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NOTES ON GEOGRAPHIC DISTRIBUTION

The unexpected naturalization of *Strobilanthes schomburgkii* (Craib) J.R.I.Wood (Acanthaceae) in Java, Indonesia

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Abstract. *Strobilanthes schomburgkii* (Craib) J.R.I.Wood is a plant native to Thailand's humid tropics. It is discovered to be newly naturalized in Bandung, Cirebon, and Sumedang, West Java. It occurs in riparian habitats along the Winong River and Ciherang River, and in a ditch in Pasir Impun, which resemble its native habitat. The discovery represents the first record of *S. schomburgkii* as a naturalized species in Indonesia. Considering its recent establishment, regular monitoring and further study of its population dynamics and potential impacts on native vegetation are recommended to anticipate and prevent its possible spread.

Key words. Alien species, Lamiales, Malesia, Rheophyte, Strobilanthineae

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INTRODUCTION

Strobilanthes Blume represents the second largest genus within the family Acanthaceae. The genus encompasses 466 species primarily distributed across tropical regions (POWO 2025). Its distribution includes the Indian subcontinent and Sri Lanka, spans the Himalayan region, and extends through Burma, China, Thailand, Malaysia, and Indonesia, ultimately reaching Korea, Japan, and northeastern Australia (Bennet and Scotland 2003). *Strobilanthes* is characterized by swollen nodes featuring a distinct horizontal ridge, a decurrent petiole, and flowers that are either sessile or possess short pedicels. It exhibits leaf-like bracts, calyx lobes that are non-imbricate, and a corolla lobe aestivation that is not quincuncial. The style is secured by trichomes on one side of the corolla tube, and the stamens are monadelphous, connected by a sheath at the base (Backer and Bakhuizen van den Brink 1965; Bennet and Scotland 2003). The presence of trichomes that secure the style, along with the rugula, are key diagnostic characters of *Strobilanthes* (Manzitto-Tripp et al. 2021).

The latest thorough revision of the genus *Strobilanthes* in Java was by Bennet and Scotland (2003). Their study identified 25 species on the island, with 12 endemic, including *S. axilliflora* C.B.Clarke ex S.Moore, *S. bibracteata* Blume, and *S. winckelii* (Bremek.) J.R.Benn. (Bennet and Scotland 2003). Along with the native flora, two naturalized species, *S. glomerata* (Nees) T.Anderson, and *S. hamiltoniana* (Steud.) Bosser & Heine, have been documented on the island (Bennet and Scotland 2003; Wood and Adhikari 2021). Both species were originally introduced to Java as ornamental plants and have since formed wild populations. *Strobilanthes hamiltoniana* has recently emerged as a notable invasive species, especially in the mountainous areas of Java (Tjitrosoedirdjo et al. 2016).

Several species of Acanthaceae have been deliberately brought to tropical areas for decorative reasons, valued for their vivid flowers, bracts, and leaves (Meyer and Lavergne 2004). Nevertheless, numerous species have since transcended their cultivated origins, becoming naturalized within ecosystems modified by human intervention, where they may function as weeds, adventive species, or ruderals. Meyer and Lavergne (2004) indicated that around one-third of the cultivated Acanthaceae species found on tropical islands have achieved naturalization, with increased naturalization rates likely as more ornamental acanths manage to escape from garden settings. *Ruellia simplex* C.Wright, an aesthetically pleasing ornamental shrub indigenous to Mexico and elsewhere in the American tropics. It has recently been documented as having naturalized in several locations in West Java Province. Initially presented as a decorative species, *R. simplex*

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has evolved to thrive in moist, humid environments, showing a particular preference for paddy fields and riverbanks (Irsyam et al. 2022).

In accordance with these tendencies, we discovered naturalized *S. schomburgkii* (Craib) J.R.I.Wood in Java. This species had not been previously documented on the island in prior botanical surveys. Populations of *S. schomburgkii* in the Malesian biogeographic region had only been documented in Sabah (Borneo) (Bennet and Scotland 2003; POWO 2025).

METHODS

An inventory of non-native plant species was conducted in several locations in West Java from September 2024 to January 2025. Specimens were collected in accordance with the methodology outlined by van Balgooy (1987). Morphological examinations and specimen preservation were performed at the Herbarium Bandungense (FIPIA), School of Life Sciences and Technology, Institut Teknologi Bandung. The identification of specimens is supported by taxonomic references such as Craib (1911), Hansen (1985), Bennet and Scotland (2003), Wood and Scotland (2009), and Kladwong and Chantaranothai (2024). The terminology used in the description follows Beentje (2016).

Additional occurrence data for *Strobilanthes schomburgkii* was sourced from the Global Biodiversity Information Facility (GBIF) database, utilising herbarium specimens and direct observational records (GBIF.org 2024). The data was integrated into our analysis and mapped using ArcGIS v. 10.8. The administrative boundary map, which delineates district and city divisions as of 2020, was obtained from the Geoportal of the Geospatial Information Agency (https://geoportal.big.go.id/).

RESULTS

***Strobilanthes schomburgkii* (Craib) J.R.I.Wood.**
Figures 1–3

New records. INDONESIA: JAVA — West Java • Bandung, Mandalajati, Pasir Impun, near the Jl. Haji Umar, along a small ditch; 06°53′38.4″S, 107°40′48.6″E; 767 m a.s.l.; 30.X.2024; ASDI 898; FIPIA-DEP115 • Cirebon Regency, Arjawinangun, Geyongan, ITB Campus, riparian zone of the Winong River; 06°39′51.7″S, 108°24′52.5″E; 11 m a.s.l.; 06.IX.2024; ASDI 896–897; FIPIA-DEP116–117 • Sumedang Regency, Cijeruk, Jl. Cadas Pangeran; 06°52′54.5″S, 107°51′36.8″E; 752 m a.s.l.; 19.I.2025; ASDI 919; FIPIA-DEP118 • Sumedang Regency, riparian zone of the Ciherang River; 06°52′41.5″S, 107°52′22.5″E; 592 m a.s.l.; ASDI 923; FIPIA-DEP119.

Description. Shrub, up to 2.5 m high. Older stem terete, glabrous, green; young stem quadrangular, reddish brown; internodes 2.0–9.5 cm long; nodes reddish. Leaves opposite; petiole short, 5.0–6.0 mm long, glabrous, green; blade lanceolate to falcate, 1.5–17.2 cm long × 0.35–2.6 cm wide, base attenuate, margin entire, apex acuminate to caudate, chartaceous, adaxial surface shiny dark green or greyish green, abaxial surface pale green, reddish at base, glabrous on both sides, midrib raised on both sides, lateral nerves in 6 or 7 pairs; young leaves reddish green adaxially, abaxial surface reddish to pale green. Inflorescences spicate, terminal, 1.0–2.0 cm long; peduncle short, 1.0–3.0 mm long, puberulent; bracts imbricate, ovate-lanceolate, 9.0–24.0 mm long × 2.5–8.0 mm wide, margin ciliate, apex acuminate, pilose, glandular, pale green; bracteoles minute, lanceolate, 5.0 mm long × 1.5 mm wide, pilose, green; calyx 5, lobes linear-lanceolate, 10.0 mm long × 1.5–2.0 mm wide, margin ciliate, densely covered with glandular hairs on outside, pale green; corolla campanulate; tube gradually widened from base, 1.7–2.1 cm long, pilose inside, yellowish green with pink tinge; limb 5 lobed; lobes ovate, 5.0–6.0 mm long × 3.0–5.0 mm wide, white with dark pink and yellow at throat. Stamens didynamous, 4, basally monadelphous; 2 longer filaments 17.0–17.5 mm long, barbate, yellowish white; 2 shorter filaments ca. 15.0 mm long, pilose, yellowish white; anthers oblong, ca. 2.5 mm long, white; thecae with purple color on margin. Ovary ellipsoid, 2-locular, glandular at the apex, greenish; style filiform, slender, ca. 16.0 mm long, pubescent, white; stigma 2-cleft, 2.0–3.0 mm long, greenish. Capsule not observed.

Distribution. The species is believed to have its origins in Thailand, and it has subsequently spread to various regions, including Cambodia, Malaysia (Sabah), Singapore, Sri Lanka, Vietnam, and Trinidad and Tobago (Wood and Scotland 2009; GBIF.org 2024; Kladwong and Chantaranothai 2024; POWO 2025). The new records demonstrate the naturalization of *S. schomburgkii* in West Java, particularly in the regions of Bandung, Cirebon, and Sumedang (Figure 4).

Ecology. In West Java, *S. schomburgkii* has expanded into shaded habitats, especially beneath bamboo thickets adjacent to riverbanks and near ditches, at altitudes of 11–767 m above sea level (Figure 2).

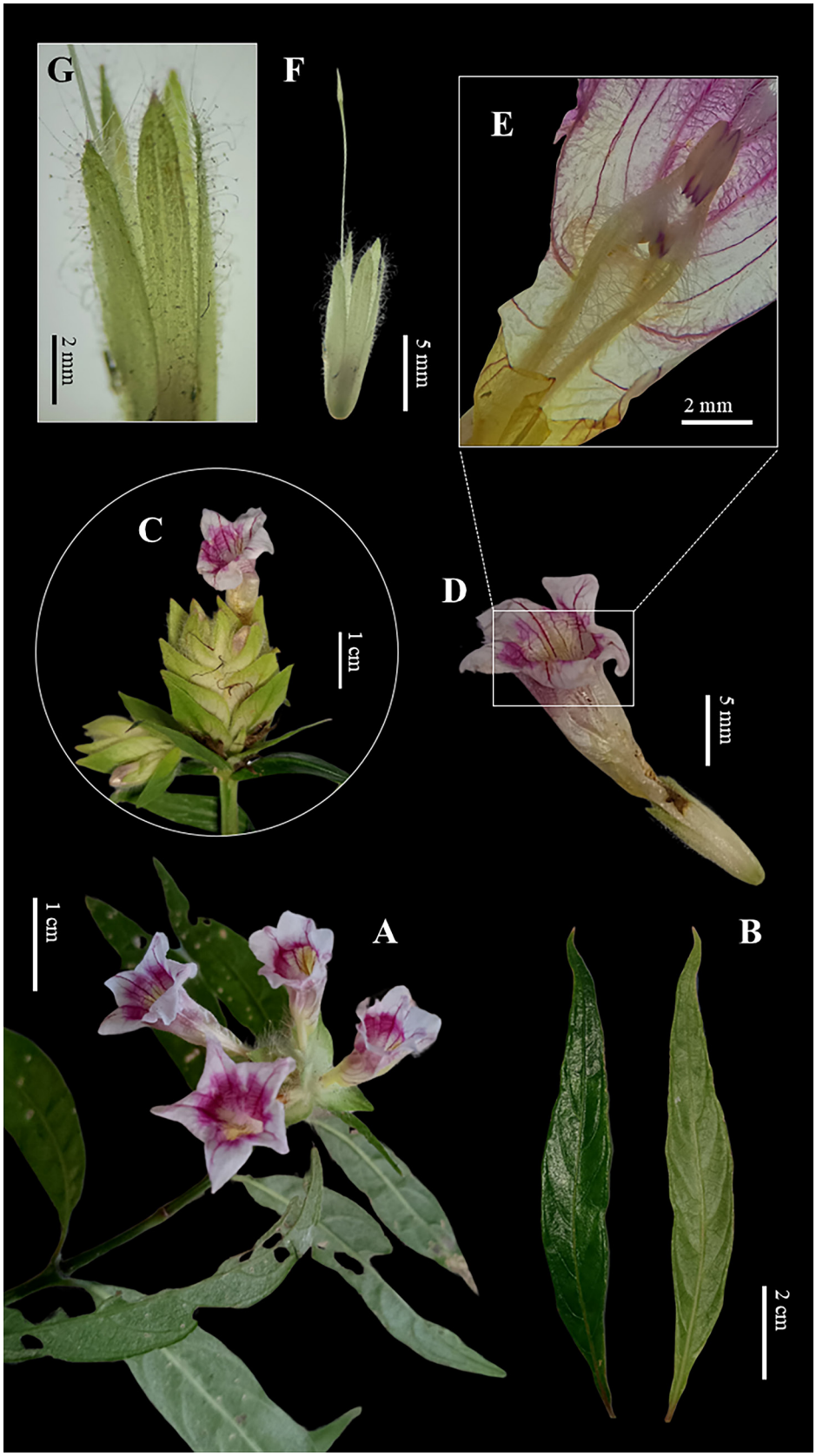

Figure 1. *Strobilanthes schomburgkii* (Craib) J.R.I.Wood. **A.** Flowering branch. **B.** Leaf blade. **C.** Inflorescence. **D.** Flower. **E.** Inside section of corolla tube displaying didynamous stamens and a pistil. **F.** Calyx with attached pistil (corolla artificially removed). **G.** Glandular trichomes on the calyx. Each figure was observed using different magnification and scale.

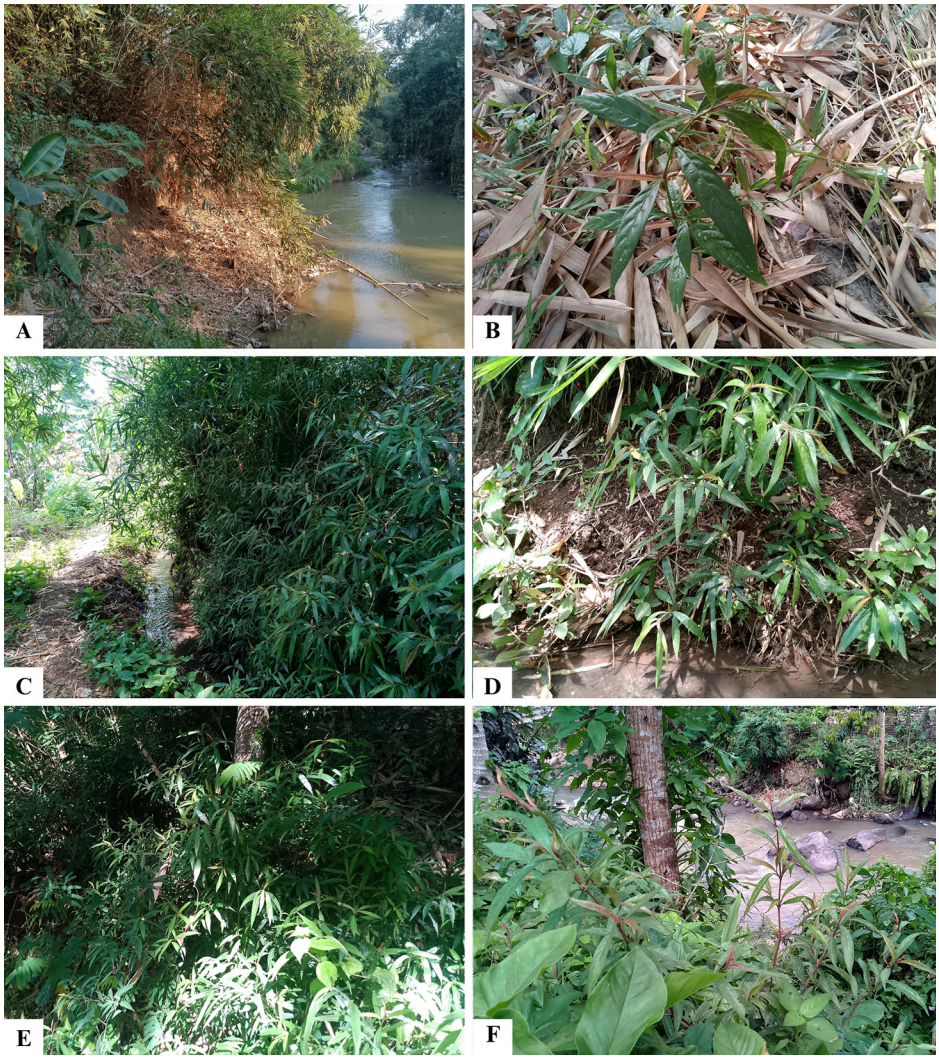

Figure 2. Locations of naturalized *Strobilanthes schomburgkii*. **A, B.** Riparian zone of the Winong River located within the ITB Cirebon Campus in Arjawinangun. **C, D.** A small ditch in Pasir Impun village, Bandung. **E.** Roadside of Cadas Pangeran, Sumedang. **F.** Riparian zone of the Ciherang River in Sumedang.

Figure 3. *Justicia gendarussa* Burm.f. **A.** Habit. **B.** Inflorescence.

DISCUSSION

Strobilanthes schomburgkii was described for the first time from Bangkok in 1911 and is considered native to Thailand (Craib 1911). Studies reveal that this species has been cultivated in Thailand and Sri Lanka, chiefly as an ornamental plant for fencing applications (Wood and Scotland 2009; Nilanthi 2019). It is reasonable to suggest that *S. schomburgkii* may have been brought to Java for similar ornamental purposes. Based on our field observations, the species is occasionally planted as a living hedge in traditional gardens or rice fields by local people in Sumedang.

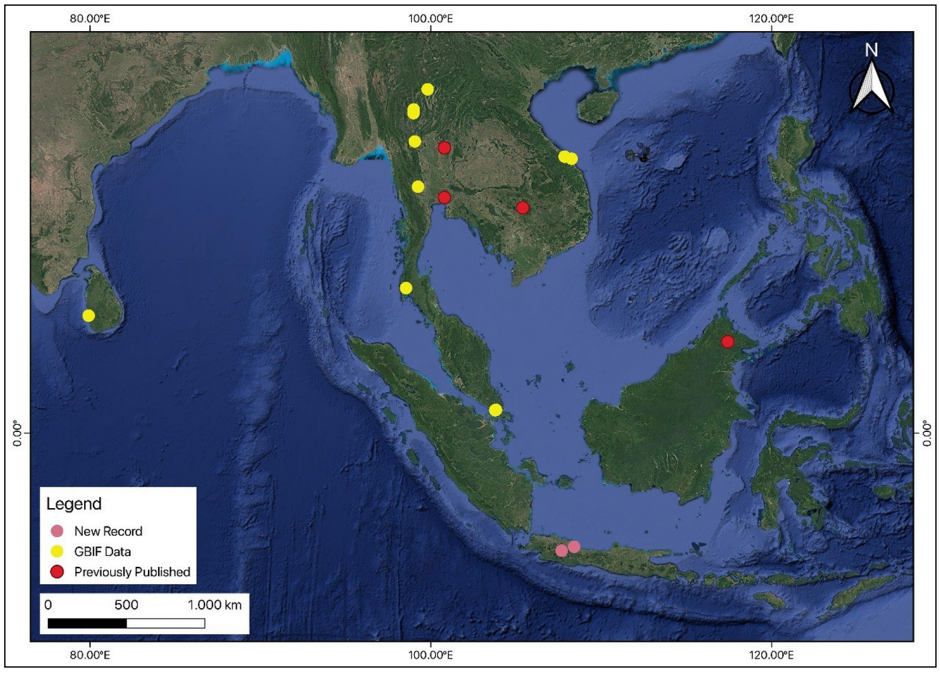

Figure 4. The current distribution of *S. schomburgkii* in Asia.

In Indonesian horticultural practices and among plant enthusiasts, *S. schomburgkii* is frequently misidentified as *Justicia gendarussa* L.f. because of significant morphological similarities. The misidentification is perpetuated through online marketplaces, where *S. schomburgkii* is often marketed under the name "Gendarusa." Both species display similar growth patterns and leaf structures, complicating visual differentiation in the absence of reproductive features. A comprehensive comparison of the morphological differences between these two species to aid in precise identification is provided in the Figure 3 and Table 1.

Prior research has demonstrated that some ornamental acanths have the capacity to invade new geographical areas (Meyer and Lavergne 2004; Singhurst and Holmes 2012; Keith et al. 2017; Wood and Adhikari 2021; Irsyam et al. 2022). Humans served as a crucial role in the cultivation and spread of these species. The family Acanthaceae, in conjunction with Fabaceae, Rosaceae, Solanaceae, and Liliaceae, demonstrates a significant dependence on anthropogenic influences for its dissemination and establishment (Pyšek 1998). In West Java, the ongoing distribution and colonization of *S. schomburgkii* are profoundly shaped by human activities, heightening the probability that this species could proliferate beyond controlled or regulated environments.

Table 1. Morphological comparison of *Strobilanthes schomburgkii* and *Justicia gendarussa*.

Morphological characters	***S. schomburgkii***	***J. gendarussa***
Habit	Shrub, to 2.5 m high	Sub-shrub or shrub, 0.7–1.5 m high
Stem surface	Glabrous	Pubescent
Leaf shape	Lanceolate to falcate	Elliptic to narrowly lanceolate
Leaf apex	Acuminate to caudate	Acute to shortly acuminate
Leaf base	Attenuate	Cuneate to attenuate
Leaf margin	Entire	Subsinuate
Lateral nerves	6–7 pairs	5–8 pairs
Inflorescence	Terminal	Terminal or axillary
Bracts	Ovate-lanceolate, pale green	Triangular, green to purple
Calyx	Linear, pilose to grandulary	Linear-lanceolate with simple short hair
Corolla	5-lobed, lobes ovate, yellowish green with pink tinge and white with dark pink and yellow at throat, pilose inside	Bilabiate, with two lip forms; lower lip cuneate-obovate, 3-lobed, violet dotted basally, creamy white or pinkish, glandular; upper lip oblong-deltoid, violet blotched
Filaments	17 mm long, pilose	3–6 mm long, glabrous
Ovary	Ellipsoid, glandular at apex	Oblong-cylindric, glabrous

The invasive acanths propagate vegetatively through stem fragmentation, clump division, or root suckers in their natural environments, resulting in a rather gradual range extension (Meyer and Lavergne 2004). Field observations reveal that *S. schomburgkii* exhibits an impressive ability for vegetative reproduction, predominantly via two processes: stem fragmentation and root suckering. Stem fragments are efficiently disseminated through hydrochory, indicating their transportation by water, which aids in the colonization of novel regions. Upon encountering favourable conditions, these stem fragments can swiftly take root and evolve into distinct entities, thereby enhancing the species' capacity for proliferation.

Considering the occurrence of *S. schomburgkii* in Java, knowledge of its population dynamics is needed to reduce this species' potential widespread dissemination, as unchecked spread may adversely affect natural ecosystems and biodiversity. Citizen science, or observations of *S. schomburgkii* driven by netizens, has demonstrated its usefulness in tracking the distribution of species, as illustrated by successful initiatives in Thailand available in the Global Biodiversity Information Facility data (GBIF.org 2024). Adopting such participatory approaches in Indonesia could significantly improve data collection and enable timely management of the spread of *S. schomburgkii*, thereby serving as a proactive measure against its uncontrolled spread.

ADDITIONAL INFORMATION

Conflict of interest

The authors declare that no competing interests exist.

Ethical statement

No ethical statement is reported.

Author contributions

Conceptualization: ASDI, MRH. Data curation: ASDI, MRH, IPAH, MHB. Investigation: ASDI, IS. Methodology: ASDI, MRH. Supervision: DR. Visualization: ASDI, MRH, IPAH. Software: IPAH. Validation: ASDI. Writing – original draft: ASDI, MRH, IPAH, MHB. Writing – review and editing: ASDI, MRH, IS, DR.

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Data availability

All data that support the findings of this study are available in the main text.

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