

LITERATURE REVIEWS

By Doug Darnowski, Barry Rice, Jans Schlauer, and guest reviewers.

Adam, J.H. & Hafiza, A.H. 2006. Pitcher Plants (*Nepenthes*) Recorded from Keningau-Kimanis Road in Sabah, Malaysia. *International Journal of Botany* 2: 431-436.

The authors continue confusion in the application of the name *Nepenthes curtisii* for a taxon (probably a relative of the true *N. stenophylla* of Masters, not in the sense of Danser) not including its type. *Nepenthes curtisii* is a straightforward synonym of *N. maxima* (as noted in numerous previous publications), and it is doubtful if its type specimen was really collected in Borneo as stated in the protologue (Curtis may have received the plants from Sulawesi/Celebes). A taxon formerly described as a subspecies of *N. curtisii* (but likewise rather a relative of *N. stenophylla*) is now considered an independent species, *N. zakriana*, by the authors. Another result of this paper, as dubious as the ones previously noted above, is the establishment of the new name *N. naquiyuddinii*. Those who always wanted to give a separate name to the specimens of *N. reinwardtiana* that lack “eye-spots” on the interior pitcher surface may now rejoice in referring to them with this new name. (JS)

Bohn, H. F., and Federle, W. 2004. Insect aquaplaning: *Nepenthes* pitcher plants capture prey with the peristome, a fully wettable water-lubricated anisotropic surface. *Proc. of the Nat. Academy of Sciences USA*, 101, 14138-14143.

The peristome (pitcher mouth) in *Nepenthes* species was previously thought to be a “safe” foothold for potential insect prey. In this paper, Bohn & Federle show that, only when moistened, does the peristome of *N. bicalcarata* become a slippery trap for ants that walk on it. Through a series of manipulative experiments, they showed that a lubricating film of water prevents attachment by the adhesive foot pads (arolia) of insects. Interestingly, ants which manage to climb out from the pitcher will have fluid retained on their bodies which, once they step on the peristome again, will rewet it and send them “aquaplaning” back into the pitcher. (Francis Brearley)

Casper, S.J. and Stimper, R. 2006. New and Revised Chromosome Numbers in *Pinguicula* (Lentibulariaceae). *Haussknechtia* 11: 3-8.

Together with confirmations of previously published counts, the following new counts are communicated:

2n=22: *P. agnata*, *P. crassifolia*, *P. cyclosecta*, *P. debbertiana*, *P. ehlersiae* (previously reported as 32), *P. emarginata*, *P. gigantea*, *P. heterophylla*, *P. jaumavensis*, *P. medusina*, *P. moctezumae*, *P. orchidioides*, *P. pilosa*, *P. primuliflora* (previously reported as 32), *P. rotundiflora*, *P. toldensis nom.nud.*

Other counts: *P. albida* (2n=16 μ ,18 μ), *P. antarctica* (2n=16), *P. bissei* (2n=18), *P. bohémica* (32, published before but later revised to 64 and now confirmed as 32 again), *P. filifolia* (2n=18), *P. gracilis* (2n=20), *P. mariae nom.nud.* (2n=32), *P. poldinii* (2n=32), *P. sethos* (2n=44), *P. cf. vulgaris* (2n=32,64,128, previously only 2n=64 was known in this species). (JS)

Casper, S.J. 2006. Auf der Jagd nach *Pinguicula* in Albanien. (“Hunting for *Pinguicula* in Albania”, in German) *Haussknechtia* 11:9-28.

Two taxa of *Pinguicula* are native to Albania, the widespread and fairly common *P. crystallina* subsp. *hirtiflora* (in the paper it is called *P. hirtiflora* or *P. louisii*, no formal decision is made which name should be preferred) and the rare *P. balcanica*. Several localities and their vegetation are described in this field trip report summarizing results of two expeditions in 2004 and 2005. (JS)

Casper, S.J. 2006. Birth, Burial, and Rebirth of *Pinguicula hirtiflora* Tenore (Lentibulariaceae)—a Reflection of the Making of Flora Napolitana (1811-1838). *Haussknechtia* 11:29-40.

The paper features in much detail the complicated processes of the composition of the treatise *Flora Napolitana* (a Flora of southern Italy) and of the ripening of the taxonomic concept of *Pinguicula hirtiflora* with the author of both. (JS)

Clarke, C. and Kruger, R. 2006. *Nepenthes tenax* C. Clarke and R. Kruger (Nepenthaceae), a new species from Cape York Peninsula, Queensland. *Austrobaileya* 7(2): 319-324.

Historically, as many as eleven species of *Nepenthes* species have been recognized in Australia, but Danser reduced all these to *N. mirabilis* in 1928. In 2005, Clarke & Kruger returned the Australian *N. rowanae* to full species status. In the current paper, the authors have identified a new species from flooded, and usually inaccessible peatlands of northern Australia. This new species is most remarkable for its small size—rosette pitchers are typically only up to 55 mm tall, aerial pitchers are typically 110-150 mm tall. The paper includes commentary on the plant's habitat, and relationships with closely related species such as *N. mirabilis* and *N. rowanae* (hybrids with both species are also noted). The authors report upon a dwarfed population of *N. tenax* (already a dwarfed entity!) that have the smallest aerial pitchers yet observed on *Nepenthes*—these are at most 5 cm tall! A key and line drawings are also provided. The specific epithet *tenax* means tenacious, and refers to the sturdy stems and pitchers, which are freestanding and resist wind.

When reading this paper, the question of course is whether *N. tenax* is a truly a separate species, or whether it is only a response of a population of *N. mirabilis* to unique conditions. However, the authors have enormous experience with the genus, so their opinions carry significant weight. (BR)

Conti, F. & Peruzzi, L. 2006. *Pinguicula* (Lentibulariaceae) in Central Italy: Taxonomic Study. *Ann. Bot. Fennici* 43: 321-337.

Recent research in Central Italy (mainly Abruzzo but also one site in Lazio) revealed differences between several populations that have previously been regarded a single taxon (*Pinguicula longifolia* subsp. *reichenbachiana*). *Pinguicula fiorii* from the Majella mountains was already segregated in 1987. This present publication establishes another new species in the complex, *P. vallis-regiae* from the Camosciara mountains in the Abruzzo National Park. This is the same plant as featured under the provisional name *P. abruzzensis* by Jürg Steiger at the 1998 ICPS conference in Bonn. The presence of true *P. longifolia* subsp. *reichenbachiana* (type locality in SE France, close to the Italian border) in the region is denied. Previous reports of this taxon are referred to the species mentioned above or to *P. vulgaris*. Minor morphological differences between the different populations of *P. vulgaris* in Central Italy (the presence of this species there has been doubted by Jost Casper until recently) are considered sufficient to warrant subspecies distinction (*P. vulgaris* subsp. *anzalonei*, subsp. *ernica*, and subsp. *vestina* are described as new to science). If such practise was extrapolated to and throughout the vast circumboreal range of the species, hundreds or actually thousands of such subspecies could be described, but the taxonomic relevance of these entities appears doubtful. (JS)

Ellison A.M. 2006. Nutrient Limitation and Stoichiometry of Carnivorous Plants. *Plant Biology* 8: 740-747.

In this paper, Ellison presents a review of the history of the cost-benefit model for carnivory. In particular, he seeks to discuss any marginal benefit of carnivory with regard to the elements nitrogen, phosphorous, and potassium. Ellison's work on the ecology of carnivorous plants has, of late, usefully highlighted the fact that phosphorous may be as important as nitrogen, or more important, as a limiting nutrient, something seldom speculated in many books on carnivores—how many times do we see nitrogen pushed forward as *the* limiting factor in habitats frequented by carnivorous plants. Besides being a review, this is essentially a meta-analysis, pulling data from a large number of papers to evaluate the cost-benefit model, which predicts that carnivory has evolved as a means of coping with these low-nutrient habitats. His general conclusion is that, while useful and confirmed in some particulars, the cost-benefit model needs modification to allow for other factors such as evolutionary constraints on the evolution of carnivory in particular taxonomic groups. This is one more useful contribution from Ellison's lab, which has recently documented, among other things,

trapping of salamander larvae by *Sarracenia purpurea*. (DWD)

Lowrie, A. and Conran, G. 2006. *Drosera sidjamesii* (Droseraceae): Systematics and Ecology of a Natural Hybrid from Western Australia. Australian Systematic Botany 20: 44-53.

The new taxon described in this paper is the hybrid between *D. nitidula* subsp. *omissa* sensu Marchant & Lowrie, *non* Diels (an illegitimate name used for a taxon not including the type of the basionym, *D. omissa* Diels; no formal description was ever validly published for it, nor is an acceptable name available) and *D. pulchella* Lehm. The hybrid is intermediate in all major distinguishing features (incl. ecological preferences) between the two assumed parents, and the chromosome count ($2n = 46$) is the sum of the diploid counts of the parents (28 and 18, respectively); the hybrid is amphiploid. Frequently amphiploid hybrids are fertile while aneuploid hybrids, in which the chromosome count is the sum of their parents' different haploid counts, are frequently sterile. But in the present case fertility is rather weakly expressed, and most fruits fail to produce viable seed. (JS)

Parnell, J.A.N. 2005. An Account of the Lentibulariaceae of Thailand. Thai Forest Bulletin (Bot.) 33: 101-155.

The article is a local Flora account and essentially repeats known data (Taylor, 1989) with a few updates and notes. What really makes the article interesting is the description of an intriguing (for systematic rather than horticultural reasons) new species, *Utricularia jackii*. The type specimen has been seen and treated as something in need of further study by Taylor. But without fruits and seeds and on the basis of only a few specimens it was not formally described by him. Based on one further specimen (likewise without ripe capsules and seeds), the decisive step was now dared. At first sight *U. jackii* looks like a whole lot of other, yellow flowered species of sect. *Oligocista* (traps with two short appendages, "leaves" linear, 1-nerved, scales, bracts and bracteoles basifixed, pedicels dorsiventrally flattened, tricolporate pollen). What catches the eye (or rather, the microscope) is the occasional presence of small (0.4 mm across) white bulbils on the rhizoids. This feature is unique in *Oligocista* and actually makes the classification in this section doubtful. The author uses the presence of bulbils to differentiate *U. jackii* from the somewhat similar *U. vitellina* but it should be noted that the latter species has been rarely collected (never with fruits or seeds) and is not very well known. Taylor (1989: 404) writes: "Tubers are not present on the very sparse material of *U. vitellina* but they may well occur." If they occurred in *U. vitellina*, he would probably have placed this species in sect. *Chelidon* (that so far contains only the tuberous, West African *U. mannii*). Now there is at least a bulbiliferous *U. vitellina* relative. (JS)

Porembski, S. and Barthlott, W. (eds.) (2006) Special issue on carnivorous plants. Plant Biol. 8: 737-860.

The papers in this issue are adapted from presentations at a symposium organized by W. Barthlott and S. Porembski and held on the occasion of the XVII International Botanical Congress in Vienna in July 2005. Authors, topics and page ranges are as follows (JS):

Adamec, L.: Respiration and photosynthesis of bladders and leaves of aquatic *Utricularia* species. pp. 765-769.

Darnowski, D.W., Carroll, D.M., P[ł]achno, B., Kabanoff, E. and Cinnamon, E.: Evidence of proto-carnivory in triggerplants (*Stylidium* spp.; Stylidiaceae). pp. 805-812.

Degtjareva, G.V., Casper, S.J., Hellwig, F.H., Schmidt, A.R., Steiger, J. and Sokoloff, D.D.: Morphology and nrITS phylogeny of the genus *Pinguicula* L. (Lentibulariaceae), with special attention to embryo evolution. pp. 778-790.

Ellison, A.M.: Nutrient limitation and stoichiometry of carnivorous plants. pp. 740-747.

Gebühr, C., Pohlson, E., Schmidt, A.R. and Küsel, K.: Development of microalgae communities in the phytotelmata of allochthonous populations of *Sarracenia purpurea* (Sarraceniaceae). pp. 849-860.

Gorb, E.V. and Gorb, S.N.: Physicochemical properties of functional surfaces in pitchers of the carnivorous plant *Nepenthes alata* Blanco (Nepenthaceae). pp. 841-848.

Greilhuber, J., Borsch, T., Müller, K., Worberg, A., Porembski, S. and Barthlott, W.: Smallest

angiosperm genomes found in Lentibulariaceae, with chromosomes of bacterial size. pp. 770-777.

- Heubl, G., Bringmann, G. and Meimberg, H.: Molecular phylogeny and character evolution of carnivorous plant families in Caryophyllales—revisited. pp. 821-830.
- Hobbhahn, N., Küchmeister, H. and Porembski, S.: Pollination biology of mass flowering terrestrial *Utricularia* species (Lentibulariaceae) in the Indian Western Ghats. pp. 791-804.
- Laakkonen, L., Jobson, R.W. and Albert, V.A.: A new model for the evolution of carnivory in the bladderwort plant (*Utricularia*): adaptive changes in cytochrome *c* oxidase (COX) provide respiratory power. pp. 758-764.
- Meimberg, H. and Heubl, G.: Introduction of a nuclear marker for phylogenetic analysis of Nepenthaceae. pp. 831-840.
- Müller, K.F., Borsch, T., Legendre, L., Porembski, S. and Barthlott, W.: Recent progress in understanding the evolution of carnivorous Lentibulariaceae (Lamiales). pp. 748-757.
- Plachno, B.J., Adamec, L., Lichtscheidl, I.K., Peroutka, M., Adlassnig, W. and Vrba, J.: Fluorescence labelling of phosphatase activity in digestive glands of carnivorous plants. pp. 813-820.

Yadav, S.R., Sardesai, M.M. & Gaikwad, S.P. 2005. A New Species of *Utricularia* L. (Lentibulariaceae) from the Western Ghats, India. *Rheedea* 15: 71-73.

Utricularia babui described in this paper is compared by the authors with *U. graminifolia*. This is somewhat misleading as its closest (and possibly even conspecific) relative is more probably the (usually) larger *U. delphinioides* with almost identical seeds, traps and flowers (if shape and not size is compared). Talking about size it should be noted that a smaller form, *U. delphinioides* f. *minor* was described by Pellegrin already in 1920. Monographer P. Taylor (Kew Bull. Add. Ser. XIV, 1989) considered this form to be connected to the larger, more typical plants by “a continuous range of size”. (JS)

Yesson, C. and Culham, A. 2006. Phyloclimatic modeling: Combining phylogenetics and bioclimatic modeling. *Systematic Biology*. 55: 785-802.

The authors used a novel approach to examine the timing of some speciation events within the *Droseraceae* (*Aldrovanda vesiculosa*, *Dionaea muscipula* and 44 species of *Drosera*). They reanalyzed available molecular sequences using heuristic (educated guess) and Bayesian (likelihood) approaches which yielded an almost identical estimated evolutionary relationship (phylogeny) to Rivadavia *et al.* (2003). Chronograms were produced from phylograms by fixing dates from the fossil record and estimating the rate of speciation by using a likelihood method. Replicate analysis was used to determine confidence levels in the dates indicated for speciation events. Ten climatic parameters were determined for all species examined and mapped onto the chronogram. This account thereby tested how the climatic preferences that could have influenced speciation had changed over time. The results suggested that co-evolution of guilds of species had occurred in response to climate change, particularly the onset of Mediterranean climates in southern Africa and Australia about 15 to 10 million years ago. Palaeoclimatic maps produced indicate how the distribution of optimum climatic conditions changed over time within some *Drosera* lineages.

The approach used is innovative but seems coarse due to limitations of palaeoclimatic data and in the models themselves. The representation of climatic data for wide-ranging and variable species appears overly simplistic (e.g. average daily rainfall for seasonally active species or aquatic species). Geological data is not used, which detracts from the results, e.g. constraining the evolution of *D. neocaledonica*. No new sequence data was presented here. Four uncited references (page 795) hinder background reading. Yet overall this appears to be an exciting approach, one that I suspected will become widely used, and more refined over time. (Robert Gibson)



Darnowski, Douglas W et al. 2007. "Literature reviews." *Carnivorous plant newsletter* 36(2), 49–52.

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