



## Revision of the subtribe Loxotidinae (Gesneriaceae) of Indian part of Eastern Himalaya

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### ABSTRACT

Loxotidinae is a very interesting group of the family Gesneriaceae. Loxotidinae belongs to the tribe Epithemateae under the subfamily Didymocarpoideae. A total of three (3) species under the subtribe Loxotidinae have been recorded from Indian part of Eastern Himalaya. Critical analysis of the recorded species shows some unusual morphology such as strong anisophylly, pseudo-racemose inflorescence etc. Detailed morphological description, correct accepted name, synonym, key to the species, phenology and distribution have been discussed here.

### KEYWORDS

*Rhynchoglossum*, Loxotidinae, Gesneriaceae, taxonomic revision.

### Introduction

Loxotidinae belongs to the tribe Epithemateae under the subfamily Didymocarpoideae of the family Gesneriaceae (Möller and Clarke, 2013). Gesneriaceae was traditionally divided into two subfamilies viz. (i) Gesnerioideae (New World) with isocotylous seedling and inferior ovary and (ii) Cyrtandroideae (Old World) with anisocotylous seedling and superior ovary (Clarke, 1883). Loxotidinae is a monotypic subtribe with only single genus (*Rhynchoglossum*) and 10 species distributed worldwide (Möller and Clarke, 2013). Gesneriad genera are generally restricted to either New World or Old World except the genera *Rhynchoglossum* and *Epithema*. Although other species of *Rhynchoglossum* are Old World in distribution, *R. azureum* has been reported from New World (Central America to Venezuela). C. B. Clarke in Flora of British India (vol 4, 1884) recorded only one species *R. obliquum* from India. B. L. Burtt in 1962 merged the genus *Klugia* into the *Rhynchoglossum* thus transferring the *Klugia ampliata* to *R. ampliatum*. Rao and Joseph recorded *R. lazulinum* from Arunachal Pradesh in 1967.

Old World gesneriads have a number of odd genera with unique morphological features. Gesneriaceae is characterised by pair flowered cymose inflorescence but in *Rhynchoglossum* it is reduced to single flower with pseudoracemose inflorescence. Extreme anisophylly is noticed in this genus where one leaf from each node is completely reduced while the other strongly asymmetrical foliage leaf matures being placed in two almost opposite ranks.

The three species of *Rhynchoglossum* from the Indian part of Eastern Himalaya have been discussed critically with key and comparative analysis.

### Material and Methods

This work is based primarily on the morphological studies of herbarium specimens as well as literature and fresh specimens collected during field survey. Important herbaria of Botanical Survey of India visited for herbarium specimens included CAL, BSHC, ASSAM, ARUN and LBG.

### Taxonomic studies of *Rhynchoglossum*

*Rhynchoglossum* Blume Bijdr., Fl. Ned. India 741.1826; C.B. Clarke, Commelyn. Cyrtandr. Bengal. 123.1874., in A. & C. de Candolle, Monogr. Phan. 5: 161. 1883 & in Hook. f. Fl. Brit. India 4: 367. 1884; Wang et. al. in Fl. China 18: 399. 1998; O. M. Hillard in Grierson and Long, Fl. Bhutan 2(3): 1327. 2001.

### Type: *Rhynchoglossum obliquum* Blume

Perennial or annual monocarpic herbs, sparsely indumentum, fleshy-succulent. Leaves alternate or opposite, unequal sided, short petiolate, lamina ovate-cordate, texture thin and delicate. Inflorescence unilateral terminal or axillary raceme, bracts subtending, linear, displaced onto the pedicels. Calyx campanulate, lobes 5, longer or shorter than tube. Corolla strongly zygomorphic, tube cylindrical, bluish or bluish violet, limb strongly bilabiate, upper 2-lobed, lower 3-lobed, larger. Stamens 2 or 4 fertile, included, anthers opposed in pairs, cells confluent. Disc cupuled. Ovary ovoid, style linear, stigma obscurely bilobed. Capsules included within calyx, ellipsoid, loculicidally 2-valved. Seeds small, many, ellipsoid, minutely rugulate.

**Distribution:** *Rhynchoglossum* with ca 10 species (Möller and Clarke, 2013) is distributed in Indo-Malayan region and tropical region; 3 species have been recorded from North Eastern India including West Bengal.

**Habitat:** On wet and shady rock, in forest or open shady places, usually in lowlands.

### Key to the species

1a. Stamens 4.....2

1b. Stamens 2.....3 *R. obliquum*

2a. Inflorescence terminal raceme; flowers showy blue-violet.....2 *R. lazulinum*

2b. Inflorescence axillary or terminal raceme; flowers whitish blue.....1 *R. ampliatum*

1. ***Rhynchoglossum ampliatum* (C. B. Clarke)** B.L. Burtt Notes Roy. Bot. Gard. Edinburgh 24. 168.1962; *Klugia ampliata* C. B. Clarke, Monogr. Phan 160. 1883 and in Hook f., Fl. Brit. India 4: 367. 1884.

**Type:** Mishmee Hills, Assam, India, *W. Griffith* 3846 (K000858040!)

**Herbs**, stem glabrous. **Leaves** ca. 15 x 8 cm, upper and lower surface glabrous, petioles 1-4 cm long. Inflorescence axillary or terminal raceme, bracteole conspicuous, persistent, peduncles 1-2 cm long, pedicels 0-4 mm long. **Calyx** ca. 15 mm long, 5-lobed, lobes as long as the tube, lanceolate, sub-equal, cylindrical, deep

green. **Corolla** bluish white. **Stamens** 4 fertile, anthers coherent. **Capsule** ovoid oblong within acrescent calyx.

**Ditribution:** India: Arunachal Pradesh

2. *Rhynchoglossum lazulinum* A. S. Rao et J. Joseph in Bull. Bot. Surv. India 9 (1-4): 280. 1967; H. J. Chaudhury et. al. in G. S. Giri et. al. Mat. Fl. Arunachal Pradesh 2: 233. 2008.

**Type:** Krishna 36 km from Bhallukpong, on the way to Sessa, Kameng district, NEFA, 1250 m, 10.9.1964, Joseph 39716A (CAL, HOLOTYPE)

**Succulent** herbs, stem 50-100 cm high, cylindrical, smooth. **Leaves** alternate as well as opposite, long petioled at lower nodes to sessile near peduncle, broadly elliptic, dark-green, 9-2.4 x 3.5-10 cm, membranous, apex acute to acuminate, base unequal, subcordate, margin entire. **Inflorescence** terminal racemes, glabrous, bract ca 4 mm long, peduncle 14.5-25.5 cm long, pedicel stout ca 1 cm long, bluish violet. **Calyx** ca 4 cm long, infundibulum, conspicuously ridged, green, calyx lobes much smaller than tube. **Corolla** ca 6 cm long, bilabiate, bright blue to violet, glabrous, prominently bent at the throat, lower lip 3 lobed, upper 2 lobed. **Stamens** 4, didynamous, anthers confluent, flat. **Disc** cuplike. **Ovary** ovoid, ca 1 cm high, style stout, ca 2.5 cm long, stigma bilobed. **Capsule** ca. 2 cm long, ellipsoid, within persistent calyx, seeds many, small, ovoid.

**Habitat:** Along hill slopes & underneath primary forest on thick humus rich soil.

**Fl. & Fr.:** August-November

**Distribution:** India: Arunachal Pradesh. Endemic to India. *Exsicc:* Lower Subansiri, 7.9.1983, G. D. Pal 299 (ARUN, acc no-2962); Way from Palin to Deed, Arunachal Pradesh, 13.9.1983 G. D. Pal 510 (ARUN, acc no-2964); 5 km from Habia Basti, Arunachal Pradesh, 26.10.85 G. D. Pal 1929 (ARUN, acc no-2965).

3. *Rhynchoglossum obliquum* Blume, Bijdr. 14: 741. 1826; C. B. Clarke in Hook f., Fl. Brit. India 4: 367. 1884; C. E. C. Fisch in Rec. Bot. Surv. India 12(2): 118. 1938; Kanjilal et. al., Fl. Assam 3: 398. 1939; *Rhynchoglossum obliquum* var. *parviflora* C. B. Clarke in A. DC. Monogr. Phan. 5: 162. 1883; Matthew, Fl. Pl. Kurseong 76. 1981; G. P. Sinha in Singh et. al. Fl. Mizoram 2: 211. 2012; H. J. Chaudhury et. al. in G. S. Giri et. al. Mat. Fl. Arunachal Pradesh 2: 233. 2008; A. Mukherjee et. al. in Pleione 2 (2): 159. 2008.

**Herbs** 30-70 cm. high. **Stem** soft, succulent. **Leaves** broadly elliptic, apex acute to acuminate, margin smooth, base prominently oblique, 5-17 x 2.5-5.5 cm, petiole 0.5-2.5 cm, alternate, surface sparsely hairy. **Inflorescence** axillary and terminal raceme, rachis hairy. **Calyx** 5-lobed, lobes 4 mm long, apex acuminate; **Corolla** 0.9 cm., blue. **Stamen** 2 perfect, 3 mm. long, anther dorsifixed, conjoint. **Carpel** 7 mm. long, ovary 2.5 mm. **Capsules** globose with persistent style and stigma.

**Habitat:** Along hill slopes & underneath primary forest on thick humus rich soil.

**Fl. & Fr.:** July-December

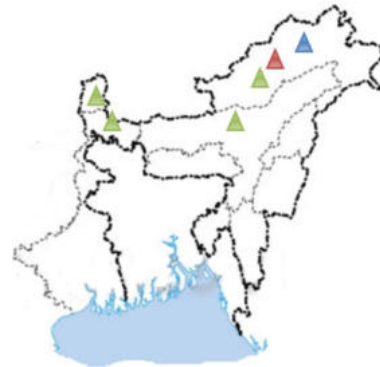
**Distribution:** India: India West Bengal (Darjeeling), Sikkim, Assam, Arunachal Pradesh; NEPAL, BHUTAN, CHINA, MYANMAR, TAIWAN, INDONESIA, THAILAND, PENINSULAR MALAYSIA, LAOS, VIETNAM, CAMBODIA.

*Exsicc:* Darjeeling, 1300 m, G. King 13722 (CAL); Mahananda Wildlife Sanctuary, Darjeeling, 24.09.07 T. K. Paul & Anant Kumar A2545 (CAL); Dampa T. R., 920 m, 21.9.2006, B. K. Sinha & Odyuo 112749 (ASSAM, acc no-71167); Subansiri F. D., 290m, 24.9.1959, G. Panigrahi 19323 (ASSAM, acc no-16274); Nagaland, 12.10.1977 C. L. Malhotra 75227 (ASSAM, acc no-68773); Howa-Pani, Arunachal Pradesh, 18.9.07 R. K.

Choudhary18673 (ARUN, acc no-7977); L. Subansiri, New Itanagar, 8.8.78., G. D. Pal. 76029 (ARUN, acc no-2937); Nyapin to Paji, 25.11.1964, A. R. K. Sastry 40905 (ARUN, 2967)

### Discussion and Conclusion

*Rhynchoglossum* Blume and *Klugia* Schlecht. are closely related as stated by Clarke (1883) emphasized on the number of fertile stamens during classification and thus kept *Klugia* and *Rhynchoglossum* as separate genera. But, Burt (1962) considered corolla character in addition to stamens during classification of the genus *Rhynchoglossum*. He included *Klugia* within *Rhynchoglossum* in Notes from the Royal Botanic Garden Edinburgh. Present paper described 3 species of *Rhynchoglossum* viz., *R. obliquum*, *R. ampliatum* and *R. lazulinum* found in the study area. Out of the 3 species *R. obliquum* is widely distributed while *R. lazulinum* and *R. ampliatum* have been reported only from Arunachal Pradesh (Fig 1).



**Fig 1. Distribution map of *Rhynchoglossum* in Indian part of Eastern Himalaya**

▲ *R. ampliatum*; ▲ *R. lazulinum* ▲ *R. obliquum*.

*R. ampliatum* was formerly known as *Klugia ampliata*. Comparative study of the three species (Table 1) shows that *R. obliquum* has 2 fertile stamens, whereas *R. lazulinum* and *R. ampliatum* have 4 fertile stamens.

**Table 1: Comparative study of *R. ampliatum*, *R. lazulinum* and *R. obliquum***

Characters	<i>R. ampliatum</i>	<i>R. lazulinum</i>	<i>R. obliquum</i>
<b>Habit</b>	Succulent herbs	Succulent herbs	Succulent herbs
<b>Leaves</b>	Surface glabrous	Surface glabrous	Surface sparsely hairy
<b>Inflorescence</b>	Axillary or terminal raceme	Terminal raceme	Axillary or terminal raceme
<b>Stamens</b>	Fertile 4, anthers coherent	Fertile 4, didynamous	Fertile 2
<b>Calyx</b>	Lobes as long as the tube, campanulate	Lobes much smaller than tube, infundibuliform	Calyx cleft, campanulate

From the field visit only *Rhynchoglossum obliquum* was collected (Fig 2).



**Fig 2. *Rhynchoglossum obliquum* Blume**

*R. lazulinum* is endemic to Arunachal Pradesh (Singh *et. al.*, 2015). It is locally known as "Taigium" by Nyshi tribe of Arunachal Pradesh. There is no record of preserved specimens of *R. ampliatum* in the studied herbarium. The description has been done on the basis of literature (REF). *R. lazulinum* recorded only from Arunachal Pradesh field Station Herbarium (ARUN). Extensive survey in the far flung areas of Arunachal Pradesh and conservation of *R. lazulinum* and *R. ampliatum* is highly warranted.

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