITS sequences, Systematic Botany 21:2, pp 121-134.

Another molecular approach to understanding carnivorous plant evolution is presented here. The findings confirm the molecular phylogeny published earlier (Albert *et al.*, Science 257:1491-1495, 1992), i.e., *Darlingtonia* is proposed as a sister to a clade containing *Sarracenia* and *Heliamphora*. This contrasts with the common perception that *Sarracenia* and *Darlingtonia* are more closely related to each other than either is to *Heliamphora*. The South American origin (or in other words, a *Heliamphora*-like progenitor) of Sarraceniaceae is doubted rather overhastily although no morphological characters unambiguously support the generic relationships assumed here. Further studies will have to aim at the identification of "primitive" plesiomorphous character-states in order to elucidate the evolutionary course of the family. Infrageneric speculations are also presented in this paper but grouping *Heliamphora nutans* as a sister to a clade comprising *H. minor* and *H. tatei*, or the inclusion of *Sarracenia leucophylla* and *S. purpurea* in one group and *S. flava*, *S. minor* and *S. psittacina* in another are so far away from any classification proposed previously that one cannot but wonder if the molecular data studied here are suitable tools at this taxonomic level. (JS)

Takeda, A. & S. Watanabe. 1997, Structure and Regeneration of a Plant Community of a New Variety of *Pinguicula vulgaris* (Lentibulariaceae) in Mie Prefecture, Journal of Japanese Botany, 72, pp. 229-237.

The growth conditions of a supposedly rare taxon considered a new variety of *Pinguicula vulgaris* by the authors are investigated. The results suggested that the communities of this plant are sustainable but the removal of adult stocks by natural or human disturbance will accelerate their degeneration. The new variety differs from *P. vulgaris* proper by its larger more numerous flowers with longer spurs and the very large leaves. These are, however, almost all the features distinguishing *P. macroceras* (which substitutes *P. vulgaris* in the circumboreal-pacific region, including Japan) from *P. vulgaris*. So the new taxon should rather have been described as a variety or subspecies of *P. macroceras*. Within the limits of this latter taxon, it approaches several so-

called lowland populations in Japan, and to a somewhat lesser degree, the northwest-American *P. macroceras* subsp. *nortensis*. Thus, a more thorough taxonomical investigation is clearly indicated and, as far as is heard from Tokyo, forthcoming. (JS)

Tan, H.T.W. 1997, A Guide to the Carnivorous Plants of Singapore, Singapore Science Centre, Singapore, 177 pp. ISBN 981-00-8629-6.

Throughout the chapters entitled "Native Species and Hybrids," "Exotic Species," "Tropical Pitcher Plant Ecology," and "Conservation and the Law," this booklet is furnished with numerous nice pictures and predominantly well researched text. The Republic of Singapore does not house any endemic plant species, so it is no surprise that the Singaporean carnivorous plants are those species that are rather widespread and well known. The species discussed are *Utricularia caerulea* (common), *U. bifida* (common), *U. aurea* (vulnerable), *U. gibba* (vulnerable), *U. uliginosa* (extinct), *U. minutissima* (vulnerable, new record), *U. punctata* (extinct), *Nepenthes ampullaria* (rare, including the rare, abnormal upper pitchers), *N. rafflesiana* (rare), and *N. gracilis* (common). The hybrids *N. ampullaria* × *gracilis*, *N. ampullaria* × *rafflesiana*, and *N. gracilis* × *rafflesiana* augment the list. The genus *Drosera* is apparently absent from Singapore although the widespread *D. burmannii*, *D. indica*, *D. spatulata*, or *D. peltata* would include Singapore within the general limits of their respective geographic and ecological ranges. Perhaps development in this highly populated region has destroyed suitable before botanists could discover any sundews habitats (even the weedy *Utricularia gibba* is vulnerable here!). Forty-six pages are devoted to various aspects of pitcher plant ecology. A rather weak point is the unfounded assertion that the proteolytic activity found in *Nepenthes* pitchers is not due to proteases produced by the plant (although such enzymes have been already characterized to a considerable degree by other authors). This serves in the first line to propagate a new theory that superoxide radicals secreted into the pitchers (by a not yet known mechanism) should be the principal protein digesting agents. Differences between the species tested may exist but suitable experiments to elucidate the enzymic processes involved are clearly required. The literature reference list is not entirely complete (e.g., the publication by Ratsirarson & Silander, 1996, cited on pp. 125, 128, 131, and 137 is missing). (JS)

Webb, C.J. & W.R. Sykes. 1997, The Reinstatement of *Utricularia protrusa* for New Zealand and an Assessment of the Status of the other New Zealand Bladderworts Based on Seed Characters, New Zealand Journal of Botany, 35, pp. 139-143.

In this paper, the authors describe the seeds of the species of *Utricularia* found in New Zealand. For the first time the seeds of *U. protrusa* have been investigated. These were found to differ profoundly (rounded rather than angled and winged, testa cell margins undulate rather than straight or curved) from the seeds of specimens of *U. australis* from Australia. Based on this difference (the only species having similar seeds being the North American *U. geminiscapa*), the specific distinctness between *U. australis* (with which *U. protrusa* has been united by Taylor, Kew Bull. Add. Ser.14:599, 1989) and *U. protrusa* is re-established. *U. protrusa* is thought to be endemic to New Zealand. It is not mentioned in the paper that the European specimens of *U. australis* very rarely set seed at all, nor have these specimens been compared with the east Asian, Australian, and New Zealandic ones. No difference between the seeds of *U. lateriflora* and *U. delicatula* has been found, but the distinction defined by Taylor (l.c.:184) is left unchallenged. The similarity between the seeds of specimens assigned to *U. novae-zelandiae* and *U. monanthos* is used to corroborate the results of a recent ecological and morphological study (M.S.Reut, New Zealand Botanical Society Newsletter 40:10-11) that the two should be treated as a single species to which the older name *U. novae-zelandiae* is to be applied. This may eventually resolve the problem that Taylor (l.c.:119) left "to subsequent investigations in Australia and New Zealand to produce a better solution". (JS)