



## Taxonomic status, occurrence and lectotypification in the genus *Ophiuros* (Poaceae) in India

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### Abstract

Present status and taxonomically valuable characters of *Ophiuros* (Poaceae) have been discussed. The distribution of *O. exaltatus* and *O. megaphyllus* is provided based on field survey and herbarium consultation in various herbaria in India. Lectotype for *O. megaphyllus* have been designated.

**Keywords:** Distribution, identity of species, Rottboelliinae

### Introduction

Genus *Ophiuros* Gaertner (1805: 181) (Rottboelliinae: Poaceae) is represented by four species and distributed in Australia, Asia, and Africa (Mabberley 2017). All species of the genus were reported from India (Bor 1960). *Ophiuros* can be differentiated from its closely related genera, *Hemarthria* Brown (1810: 207), *Mnesithea* Kunth (1835: 153), *Manisuris* Linnaeus (1771: 164), and *Glyphochloa* Clayton (1980: 814) by having one to many axillary and terminal spikes, absence of pedicellate spikelets, sunken sessile spikelets alternate in spike-rachis, distinctly pitted to obscurely pitted lower glumes and partly to wholly fused upper glumes with sunken spike-rachis.

During revision of the subtribe Rottboelliinae Presl (1830: 329) in India, we studied geographical distribution, cytology, Caryopsis morphology and molecular characters of some important endemic species (*Glyphochloa* spp. and *Ophiuros* spp.) of the subtribe. Based on the aforesaid characters, *Ophiuros bombaiensis* Bor (1951: 167) had been transferred to the genus *Glyphochloa* by Gosavi *et al.* (2016). *Ophiuros papillosus* Hochstetter (1844: 248) was reported from India by Bor (1951) based on a single herbarium specimen collected by Patel from Solapur district (Almeida 2014) and housed in BLAT herbarium. However, its occurrence is considered as doubtful as we could neither trace the specimen therein nor Gaikwad and Garad (2015) reported it from Solapur. Thus, presently *Ophiuros* comprises of two species in India, viz. *Ophiuros exaltatus* (Linnaeus 1771: 575) Kuntze (1891: 780) and *O. megaphyllus* Stapf ex Haines (1924: 1058).

Floral characters are not sufficient in differentiating these two species in the genus *Ophiuros*. Hence, taxonomically sound characters of the genus for species identification, key to the species, detailed description, photo plate, distribution based on herbarium specimens and observations of both the species in India are provided in present communication. Lectotype has been designated for the *O. megaphyllus*.

### Material and Methods

*Specimen collection, distribution, morphology and vouchers:*—Plant materials for the present investigation were collected from different states such as Maharashtra, Karnataka, Gujarat, Madhya Pradesh and Assam of India. The distributions of species were recorded by authors in the field and by consulting different herbaria (ASSAM, BLAT, BSHC, BSI, BSID, CAL, MH, PBL and SUK). Morphological studies were carried out using EMZ-5TR Meiji Stereo

Zoom Microscope. Herbarium voucher specimens are deposited in the Department of Botany Herbarium (SUK), Shivaji University, Kolhapur, Maharashtra, India.

**Cytology:**—Meiotic chromosome counts were made from young spikelets fixed in Cornoy's fixative (ethanol and glacial acetic acid, 3:1). Anthers were squashed in 2% propionic-orcein and studied under Olympus CX 21i Compound Microscope and photographs were taken with Olympus E-PL1 camera.

## Taxonomy

***Ophiuros exaltatus*** (Linnaeus 1771: 575) Kuntze (1891: 780), (**Fig. 1**)

*Aegilops exaltata* Linnaeus (1771: 575) *Mnesithea exaltata* (L.) Skeels (1913: 282). *Rottboellia exaltata* (L.) Naezén (1779: 37).

*Rottboellia corymbosa* (Linnaeus f. 1782: 114). *Ophiuros corymbosus* (L.f.) Gaertner (1805: 181). *nom. illeg.*

**Lectotype (designated by Slageren 1994: 427):**—INDIA. North Bengal, Narsingpur, Siligori [without province and precise locality], s.d., *J. Koenig* 10 (LINN 1218.15, image!).

Tuft perennial stout rhizomatous herbs; rhizome thick, horizontal. Culms 50–150 cm tall, erect, terete, glaucous, bulbous at base. Basal scaly leaves covering mouth of rhizome, villous. Leaf sheath 6–11 cm long, terete, glabrous or sparsely hirsute; ligule short, membranous; leaf blades 30–80 × 0.5–2.5 cm, flat to infolded, midrib prominent, margins smooth to sparsely scaberrulose with tubercle based hairs; base open, attenuate, loose with villous to hispid; apex acute to acuminate. Inflorescence 1 to many spikes or corymbose; peduncle 3–5 cm long, spike terete, very slender, 6–15 cm long, slightly curved; joints thick, equaling the spikelets or more, 2.5–3 mm long, glabrous. Spikelets oblong-lanceolate, 2.5–3 mm long, awnless; apex obtuse. Lower glume coriaceous, oblong-lanceolate, 2.3–3 mm long, 5–7 nerved, longitudinally, pitted between the nerves or smooth, apex obtuse. Upper glume membranous, 3-nerved; apex obtuse. Lower lemma hyaline, oblong-elliptic, 1.8–2.3 mm long, obscurely 2-nerved, apex obtuse. Palea hyaline, linear-lanceolate, 1.8–2.3 mm long, nerveless, apex obtuse to subacute. Lodicules 2. Stamens 3; anthers 1–1.5 mm long. Upper lemma hyaline, broadly elliptic, 2–2.3 mm long, nerveless, apex obtuse to round, hairy. Palea hyaline, elliptic to oblong, 1.8–2 mm long, nerveless, apex obtuse. Lodicules 2. Stamens 3; anthers 1–2 mm long. Pistil ca. 2 mm long. Caryopsis oblong, hilum punctiform.

**Flowering and Fruiting:**—July–February.

**Meiotic counts (*n*):**—*n*=7 (Fig 1. l)

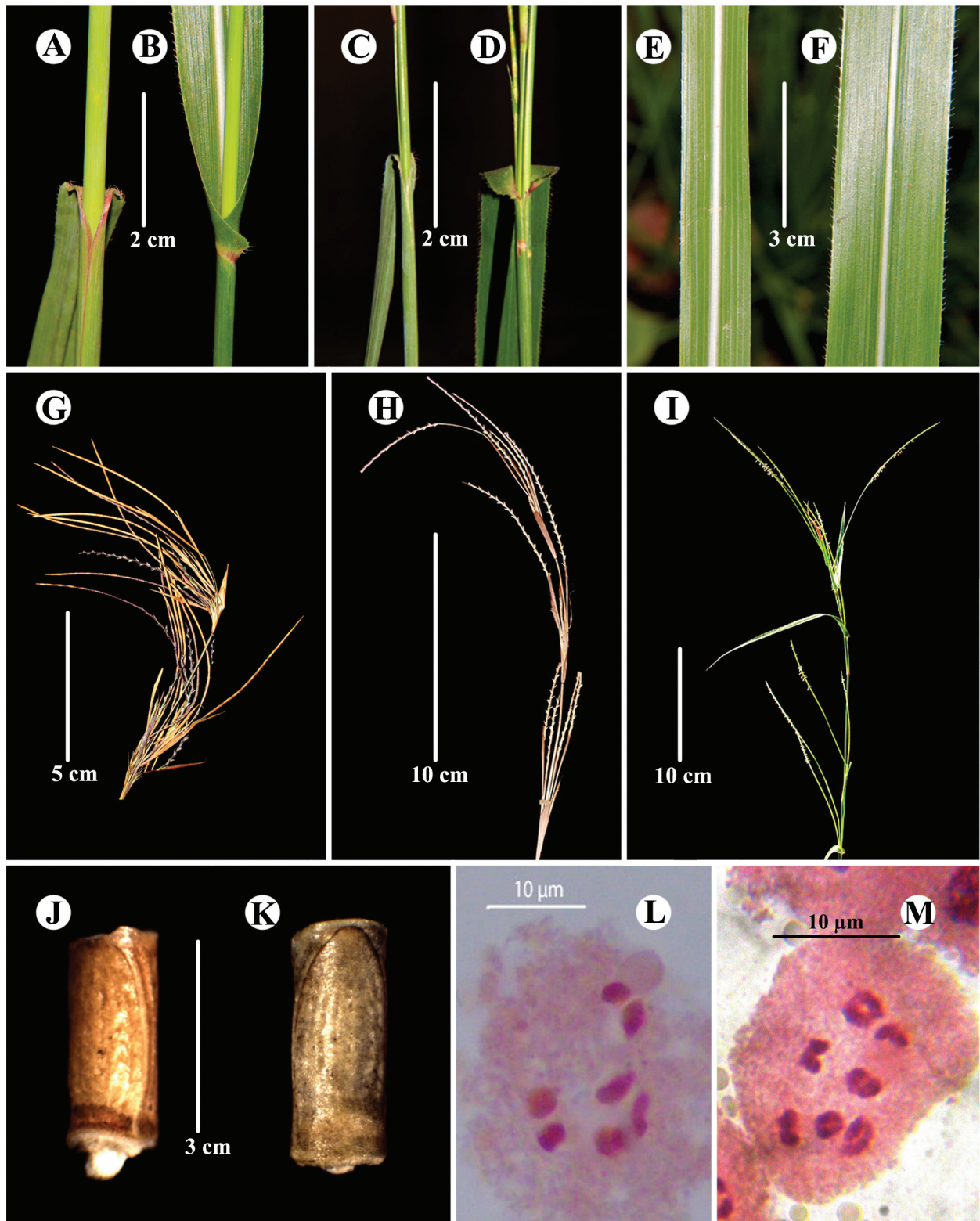
**Illustration:**—Blatt. & McCann, Gr. Bom, t. 28, 1935; Matthew, Illus. Fl. Tamilnadu Carnatic 2; t. 899& 900. 1982; Shukla, Grasses of NE India, plate. 20, 1996; Potdar *et al.*, Grasses of Maharashtra, Fig. 96, 2012.

**Specimens examined:**—INDIA. **Andaman Islands:** South Andaman, Biblito, 10 January 2013, *K.V.C. Gosavi* 112 (SUK!); **Assam:** Goalpara, Kochugaon, 20 January 1933, *Dinanath* 10471 (ASSAM!); K & G hills, July 1937, *N. L. Bor*, 21401 (ASSAM!); Lumsaw, 19 July 1933, *Ramshankar* 10901 (ASSAM!); K & G hills, Nangpoh, 4 August 1935, *G. K. Deka* 12579 (ASSAM!); K & G hills, Umraw, 19 August 1963, *Deka* 34711 (ASSAM!); **Bengal:** Howrah, B Garden, 12 October 1987, *Anand Kumar* 16660A (CAL!); Daman, Silvasa, 29 August 2014, *K.V.C. Gosavi* 122 (SUK!); **Madhya Pradesh:** Khandawa, 10 December 2013, *K.V.C. Gosavi* 110 (SUK!); Khandawa, 20 October 2014, *K.V.C. Gosavi* 124 (SUK!); **Maharashtra:** Kolhapur distr., Kagal lake, 15 August 2008, *K.V.C. Gosavi* 2888 (SUK!); Kolhapur distr., Kagal 15 August 2008 *K.V.C. Gosavi* 2888 (SUK!); Nandurbar distr., Shahada, Mohida, 10 February 2014, *K.V.C. Gosavi* 117 (SUK!).

**Note on nomenclature:**—Linnaeus (1771) described *Aegilops exaltata* Linnaeus (1771: 575) based on collection of Johann Gerhard Koenig (1728-1785) from India. After that, Linnaeus (1781) published later homonym *Rottboellia exaltata* which was already published by Naezen (1779). Gaertner (1805) published *Ophiuros corymbosus* (Linnaeus 1781: 114) Gaertner (1805: 181) which is also illegitimate being based on illegitimate basionym. Later, Kuntze (1891: 780) proposed *Ophiuros exaltatus*, a legitimate name which is accepted in this treatment. In the protologue Linnaeus (1771) did not cite any herbarium specimen number but 'Malabar' as the locality. Slageren (1994) unwittingly designated a lectotype citing a Koenig's collection housed at LINN as holotype. It is the only specimen which has been located so far and being housed in the author's herbarium matching with protologue it can be considered as original material. Slageren (1994) is the first who cited Koenig's specimen as type which amounts to inadvertent lectotypification. This specimen can be considered as probable holotype also.

**Distribution:**—BURMA, SRI LANKA, CHINA, AUSTRALIA, INDIA (throughout India except sub-temperate to temperate region).

**Note:**—Occasional. Grows on the bunds of fields, along roadsides and in low-lying areas. It can be recognized by glaucous stem and leaves; mature plants less robust and with narrow leaves as compared to *O. megaphyllus*.



**FIGURE 1.** *Ophiuros exaltatus* & *O. megaphyllus* **A.** basal leaf blade base of *O. exaltatus*. **B.** basal leaf blade base of *O. megaphyllus*. **C.** upper leaf blade base of *O. exaltatus*. **D.** upper leaf blade base of *O. megaphyllus*. **E.** leaf blade of *O. exaltatus*. **F.** leaf blade of *O. megaphyllus*. **G.** & **H.** inflorescence of *O. exaltatus*. **I.** inflorescence of *O. megaphyllus*. **J.** spikelet of *O. exaltatus*. **K.** spikelet of *O. megaphyllus*. **L.** meiotic counts (n) = 7 of *O. exaltatus*. **M.** meiotic counts (n) = 7 of *O. megaphyllus*.



*Ophiuros megaphyllus* Stapf ex Haines (1924: 1058). (Fig 1)

**Lectotype (designated here):**—INDIA. Khasia: Mushai [Mooshye] Thomson & Hooker s.n. (K000246048, image!); Syntype: Khasia, Nunklow, Thomson & Hooker s.n. K000246047, image!).

Tuft perennial stout rhizomatous herbs; rhizome thick creeping. Culms 1.5–3 meter tall, erect, terete, branched above, bulbous at base; node glabrous, brown colored. Basal scaly leaves covering mouth of rhizome, hirsute. Leaf sheath shorter than internodes, 10–30 cm long, terete, pubescent, ribbed, margin densely villous; ligule 2.5–3.5 mm long, membranous, apex ciliolate; leaf blades 30–140 × 1.5–4.5 cm, broadly linear-ovate to linear-lanceolate, flat, villous on both surface, midrib prominent on lower surface, margin scaberrulous; base close, cordate to amplexicaulis; apex acute to acuminate. Inflorescence usually one to rarely many spike, pedunculate; peduncle 10–30 cm long, usually one noded, terete, very slender, slightly curved, each spike subtended in narrow 4–7 mm long spathe; spike 5–20 cm long, slender, terete, glabrous. Joints thick, equaling the spikelets or more, 2.5–4 mm long, glabrous. Spikelet single on each node, alternate, glabrous. Spikelets oblong-lanceolate, 2.5–4 mm long, sunk in cavity of rachis-joint, awnless, apex obtuse. Lower glume coriaceous, green to purple colored, oblong-lanceolate, 2.3–3.5 mm long, 5–7 nerved, longitudinally, pitted between the nerves or smooth, apex obtuse. Upper glume membranous, 3-nerved, apex obtuse. Lower lemma hyaline, oblong-elliptic, 1.8–2.3 mm long, obscurely 2-nerved, apex obtuse. Palea hyaline, linear-lanceolate, 1.8–2.3 mm long, nerveless, apex obtuse to subacute. Upper lemma hyaline, broadly elliptic, 2–2.3 mm long, nerveless, apex obtuse to round, hairy. Palea hyaline, elliptic to oblong, 1.8–2 mm long, nerveless; apex obtuse. Lodicules 2. Stamens 3; anthers 1–2 mm long. Pistil ca. 2 mm long. Caryopsis oblong, hilum punctiform.

**Flowering and Fruiting:**—May–February.

**Meiotic counts (n):**—n=7 (Fig 1.m)

**Specimens examined:**—INDIA. **Assam:** Garampani, (N-E hills) 8 September 1976, Bhaskaran 68913 (ASSAM!); Goalpara distr., Kochugaon, 24 February 1934, Das 10673 (ASSAM!); Kochugaon, 28 January 1935, A. Das 10471 (ASSAM!); North Cachar distr., Garampani, 36 mile to the east of Jowai hills of farm, 30 October 1956, G. Panigrahi 4273 (ASSAM!); Manas National Park, 12 December 2015, K.V.C. Gosavi 231 (SUK!); **Meghalaya:** K & G hills, Jowai to Shangpang 8 November 1938, G. K. Deka 20159 (ASSAM!); K & G hills, Umling forest, 5 December 1938, S. R. Sharma 20069 (ASSAM!); **Nagaland:** Naga hills, July 1935, N. L. Bor 13790 (ASSAM!).

**Note on nomenclature:**—Haines (1924) described *O. megaphyllus* based on the specimens collected from Khasia Hills by Thomson & Hooker, identified initially by them as *O. corymbosus*. These specimens are housed at K and agree well with the protologue of *O. megaphyllus*. Haines cited *O. corymbosus* partly in synonymy which indicates that he had seen these specimens while describing *O. megaphyllus*. K000246048 specimen contains clear characters of *O. megaphyllus* thus, K000246048 is designated here as lectotype and K000246047 as isolectotype following art. 9.3 of the Shenzhen Code (Turland *et al.* 2018).

**Distribution:**—Burma, Australia, Some parts of South-east Asia; **India:** Bihar, West-Bengal, Arunachal Pradesh, Assam, Manipur, Meghalaya and Nagaland.

**Note:**—Rare. Grows in open tall grassland. It is wrongly reported in many Floras and Manuals from North-east India to Maharashtra without designating herbarium specimens. Based on herbarium specimens and observation, it is reported from Bihar, West-Bengal, Arunachal Pradesh, Assam, Manipur, Meghalaya and Nagaland. The species can be easily recognized by its sturdy habit and wider leaf than *O. exaltatus*.

**Taxonomical note on the genus *Ophiuros*:** Floral characters used to delimit the species in the genus *Ophiuros* are taxonomically not good. *Ophiuros megaphyllus* is robust species as compared to *O. exaltatus* but chromosome counts of both species are the same i.e.  $n = 7$  (Fig 1. l and m). Taxonomically valuable characters of the genus for species identification are given in the table 1.

**TABLE 1.** Taxonomically valuable characters of *Ophiuros exaltatus* and *O. megaphyllus* (Fig. 1).

Characters	<i>Ophiuros exaltatus</i>	<i>Ophiuros megaphyllus</i>
Plant appearance	Aerial parts usually glaucous	Aerial parts always non glaucous
Leaf blade base	Open, attenuate	Close, cordate to amplexicaulis
Leaf margin	Smooth to sparsely scabrous	Scabrous
Leaf width	0.5–2.5 cm	1.5–4.5 cm
Inflorescence pattern	One to many spikes or corymbose	Usually one to rarely many spikes
Peduncle size	ca. 5 cm long	10–30 cm long

## Key to the species of the genus *Ophiuros*

- 1a. Plants glaucous; leaves linear, mature basal leaf blade up to 80 cm long; leaf base open, attenuate..... *O. exaltatus*  
1b. Plants non glaucous; leaves broadly linear, mature basal leaf blade 100–140 cm long; leaf base cordate to amplexicaul .....  
.....*O. megaphyllus*

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