

# ON THE NOMENCLATURE OF *ALOCASIA ODORA* (ARACEAE)

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**Abstract.** A nomenclatural revision of the vascular plant taxon *Alocasia odora* is presented. Issues associated with the valid publication of its basionym, *Arum odorum*, and the arguments for the accepted name are addressed here. The correct epithet of *Caladium odoratum*, a confusing synonym, is clarified and the name is lectotypified. A determined attempt is made to clarify the nomenclature of *Alocasia odora* and related nomenclatural entities and to provide the correct citations for them.

**Keywords:** *Arum*; *Caladium odoratum*; homonym; valid publication; William Roxburgh.

*Alocasia odora* (Roxb.) K. Koch (Araceae) is a species common to tropical Asia and Oceania and is a popular ornamental plant in the horticultural industry. It is widely known as “海芋” (hai yu) or “滴水观音” (di shui guan yin) in the Chinese market. The discovery of species of *Alocasia* (Schott) G. Don can be traced back to the Linnean era. As early as Roxburgh’s time, a few names (e.g. *Arum cucullatum* Lour., *Arum odorum* Roxb., *nom. nud.*, *Arum fornicatum* Roxb., *nom. nud.* and *Arum macrorrhizon* L.) had been proposed. During a revision of *Alocasia* in

China, we noticed that the correct name and typification of *Alocasia odora* and its related nomenclatural entities are unclear in the literature (sensu Boyce, 2008; Engler, 1920: 97; Govaerts et al., 2021; IPNI, 2021; Li, 1979: 76; Li and Boyce, 2010: 76; Schott, 1860: 149; The Plant List, 2013; Tropicos, 2019). In this paper we discuss the nomenclature history of *Alocasia odora* and its relationship with related names and address the validation of its basionym, citations, and typifications.

## MATERIALS AND METHODS

Literature concerning the nomenclature of *Alocasia odora* and related names was obtained from Biodiversity Heritage Library (BHL) and HathiTrust Digital Library and examined in terms of effectiveness of publication, validity, and legitimacy in accordance with the *International Code of Nomenclature for algae, fungi, and plants* (Turland

et al., 2018). The libraries of the Royal Botanic Gardens, Kew, and the Calcutta Botanical Garden, as well as twenty herbarium databases (CAL, BM, BR, E, G, K, LIV, A, B, C, FC, FI, GLAS, LINN, NY, OXF, P, PH, TCD, and UPS) were examined in an attempt to locate original material, including specimens and illustrations.

## RESULTS

Validation and typification of the basionym *Arum odorum*

Roxburgh (1814: 65) first used the name *Arum odorum*, but without a diagnosis or description. Loddiges et al. (1820) later provided a detailed description with an illustration and cited Roxburgh’s *Hortus Bengalensis*, thereby validly publishing the name, *Arum odorum* Roxb. ex Lodd., G.Lodd. & W.Lodd. (Art. 35.1). In 1832, the name *Arum odorum* Roxb. was published with detailed descriptions in Roxburgh’s *Flora Indica*. Since the name with description was prepared before Roxburgh’s death in 1815, it cannot be an emended description of *Arum odorum* Roxb. ex Lodd. et al. (1820) and should be considered a nomenclatural novelty attributed to Roxburgh. *Arum odorum* Roxb. was spelled exactly the same as *Arum odorum* Roxb. ex Lodd. et al., but it was based on a different type. Therefore, we consider the name *Arum odorum* Roxb. a separate name from, and a later homonym to, *Arum odorum* Roxb. ex Lodd. et al. (Art. 53.1).

Turner (2016) designated the illustration in the *Botanical Cabinet* 7: t. 641. 1820 as the lectotype of *Arum odorum*, although that citation needs to be corrected to Bot. Cab. 5: t. 416. 1820; since the illustration in the former is *Aristolochia tomentosa* Sims. We consider Turner’s citation to be an amendable error that does not match the context of “serious conflict with the protologue” in the Code (sensu Art. 9.19c, Ex. 16). Consequently, this lectotypification must be accepted with correction (Art. 9.19).

The correct epithet of *Caladium odoratum*

Two years after the valid publication of *Arum odorum*, Gawler (1822) published a page from Roxburgh’s manuscript with the name *Caladium odorum* (sensu Boyce 2008; IPNI 2021; Li, 1979: 76; Li and Boyce, 2010: 76; The Plant List, 2013; Tropicos, 2019). The two epithets are not orthographical variants and cannot be used interchangeably

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because they are derived from different Latin words, *odorum* from the noun *odor*, while *odoratum* from the adjective *odoratus* (Art. 61.2 ex. 2). An errata at the beginning of the volume where *Caladium odorum* was published that reads: “Vol. 8, fol. 641. 1. 2. pro ‘CALADIUM odorum’ lege ‘CALADIUM odoratum’” (Gawler 1822); *Caladium odoratum*, but not *Caladium odorum*, is the only legitimate name published here. In fact, Hooker (1842) adopted the former as the basionym for his new combination *Colocasias odorata* Hook.

Furthermore, the name *Caladium odoratum* should be adopted as a name of a new taxon, ascribed to Gawler, the volume editor. Although Roxburgh’s contribution was acknowledged at the end of the text as “Roxburgh MSS,” whether it was Roxburgh’s intention to use the name *Caladium odoratum* is still doubtful (Art. 46.2. Note 1. Ex. 11). Therefore, *Caladium odoratum* Roxb. ex Ker Gawl. should be the correct name (Art. 46.5).

To maintain the stability of these names, *Caladium odoratum* is lectotypified here. After consulting the online databases of major herbaria in the world (see Materials and Methods), we have not found any specimens traceable to Gawler, or any specimens collected by Roxburgh identified as either *Arum odorum* or *Caladium odoratum*. Therefore, we choose the illustration associated with the protologue as the type for *Caladium odoratum*, which clearly indicates its synonymy with *Arum odorum*.

The correct name of *Alocasia odora*

Brongniart (1834) proposed a new combination, *Colocasias odora*, without reference to a basionym or a previously published diagnosis or description. We presume it was his

intention to make a new combination based on an existing basionym (Art. 41.4). Hence, we consider the earliest validly published name, *Arum odorum* Roxb. ex Lodd. G. Lodd., & W. Lodd., to be the basionym for the combination *Colocasias odora* (Roxb. ex Lodd., G. Lodd. & W. Lodd.) Brongniart.

The combination *Alocasia odora* was first proposed by Spach (1846) in his *Histoire Naturelle des Végétaux. Phanérogames Vol. 12*. The French common name, *Alocase odorante*, precedes the name accepted by Spach (1846, Page 46), *Alocasia odora*, which is attributed to Kunth. We believe the new combination, *Alocasia odora*, should not be ascribed to Kunth, since Kunth (1841, Page 39) followed Brongniart’s treatment by placing the species in *Colocasias* sect. *Alocasia* Schott without proposing a new combination.

The basionym of *Alocasia odora* is also worth discussion. Although it was not directly indicated in the protologue, both Spach (1846: 46) and Kunth (1841: 39) cited most of the synonyms back to Roxburgh’s time and paraphrased the description from Brongniart (1834). We, therefore, believe the basionym of *Alocasia odora* should be *Arum odorum*, the same basionym as that of *Colocasias odora*, due to the presence of an indirect reference (Art. 38.14 & 41.3).

Subsequently, Koch published the later homonym, *Alocasia odora* K. Koch, 1854, *non auct.* (Roxb. ex Lodd., G. Lodd. & W. Lodd.) Spach, 1846, citing only *Arum odorum* Roxb., 1832, *non auct.* Roxb. ex Lodd. G. Lodd. & W. Lodd., 1820. (The latter’s illegitimacy precludes its potential of being a basionym). This nomenclatural entity, therefore, should be solely ascribed to Koch himself as a name of a new taxon despite being illegitimate (Art. 53.1). In conclusion, the correct name for this taxon should be *Alocasia odora* (Roxb. ex Lodd. G. Lodd. & W. Lodd.) Spach.

#### NOMENCLATURE

***Alocasia odora*** (Roxb. ex Lodd., G. Lodd. & W. Lodd.) Spach, Hist. Nat. Veg. (Spach) 12: 46. 1846.

Basionym: *Arum odorum* Roxb. ex Lodd., G. Lodd. & W. Lodd., Bot. Cab. 5(2): t. 416. 1820. TYPE: U.K., Bretton-Hall in Yorkshire (originally introduced from Pegu, Myanmar). (Holotype: [not located or not preserved]; Lectotype: designated by Turner 2016, [illustration] *Arum odorum* in Loddiges, C., G. Loddiges and W. Loddiges, Bot. Cab. 5: t. 416. 1820.

Homotypic synonym: *Colocasias odora* (Roxb. ex Lodd. et al.) Brongn., Nouv. Ann. Mus. Hist. Nat. 3: 145, t. 7. 1834.

Heterotypic synonym: *Caladium odoratum* Roxb. ex Ker Gawl., Bot. Reg. 8: t. 641. 1822 [‘*odorum*’]. TYPE: U.K. Lord Caernarvon’s hothouse at Highclere

(original locality unknown). (Holotype: [not located or not preserved]; Lectotype: [designated here] [illustration] “*Caladium odoratum*” Roxb. ex Ker Gawl., Bot. Reg. 8: t. 641. 1822).

*Colocasias odorata* (Roxb. ex Ker Gawl.) Hook., Bot. Mag. t. 3935. 1842.

*Arum odorum* Roxb., Fl. Ind. (Roxb.) 3: 499. 1832, *non auct.* Roxb. ex Lodd. et al. 1820. *nom. illeg.* (Art. 53.1).

*Alocasia odora* K. Koch, Index Seminum [Berlin] 5. 1854, *non* (Roxb. ex Lodd. et al.) Spach 1846. *nom. illeg.* (Art. 41.4 & 53.1).

## LITERATURE CITED

- BOYCE, P. C. 2008. A review of *Alocasia* (Araceae: Colocasieae) for Thailand including a novel species and new species' records from South-West Thailand. *Thai Forest Bull., Bot.* 36: 1–17.
- BRONGNIART, A. 1834. Note sur le *Colocasia odora*. *Nouv. Ann. Mus. Hist. Nat.* 3: 145–161.
- ENGLER, A. 1920. Araceae–Arum. Page 97 in A. ENGLER, ED., *Das Pflanzenreich: regni vegetabilis conspectus*, Heft. 73. Wilhelm Engelmann, Leipzig.
- GAWLER, J. B. K. 1822. Errata, *Caladium odoratum* [“*odorum*”]–Apple-scented *Caladium*. Page 641 In J. B. K. GAWLER, ED., *Bot. Reg.*, Vol. VIII. James Ridgeway, London.
- GOVAERTS, R., J. BOGNER, J. BOOS, P. BOYCE, B. COSGRIFF, T. CROAT, E. GONÇALVES, M. GRAYUM, A. HAY, W. HETTERSCHIED, S. ITTENBACH, E. LANDOLT, S. MAYO, J. MURATA, V. D. NGUYEN, C. M. SAKURAGUI, Y. SINGH, S. THOMPSON, AND G. ZHU. 2021. World Checklist of Araceae. The Board of Trustees of the Royal Botanic Gardens, Kew; <https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:30000216-2> (accessed February 9, 2021).
- HOOKE, W. J. 1842. *Colocasia odorata*. Fragrant Indian Kale. Page 3935 In S. CURTIS AND W. J. HOOKE, EDS., *Bot. Mag.*, Vol. LXVIII. Edward Couchman, London.
- KOCH, C. 1854. *Alocasia odora*. Page 5 In C. KOCH, ED., *Appendix Generum et Specierum Novarum et Minus Cognitarum quae in Horto Regio Botanico Berolinensi Coluntur*. Hortus, Berlin.
- KUNTH, C. S. 1841. *Colocasia odora*. Page 39 In C. S. KUNTH, ED., *Enumeratio Plantarum Omnium Hucusque Cognitarum, Secundum Familias Naturales Disposita, Adjectis Characteribus, Differentiis et Synonymis*, Vol. III. Sumtibus J. G. Collae, Stuttgart and Tübingen.
- LI, H. AND P. C. BOYCE. 2010. Araceae–*Alocasia odora*. In C. Y. WU, P. RAVEN AND D. Y. HONG, EDS., *Acoraceae through Cyperaceae. Flora of China*, 23: 76–77. Science Press, Beijing AND Missouri Botanical Garden Press, St. Louis.
- . AND C. W. WU. 1979. *Alocasia macrorrhiza*. In C. Y. WU, ED., *Araceae and Lemnaceae. Fl. Republ. Popularis Sin.* 13(2): 76. Science Press, Beijing.
- LODDIGES, C., G. LODDIGES, AND W. LODDIGES. 1820. *Arum odorum*. Page 416 In C. LODDIGES, G. LODDIGES AND W. LODDIGES, EDS., *The Botanical Cabinet*. John and Arthur Arch, John Hatchard, C. Loddiges AND Sons and G. Cooke, London.
- MAYO, S. J., J. BOGNER, P. C. AND BOYCE. 1997. *The Genera of Araceae*. Royal Botanic Gardens, Kew, London.
- ROXBURGH, W. 1814. Class XXI. Monoecia Monandria. *Hortus Bengalensis*. 65. Mission Press, Serampore.
- . 1832. Araceae–*Arum odorum*. In W. CAREY, ED., *Flora Indica*, Vol. III. 499. W. Thacker and Co. Calcutta, Serampore; Allen and Co. London, London.
- SCHOTT, H. W. 1860. *Alocasia macrorrhiza*. Page 149. In SCHOTT, H. W. *Prodromus Systematis Aroidarum*. Vindobonae, Vienna.
- SEALEY, J. R. 1956–7. The Roxburgh *Flora Indica* drawings at Kew. *Kew Bull.* 11(2): 297–348; 11(3): 349–399.
- SPACH, E. 1846. Callaceae–Alocase Odorante. Page 46 In E. SPACH, ED., *Histoire Naturelle des Végétaux. Phanérogames*, Vol. 12. Librairie encyclopédique de Roret, Paris.
- THE INTERNATIONAL PLANT NAMES INDEX (IPNI). 2021. The Royal Botanic Gardens, Kew, Harvard University Herbaria AND Libraries, and Australian National Botanic Gardens. <http://www.ipni.org> (accessed February 9, 2021).
- THE PLANT LIST. 2013. Version 1.1. <http://www.theplantlist.org/> (accessed February 9, 2021).
- TROPICOS. 2019. Tropicos.org. Missouri Botanical Garden, St. Louis, <https://tropicos.org/home> (accessed June 17, 2019).
- TURLAND, N. J., J. H. WIERSEMA, F. R. BARRIE, W. GREUTER, D. L. HAWKSWORTH, P. S. HERENDEEN, S. KNAPP, W.-H. KUSBER, D.-Z. LI, K. MARHOLD, T. W. MAY, J. MCNEILL, A. M. MONRO, J. PRADO, M. J. PRICE, AND G. F. SMITH, EDS., 2018. *International Code of Nomenclature for algae, fungi, and plants (ShenzhenCode) adopted by the Nineteenth International Botanical Congress Shenzhen, China, July 2017*. Regnum Vegetabile 159. Koeltz Botanical Books, Glashütten.
- TURNER, I. M. 2016. Rather for the nomenclaturist than for the scientific botanist: *The Botanical Cabinet* of Conrad Loddiges & Sons. *Taxon* 65(5): 1107–1149.