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Studies on *Oberonia* 2 (Orchidaceae: Malaxideae): *Oberonia aureolabris*, a new species discovered in cultivation

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Abstract

Oberonia aureolabris sp. nov. from western Java is described, having been studied using light and scanning electron microscopy. It is distinguished by a panduriform inflated disc, relatively short and widely separated epichile lobes on the lip, more or less equal length of the floral bracts over the entire floriferous portion of the inflorescence and orange colour.

Introduction

Oberonia Lindley (1830: 15) is an overlooked genus of small- to medium-sized, mostly epiphytic orchids with a long inflorescence bearing minute (1–4 mm) flowers. The 150–300 species (~470 taxa) are distributed from central Africa to French Polynesia and from southern Japan to northernmost New South Wales (Australia). The centre of diversity is the Malayan region, with New Guinea harbouring the greatest number of species (Schlechter 1911, Schuiteman & de Vogel 2006, Pridgeon *et al.* 2010).

Materials and methods

The habit of these plants was photographed with a digital single lens reflex camera (SLR). The close-up photographs of the flowers were acquired by z-stacking on a Zeiss Discovery V20 stereomicroscope with motorised focus, using a Zeiss 1.5× PlanApoS lens, objective slider, and a Zeiss Axiocam HRc revIII Peltier cooled microscope camera. The microscope was controlled through Zeiss Zen Blue. Additional photographs were taken on a Zeiss Axioskop 2plus, using a Zeiss Epiplan Neofluar 2.5×/0.06 ∞/0 objective (152 µm steps) and a Zeiss PlanApo 5×/0.16 ∞/0.17 (17 µm steps), illuminated with LED cold-light source with dual gooseneck light guides diffused with ping pong balls and captured with a digital SLR camera. The manual fine focus was motorised with a Cognisys (Traverse City, Michigan, USA) stepper motor and a custom adaptor (Aben Machine Products, Woodland Hills, California, USA) and controlled on a laptop computer using ZereneStacker (Richland, Washington, USA), which permitted automatic acquisition of stacks with high precision of step sizes. All z-stacks were generated from 16 bit/channel .tif files in ZereneStacker using the PMax algorithm. For further details see Geiger (2013).

For scanning electron microscopy (SEM), individual flowers were removed from the living plant of the prospective holotype and preserved in 95% ethanol, then brought to 100% ethanol through three changes of 100% ethanol. The flowers were then critical-point dried in a Tousimis Autosamdri 815A (Tousimis, Rockville, Maryland) using default settings, mounted on double-sided carbon tabs (PELCO Image Tabs, Ted Pella, Redding, California) on aluminium stubs and coated with gold in a Cressington 108Auto with rotary planetary stage (Watford, UK). The flowers were imaged on a Zeiss EVO 40XVP SEM in variable pressure (30 Pa) at 20 kV and 50–500 pA depending on magnification and working distance.

Additional digital imaging was carried out in AffinityPhoto (Serif, Nottingham, UK). Terminology for the cell surface sculpturing was derived from the vocabulary used to describe pollen (Hesse *et al.* 2009).

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Taxonomy

Oberonia aureolabris Geiger, *sp. nov*. (Figs. 1–3)

Type:—INDONESIA. Java: western portion, 1500 m; 7.0±0.7˚S, 108.25±2.25˚E, *unknown collector*, 2 August 2017, (holotype: HNT 12607). The holotype consists of a pressed plant with images of flowers on two sheets, ethanol preserved flowers and critical point dried, gold-coated flowers mounted on one SEM stub. SEM mounts are not typical preparations of types in botany. They are permissible under ICN Arts 8.2 and 8.3, and are referred to in Art. 9.8 Ex. 4. The material is considered important because it has some of the figured specimens.

FIGURE 1. *Oberonia aureolabris*. A. Habit (scale bar = 10 cm). B. Portion of inflorescence (scale bar = 10 mm). C. Enlarged portion of B (scale bar = 1 mm). D. Lateral view of flower showing inflated sac (scale bar = 1 mm). E. Frontal view of flower showing lateral lobes and fine serrations towards base (scale bar = 1 mm). B–C: z-stacked on stereomicroscope. D–E: z-stacked on compound microscope. (Photographs of the material that became the type.)

This new species is similar to *Oberonia rufilabris* Lindley (1838: t. 8A), but with an orange flower, lip with panduriform inflated disc, one pair of long lateral lobes in middle of lip, epichile unequally trifid, large outer lobes 25–30% as long as lip and a minute lobe in midline.

Epiphytic herbs, up to 10 cm tall. Roots fibrous, c. 1 mm in diameter, off white. Leaves light green, irregularly falcate bending away from axis, base narrower than middle, acuminate to acute tip, basal leaves largest, proportionally wider than more apical leaves, basal leaf length 8 cm, width at base 0.8 cm, maximum width 1.2 cm about 3 cm from base; apical leaf length 4.7 cm, width at base 0.5 cm, maximum width 0.6 cm c. 2.5 cm from base. Leaves imbricate, resulting in densely leafed stem. Inflorescence terminal, 10.5 cm long; peduncle approximately 12 mm, infertile bracts sparsely scattered, long (~ 3 mm), aristate; rachis in cross section obtuse-angulate, glabrous; flowers in ill-defined whorls to scattered, approximately 8–10 per "whorl", first flowers opening in apical third of inflorescence. Flower non-resupinate, orange. Floral bracts broad, clasping at base, acuminate, about ¼ longer than flower, glabrous, with approximately four to six thickenings. Sepals ovate acute. Lateral petals narrow lanceolate,

shorter than sepals. Lip overall rectangular, base with panduriform inflated disc; lateral lobes linear, approximately at middle of lip, between lateral lobes and base sometimes irregular, shallow, inequilateral serrations; epichile trilobed; outer lobes acuminate, acute, 25–30% of length of lip, not spreading but more or less parallel to axis of flower; central lobule separating outer lobes; cells pneumate with glabrous surface. Gynostemium vasiform, clinandrium forming expansive shelf; anther cap light orange, covering half of clinandrium, cell surface sculpture finely rugulate, pneumate; pollinaria light orange-dark yellow. Pedicellate ovary with weak longitudinal, blunt ridges, glabrous.

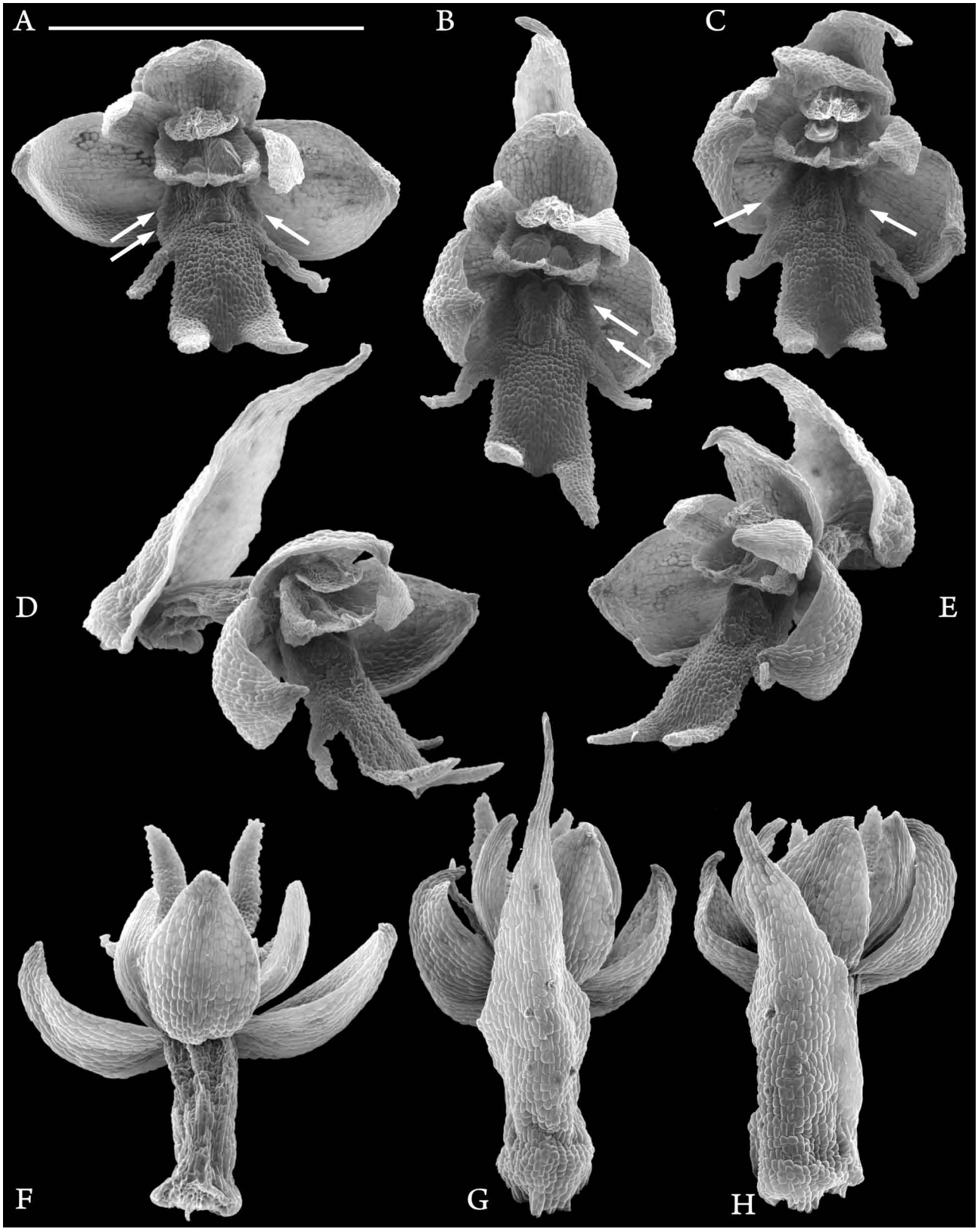

FIGURE 2. *Oberonia aureolabris*, SEM images of flowers from the holotype. A–C. Frontal. D–E. Oblique. F. Medial without floral bract. G–H. Medial with floral bracts (scale bar = 1 mm). Arrows point to an irregular serration between main lateral lobe and base of lip.

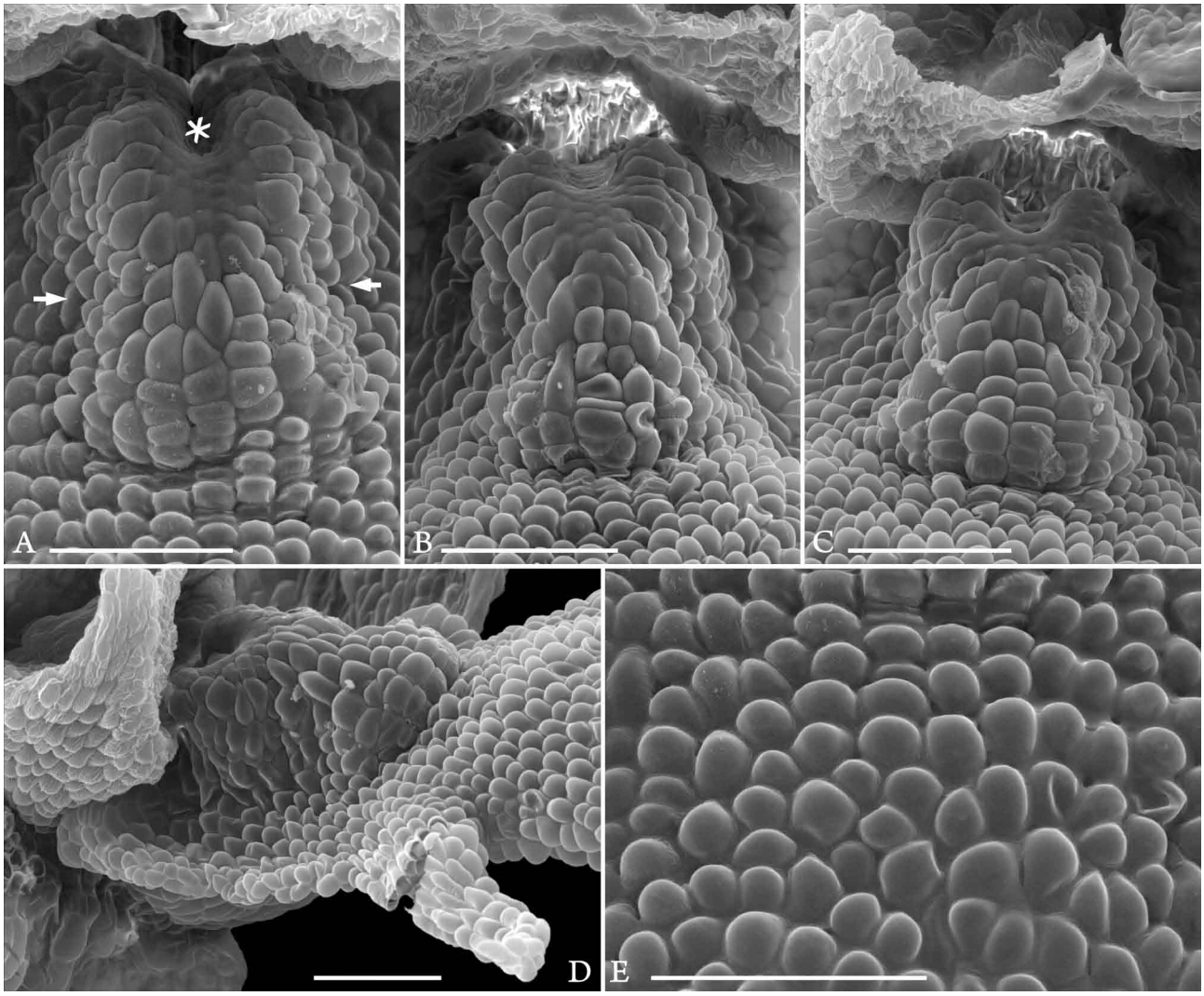

FIGURE 3. *Oberonia aureolabris*, SEM details of flowers from the holotype. A–C. Inflated disc frontal (arrows highlight constriction in the panduriform disc. *: sac). D. Oblique view of inflated disc. E. Cell on middle of lip with glabrous pneumate surface sculpture (scale bars = 100 μm).

Etymology:—*aureo*, Latin for golden/orange; *-labris*, Latin for lip. Referring to the golden coloured lip and similarity to *O. rufilabris*.

Notes:—The holotype is a cultivated specimen obtained from Popow Orchids, who indicated (pers. comm. 7/2017) that the stock plant originated from western Java. The elevation indication agrees with the plant being better cultivated in intermediate (15–28˚C) conditions as opposed to warm (21–35˚C). A new *Oberonia* species from western Java is not unlikely. In Comber's (1990) volume on the orchids of Java, it was noted that he had found several *Oberonia* plants that did not fit any of the known species.

The distinguishing features include a unique panduriform inflated disc, short lobes of the epichile (less than a third of the length of the lip) that are also more widely separated from each other and the more or less equal length of the floral bracts over the entire flower-bearing portion of the inflorescence, longer at base of inflorescence than at tip in *O. lotsyana* Smith (1905: 241) and *O. rufilabris* (Table 1, Fig. 4).

TABLE 1. Comparison of *O. aureolabris* to *O. rufilabris* and *O. lotsyana*.

Character	*O. aureolabris*	*O. rufilabris*	*O. lotsyana*
Flower colour	Orange	Red	Red
Serrations between lateral lobe and base	Absent/indistinct	Absent/indistinct	Distinct
Length of major epichile lobes	25–30% of lip length	50% of lip length	40% of lip length
Shape of inflated disc	Panduriform	Oval	Oval
Floral bracts	Equal length along inflorescence	Longer at base of inflorescence than at tip	Longer at base of inflorescence than at tip

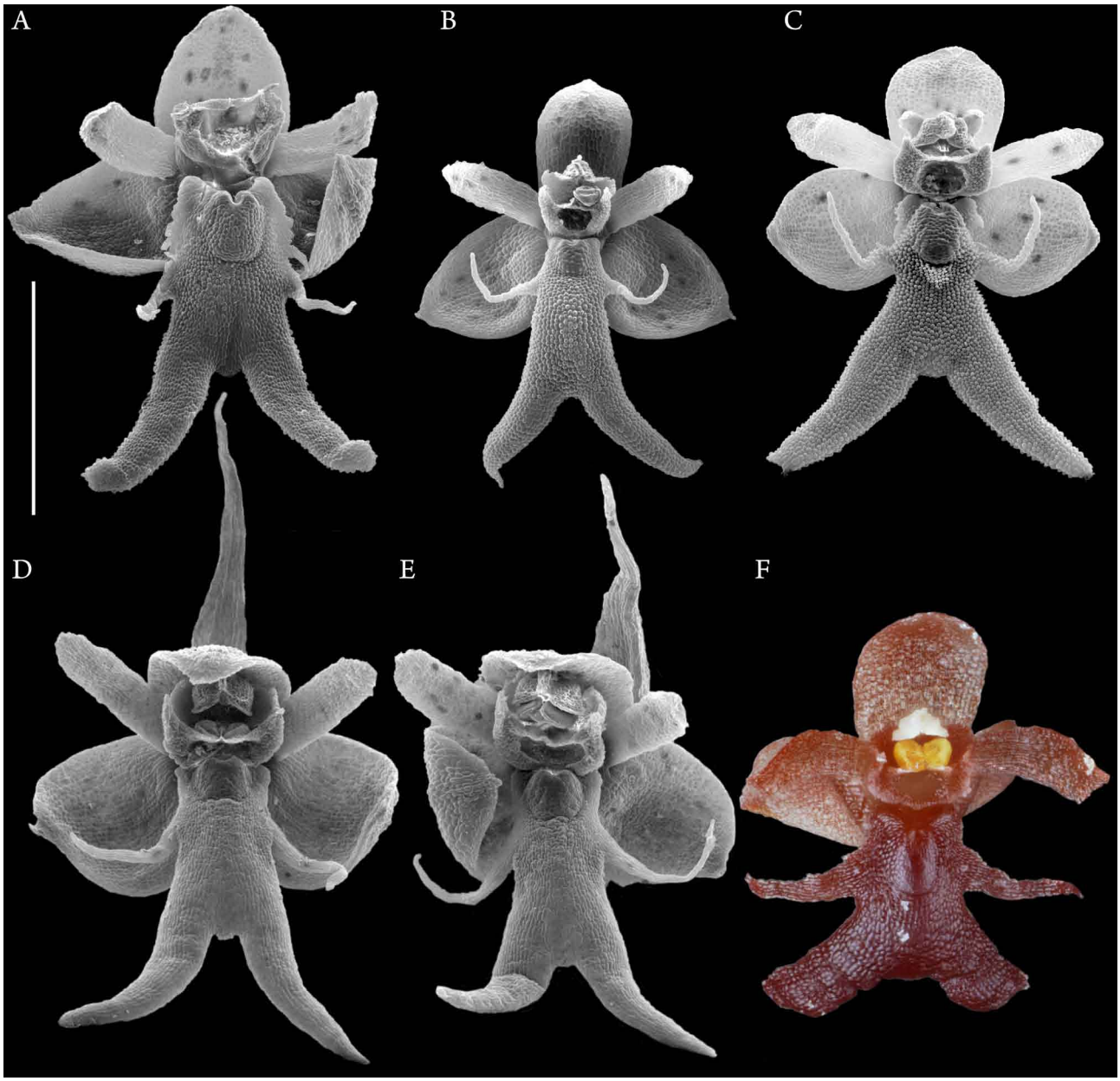

FIGURE 4. *Oberonia* species similar to *O. aureolabris*. A. SEM of flower of *Oberonia lotsyana* (K 52868, *Comber 1724*). B–F. *Oberonia rufilabris*. B. HNT 13047, ex cult. C. L17649. *unknown/s.n.* Slope of Gurung Penrissen, Borneo, Indonesia. D. L18987. *Hortus Singapore 2790*. E. L19257. *Hortus Singapore/s.n.* Ubi. F. Private collection. Z-stack of 67 images on compound microscope. Note orange pollinaria (scale bar = 1 mm).

Although *Oberonia* species are known for their "annoying variability" (Santapau & Kapadia 1966), and many unrecognised synonyms need to be addressed (Geiger, unpubl. data), *O. aureolabris* is clearly different from any other known *Oberonia* species. The inflated disc at the base of the lip is a distinct character and diametrically opposite to the much more common single or double sac on a more or less flat disc. It is known only in two other species, *O. rufilabris* and *O. lotsyana*. The panduriform shape of the inflated disc distinguishes *O. aureolabris* from the other two. Some other species have raised modifications of the usually flat surface of the disc, e.g., *O. ensiformis* (Smith 1812: 182) Lindley (1859: 4) with paired warts, *O. setigera* Ames (1912: 10) with annular ring, but the strongly inflated disc is restricted to the species mentioned.

The orange colour of the flower is equally distinct among the species with the inflated disc at the base of the lip. Although many *Oberonia* species vary widely in flower colour, the fairly common *O. rufilabris* has only red flowers. The same applies to the somewhat less well-known *O. lotsyana*. Based on the stable colour in *O. rufilabris* and *O. lotsyana*, it is expected that the flower colour is also constant in *O. aureolabris*, although it is not certain given the limited material available.

Floral bracts are an important character in *Oberonia,* in terms of both shape as well as relative length in comparison to the flower. They may be shorter than the pedicellate ovary but may be several times as long as the flower itself (*O. setigera*). In most species, the floral bracts are of the same length along the entire inflorescence, as is the case in *O. aureolabris*. Whereas the condition found in *O. aureolabris* is the norm for *Oberonia*, it is at variance to the other species with an inflated disc at the base of the lip, which readily distinguishes the new species.

It is unlikely that *O. aureolabris* is a rare mutant plant. Although a number of aberrations and (pseudo-)peloric flowers are known (Geiger & Kocyan in press), those modifications are usually only found on a few flowers of an inflorescence with otherwise typical flowers. Accordingly, the panduriform inflated disc and the orange colour seem to be a species-specific characters and not simultaneous aberrations. In fact, *O. aureolabris* is more distinct than *O. rufilabris* is from *O. lotsyana*. Given the known intermediates between the last two with respect to the degree of serration between the lateral lobe and the base, one may consider the two as synonyms. I retain them for the time being.

From species with abundant material in cultivation, *O. rufilabris* in particular, flowering plants may differ in size by a factor of five; small flowering plants tend to have small inflorescences with no more than three whorls of flowers, whereas large plants may have approximately 60 whorls of flowers. The arrangement and density of the flowers on the rachis is highly variable and a poor taxonomic character. Inflorescences of *O. setigera* that change from spiral arrangement to whorls on the same inflorescence are a case in point (Geiger unpubl.). *Oberonia leytensis* Ames (1920: 291) specimens with closely spaced flowers (flowers almost touching) to widely spaced flowers (whorls separated by about as much as the height of the flower) are known (Geiger unpubl.).

Oberonia has a number of proposed taxonomic sections. The application of those sectional names is not straightforward at all. In fact, less than half of the species names have ever been assigned to a section. The species with inflated disc may best fit in the section *Arachnochilus*, given the thread-like lateral lobes of the lip. I consider the following species to belong in the section *Arachnochilus*: *elbertii* Smith (1925: 5), *griffithiana* Lindley (1838: t. 8B), *insectifera* Hooker (1890: pl. 21, t. 2004), *jenkinsiana* Griffith ex Lindley (1859: 4), *lotsyana*, *punamensis* Schlechter *in* Schumann & Lauterbach (1905: 115), *rufilabris*, *stenophylla* Ridley (1896: 218) and probably also *setigera*. This list excludes various synonyms currently still considered correct by Govaerts *et al.* (2017). Whether a distinct section could even be justified for the species with inflated disc is open to further investigations.

The holotype flowered in July/August in cultivation. It is unclear whether this is a good indication for potentially finding flowering plants in nature. Although some species seem to show remarkably consistent phenological patterns even in cultivation (e.g., *O. leytensis*: Geiger pers. obs.), others seem to adapt to cultivation by flowering throughout the year. The latter is the case in *O. rufilabris*, which has been recorded to flower from October through April in nature (Ansari & Balakrishnan 1990, Averyanov 2013, Backer & Bakhuizen van der Brink 1968: as *O. valetoniana*, Banerji 1982, Banerji & Thapa 1971, 1978, Chowdhery 1998, Chowdhery & Pal 1997, Ding & Yin 2005, Gogoi & Yonzone 2016, Haines 1924, Lucksom 2007, Pradhan 1979, Raskoti 2009: also as *O. nepalensis*, Seidenfaden & Smitinand 1959, Shakya & Chaudhary 1999: also as *O. nepalensis* and *O. pantlingiana*, Singh 2015, Stainton 1988, Xinqi *et al.* 2009), but flowers throughout the year under cultivation (Geiger pers. obs.).

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References

Ames, O. (1912) Notes on Philippine orchids with description of new species, IV. *The Philippine Journal of Science, Section C. Botany* 7: 1–28.

Ansari, R. & Balakrishnan, N.P. (1990) A revision of the Indian species of *Oberonia* (Orchidaceae). *Orchid Monographs* 4: 1–82.

Averyanov, L.V. (2013) The orchids of Vietnam illustrated survey. *Turczaninowia* 16: 5–163.

Backer, C.A. & Bakhuizen van den Brink, R.C. Jr. (1968) *Flora of Java. Vol. 3*. Volters-Noordhoff N. V, Groningen, 761 pp.

Banerji, M.L. (1982) *Orchids of Nepal*. Bishen Singh Mahendra Pal Singh, Dehra Dun, 135 pp.
Banerji, M.L. & Thapa, B.B. (1971) Orchids of Nepal – 4. *Journal of the Bombay Society of Natural History* 68: 29–36.
Banerji, M.L. & Thapa, B.B. (1978) *Orchids of Nepal*. Today & Tomorrow's Printers and Publishers, New Delhi, 130 pp.
Chowdhery, H.J. (1998) *Orchid flora of Arunachal Pradesh*. Bishen Singh Mahendra Pal Singh, Dehra Dun, 824 pp.
Chowdhery, H.J. & Pal, G.D. (1997) *Orchidaceae of Arunachal Pradesh (check list)*. Bishen Singh Mahendra Pal Singh, Dehra Dun, 148 pp.
Comber, J.B. (1990) *Orchids of Java*. Royal Botanic Gardens, Kew, 407 pp.
Ding, S. & Yin, J. (2005) *Atlas of wild orchids in Hainan Island, China* [Hainandao yesheng lanhua tujian: in Chinese]. [unknown publisher, place of publication], 152 pp.
Geiger, D.L. (2013) Imaging small orchids using visible light. *Orchid Digest* 77: 112–123.
Geiger, D.L. & Kocyan, A. (in press) Studies in *Oberonia* 3. Aberrant flowers and other floral modifications in the orchid genus *Oberonia*. *Nordic Journal of Botany*.
Gogoi, K. & Yonzone, R. (2016) *Oberonia rufilabris* Lindley (Orchidaceae): a new record for the state of Assam, India. *Pleione* 10: 199–202.
Govaerts, R., Bernet, P., Kratochvil, K., Gerlach, G., Carr, G., Alrich, P. Pridgeon, A.M., Pfahl, J., Campacci, M.A., Holland Baptista, D., Tigges, H., Shaw, J., Cribb, P., George, A., Kreuz, K. & Wood, J. (2017) *World checklist of Orchidaceae.* Facilitated by the Royal Botanic Gardens, Kew. Published on the Internet: http://apps.kew.org/wcsp/ (accessed 30 July 2017)
Haines, H.H. (1924) *The botany of Bihar and Orissa, part 6*. Adlard & Son & West Newman, London, pp. 1059–1350.
Hesse, M., Halbritter, H., Zetter, R., Weber, M., Buchner, R., Frosch-Radivo, A. & Ulrich, S. (2009) *Pollen terminology, an illustrated handbook*. Springer, Vienna, 267 pp.
Hooker, J.D. (1890) *The flora of British India, vol. 6 Orchideae to Cyperaceae, part 17*. Reeve, London, 224 pp.
Lindley, J. (1838) *Sertum orchidaceum: a wreath of the most beautiful orchidaceous flowers.* Ridgeway, London, 49 pls.
Lindley, J. (1859) *Oberonia*. *In: Folia Orchidacea* 1: 1–8.
Lucksom, S.Z. (2007) *The orchids of Sikkim and north east Himalaya*. Privately published, 984 pp.
Pradhan, U.C. (1979) *Indian orchids: guide to identification and culture. Volume 2*. Privately published, Kalimpong, 747 pp.
Pridgeon, A.M., Cribb, P.J., Chase, M.W. & Rasmussen, F.N. (2010) *Genera orchidacearum, volume 4, Epidendroideae (part 1).* Oxford University Press, Oxford, 672 pp.
Raskoti, B.B. (2009) *The orchids of Nepal*. Raskoti & Ale, Kathmandu, 252 pp.
Ridley, H.N. (1896) The Orchideae and Apostasiaceae of the Malay Peninsula. *Journal of the Linnean Society Botany* 32: 213–416. https://doi.org/10.1111/j.1095-8339.1896.tb00698.x
Santapau, H. & Kapadia, Z. (1966) *The orchids of Bombay*. The Government of India Press, Calcutta, 239 pp.
Schlechter, R. (1911) Die Orchideen von Deutsch-Neu-Guinea. *Repertorium Speciarum Novarum, Regni Vegetalis, Beihefte* 1: 1–1079. https://doi.org/10.1002/fedr.19110100103
Schumann, K. & Lauterbach, K. (1905) *Nachträge zur Flora der deutschen Schutzgebiete in der Südsee (mit Ausschluss Samoa's und der Karolinen).* Borntraeger, Leipzig, 446 pp.
Schuiteman, A. & de Vogel, E.F. (2006) *Flora Malesiana: orchid genera of New Guinea, vol. IV, Kuhlhasseltia to Ophioglossella.* CD ROM. ETI, Amsterdam.
Seidenfaden, G. & Smitinand, T. (1959) *The orchids of Thailand, a preliminary list, part 1*. The Siam Society, Bangkok, 1–184b.
Shakya, L.R. & Chaudhary, R.P. (1999) Taxonomy of *Oberonia rufilabris* (Orchidaceae) and allied new species from the Himalaya. *Harvard Papers in Botany* 4: 357–363.
Singh, B. (2015) *Himalayan orchids: distribution and taxonomy*. Educationist Press, New Delhi, 224 pp.
Smith, J.J. (1905) *Die Orchideen von Java*. Brill, Leiden, 672 pp. https://doi.org/10.5962/bhl.title.86938
Smith, J.J. (1925) Die Orchideen der zweiten Frankfurter Sunda-Expedition 1906–1910. *Mededeelingen van Rijks-Herbarium* 53: 1–17.
Stainton, A. (1988) *Flowers of the Himalaya, a supplement*. Oxford University Press, Delhi, 86, 128 pp.
Xinqi, C., Ormerod, P. & Wood, J.J. (2009) 81. *Oberonia* Lindley. *In*: Z. Wu, Z., Raven, P.H. & Hong, D. (Eds.) *Flora of China, volume 25*. Science Press, Beijing, pp. 236–245.