Rediscovery of an outstanding *Nepenthes*: *N. aristolochioides* (Nepenthaceae)

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Summary

The morphology and ecology of a recently described *Nepenthes*-species, *Nepenthes aristolochioides* (Jebb & Cheek, 1997) from Central-Sumatra, is described and illustrated in this article.

Introduction

During a visit to the Herbarium of Leiden in 1988 I became aware of a rather poor herbarium specimen of a *Nepenthes* from Central Sumatra marked "new species?" It was collected in 1956 by Prof. Willem Meijer, a well-known *Rafflesia*-specialist. The species seems to be closely related to *Nepenthes talangensis*. In the summer of 1996, Dr. Jan Schlauer organized a meeting with Prof. Meijer in the Palmengarten Frankfurt, Germany. At this meeting, he showed us a photo of the mentioned new *Nepenthes* species with extraordinary new features. The new features of it will be discussed later on in this article. To get more detailed information about it, in June of 1996 Katrin Hinderhofer and I organized a field rip to Sumatra, where we were able to rediscover this species in its natural habitat (see Front Cover). The species has been described recently (Jebb & Cheek 1997) as *Nepenthes aristolochiodes*. Because of the new details which we obtained, I will now give a detailed description of the examined material.

Plants usually climbing, climbing stems reaching up to 5-8 m height, the part with adult leaves 3-5 mm thick, cylindrical to obtusely angular, internodes 7-10 cm long, leaves of the rosettes and climbing stems thick, coriaceous, sessile, lanceolate-spathulate, about 8-14 cm long, up to 3 cm broad, apically acute or obtuse, attenuate towards the base, leaves clasping the stem, not decurrent. Pinnate nerves irregularly reticulate, longitudinal ones 3-5 on each side, originating from the leaf base, running parallel in the outer 2/3 of the lamina. Pitchers of the rosettes (Figure 1) originating with a short curve, 3-5 mm wide from the hanging end of the tendril. Tendrils about twice as long as the leaves, without curl. Pitchers utriculate, thick, coriaceous, 5-7 cm high, 2.5-3 cm wide, with two fringed wings, the wings up to 1 mm broad, the fringe segments up to 3-5 mm long, 0.5 to 2 mm apart; mouth orbicular to ovate, up to 1.5 cm wide, oblique to vertical, facing forward. Peristome flattened, 7-20 mm wide, the ribs 1/2 -1/3 mm apart, the teeth of the inner margin 2-3 times as long as broad. Inner side of the pitcher wholly glandular. In the lower half of the pitcher overarched glands, 0.2-0.3 mm in diameter, 200 cm^{-2}, smaller ones, 500 cm^{-2} in the upper part of the pitcher. Lid orbicular to ovate, 1-1.5 cm in diameter, in front of the pitcher. Lower surface without appendage, with rather large glands at the whole surface, especially near the midrib. Three prominent nerves on each side of the midrib. Spur broad and flattened, 3-7 mm long, branched, inserted close to the lid. Pitchers of the climbing stem (Figure 2) originating with a short

curve, 10 mm wide from the hanging end of the tendril, narrow infundibuliform, 7-10 cm high, 2.5-4 cm wide, with 2 prominent ribs; mouth almost to completely vertical, facing forward. Peristome flattened, 4-6 mm wide, the ribs 1/3 mm apart, the teeth of the inner margin 2-3 times as long as broad, not distinct. Interior surface of the pitcher wholly glandular. In the lower part of the pitcher slightly overarched glands, 0.3-0.4 mm in diameter 200 cm^{-2}, smaller overarched glands in the upper part, 250 cm^{-2}, 0.2-0.3 mm in diameter. Lid ovate, in front of the pitcher. Lower surface without appendage, with rather large glands over the whole surface. Three to four prominent ribs on each side of the midrib. Spur broad and flattened, 3-5 mm long, branched, inserted close to the lid. Female inflorescence a raceme, the peduncle 4-5 cm long, 2-4 mm thick, the axis 14-15 cm long. The pedicels all of them 1-flowered, the lower ones 12 mm, the upper ones 6 mm long. Fruits 15-20 mm long, the valves lanceolate, 3 to 4 mm broad, gradually attenuate towards both ends. Seeds filiform. Colour of herbarium specimens: Brown to dark brown, pitchers with dark spots. Colour of living specimens: Vegetative parts light green, leaves with white hairs at the margins, pitchers ivory white to reddish with numerous red spots. Rim usually red to dark red, especially in rosette-pitchers. Lid on the lower surface red, on the upper surface yellowish with small red spots.

Distribution and Ecology

This species is only known from a very limited area in central Sumatra, where it grows at an altitude of 2400 m. It grows in mossy forest, climbing in shrubs and small trees. The typical mossy forest with *Sphagnum* on the ground was restricted just to the very top of the explored ridge. Just here some few single plants of *Nepenthes aristolochioides* were found, mostly climbing—only very few rosette-plants were growing in the moss. A gracile type of *Nepenthes singalana* is growing together with *Nepenthes aristolochioides*, usually in *Sphagnum*, sometimes climbing up into the shrubs and treelets.

Other *Nepenthes* Species of This Mountain:

At an altitude of about 1800-2100 m in montane forests and in *Pandanus*-swamps on the shoreline of a crater lake, *Nepenthes gymnamphora* can be found regularly, but scattered. Here, plants climb among shrubs and in the forest. Sometimes the funnel shaped, small upper pitchers can be found.

Nepenthes singalana grows in the same habitat as *Nepenthes aristolochioides*, but in a different ecological niche, as mentioned above. The type of *Nepenthes singalana* growing here is usually quite small and gracile, but also single large ground-pitchers have been found. The upper pitchers are very slender and small, while several (but not all) ground pitchers show very distinct ribs and teeth. *Nepenthes singalana* is also restricted to the mossy forest, but single plants can also be found at somewhat lower altitudes at open places. It is obvious that *Nepenthes aristolochioides* mainly produces pitchers high up in the trees while *Nepenthes singalana* usually bears pitchers at the ground on *Sphagnum* moss, so they colonize different ecological niches in the same habitat. One hybrid between *Nepenthes aristolochioides* and *Nepenthes singalana* has been found growing in *Sphagnum* moss. The mouth of it was nearly vertical.

Trap Mechanism of *Nepenthes aristolochioides*:

The outstanding characteristic of the upper pitchers of *Nepenthes aristolochioides* is the vertical position of the mouth; in this distinctiveness it is unique within the genus *Nepenthes*. This phenomenon can be found in *Nepenthes klossi*



Figure 1: *Nepenthes aristolochioides* ground pitcher viewed from above.

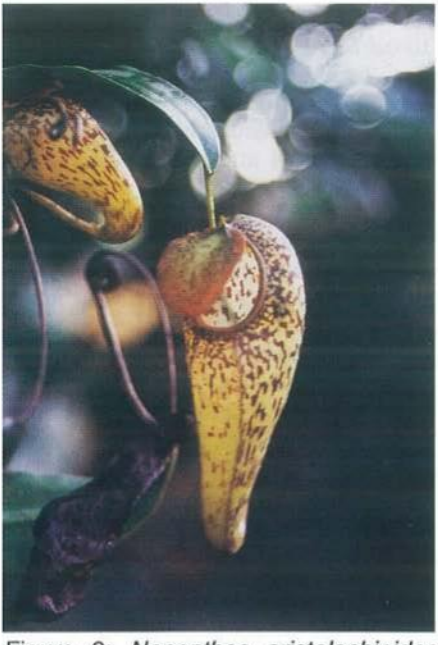


Figure 2: *Nepenthes aristolochioides* upper pitcher.

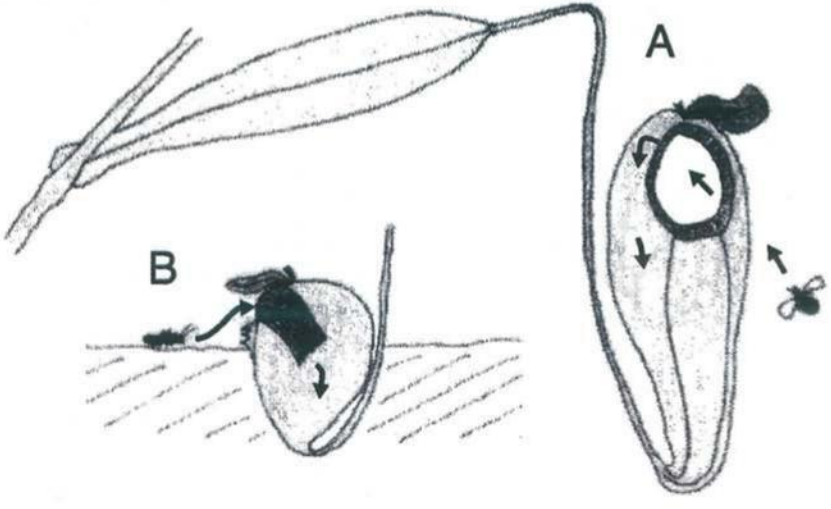


Figure 3: *Nepenthes aristolochioides*. A)proposed trapping mechanism of upper pitcher B)proposed trapping mechanism of lower pitcher

from Irian Jaya, but not as extreme as in *Nepenthes aristolochioides*. It seems that it is an adaptation to a special ecological niche in this species; the species are not closely related to each other. In the pitchers of the climbing stem of *Nepenthes aristolochioides* it is remarkable that the rim and the lower surface of the lid is usually coloured dark red, but the colour of pitchers is ivory white with red dots. The author presumes that the trap-mechanism of the upper pitchers of *Nepenthes aristolochioides* is like the mechanism in *Darlingtonia californica* or *Sarracenia psittacina* (Sarraceniaceae): the front of the mouth is darkened by the dark red lid and the dark red rim, but small insects are attracted by the light which shines through the ivory white pitchers. Insects get through the dark mouth to the shiny inner side of the pitcher, where they do not find the way back because of the dark entrance; later on the insects become exhausted and fall into the fluid at the ground of the pitcher (Figure 3a). The shiny inner side of the pitcher and the dark mouth can well be observed at Figure 1. In the field, just few small flying insects have been found in the upper pitchers. The mechanism of the rosette-pitchers seems to be quite different; it is striking that the utriculate pitchers bear just an extremely small, nearly vertical mouth with an extremely broad rim to the inner side of the pitcher. It may be something like a wicker trap which catches small crawling insects at the ground. The inner side of the pitcher can easily be reached by crawling insects by crawling through the tunnel of the mouth, but once fallen into the pitcher it is impossible to climb back through the mouth (Figure 3b). More detailed field-observations and analysis of the captured insects may help to demonstrate the real mechanism of these extraordinary traps.

Table 1

Because of its unique vertical mouth, *Nepenthes aristolochioides* is clearly distinguished from all other species of Nepenthaceae. *Nepenthes aristolochioides* shows close affinities to *Nepenthes talangensis,* but this species has pitchers with a vertical mouth. Table 1 shows some characteristics which clearly distinguish *Nepenthes aristolochioides* from *Nepenthes talangensis*.

Characteristic	*Nepenthes aristolochioides*	*Nepenthes talangensis*
mouth of upper pitchers:	vertical	horizontal
mouth of lower pitchers:	oblique to vertical	horizontal
shape of mouth:	oblique to ovate, without neck	elevated into a short neck
insertion of lid:	in front of the pitcher	above the pitcher
size of mouth in lower pitchers:	1-1.5 cm wide	3-5 cm wide
size of lid in lower pitchers:	1-1.5 cm in diameter	3-4 cm in diameter
orientation of rim of lower pitchers:	elongated towards the inner side of the pitcher	around the horizontal mouth
growing habit:	usually climbing high up into the trees or high shrubs; with long internodes	usually growing as rosettes or climbing in low shrubs

Conservation

Nepenthes aristolochioides seems to be an extremely endangered species because of its very small range, which is just known from two mountains in Central Sumatra! At moment, the habitats are not endangered by logging because both are situated in Nature Reserves, but too enthusiastic collectors could endanger the known population dramatically. So it remains the responsibility of all of us not to disturb such fragile populations of Nepenthaceae. Owing to the horticultural interest in this species, the precise locality is omitted from this description.

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Book Review

D'Amato, Peter. 1998. The Savage Garden: Cultivating Carnivorous Plants. Ten Speed Press, Berkeley, CA, USA. ISBN 0-89815-915-6, 314 p. + xxii, approximately 230 photographs and illustrations, most in color. A quality paperback, 15 × 23 cm (6 × 9 in), $19.95.

Reviewed by Barry Meyers-Rice



There are already several full-sized books on growing carnivorous plants. Granted, Slack's works are very hard to find, but Cheers wrote a fine volume. Do we really need another? In answer, I tell you to run, not walk, to the nearest bookseller and buy D'Amato's new book, The Savage Garden.

First, the basics. The book is only available as a paperback, and the signatures appear to be glued and not sewn. However, the paper has a high clay content and even after being soaked with greenhouse water it dries well. The book's layout is clear and efficient—every part of every page is filled with crisply printed illustrations or text. The photographs are not as large, numerous, or stunning as those in Cheers, but instead serve a supporting role of illustrating the text. (Although some are heart-stoppers, such as the astonishing image of *Nepenthes hamata* that makes *N. bicalcarata* look as alarming as a bean sprout.)

Cultivation is the focus of the book. For example, D'Amato dedicates nearly an entire page to color photographs of planting media used in carnivorous plant horticulture! Then, following nearly fifty pages on basic cultivation, D'Amato offers 230 more on detailed guidelines for each genus. The monotypic genera such as *Darlingtonia, Cephalotus*, and *Drosophyllum* are covered in just a few pages each, while the sections on the big genera are more expansive. D'Amato outdoes himself with a sundew chapter nearly fifty pages long! At no point did I disagree substantially with his cultivation prescriptions—with thirty years of experience, he knows his subject matter. When weighing his advice, it is good to remember that D'Amato

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