



## Formation-to-fall: natural history and the journey of a lesser-known genus of orchids, *Monomeria*

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### Abstract

This article investigates the history of a genus of orchids, *Monomeria* Lindl., known to science since its first collection in 1821, with the aim of highlighting the reasons for the loss of its original identity due to compelling nomenclatural changes. *Monomeria* remained a monotypic genus with its nomenclatural type, *Monomeria barbata* Lindl. until Reichenbach founded *Monomeria crabro* C.S.P.Parish & Rchb.f. in 1874. The only other accepted taxon, which was originally formed under *Monomeria*, was *M. fengiana* Ormerod in 2011. The systematic botanists treated *Monomeria* as an ally of *Bulbophyllum* Thouars and differentiated it on the basis of reproductive unit, the gynandrium. The historical investigations reveal that five species of *Bulbophyllum*, viz., *B. longipes*, *B. gymnopus*, *B. kingii*, *B. dichromum* and *B. digitatum* and one species of genus *Acrochaene*, viz., *A. rimannii* were renamed, at least once, under *Monomeria*. However, the altered names failed to sustain for long and got reduced to synonyms. In 2014, *Monomeria*, along with allied genera, was transferred to *Bulbophyllum* which effected restoration of founding binomials of five species of *Bulbophyllum* and offered new binomials for two taxa, i.e., *B. fengianum* for *M. fengiana* and *B. rimannii* for *A. rimannii*. The remaining taxon, *M. barbata*, suffered major loss of identity in terms of generic name, epithet, credit to founding author, basionym, homotypic synonym, nomenclatural type and locality, as it was offered a new combination, *B. crabro* (C.S.P.Parish & Rchb.f.) J.J.Verm., Schuit. & de Vogel. The generic name *Monomeria* was degraded to the rank of a Section within the genus *Bulbophyllum*. Hence, a provision in plant nomenclature to protect the credit of original authority is proposed in terms of a new label, ‘First Basionym’ as promising remedy.

**Keywords** *Bulbophyllum crabro* · *Monomeria* · *Monomeria barbata* · *Monomeria crabro* · Natural history · Orchidaceae · Plant nomenclature

### 1 Introduction

The family of orchids offers the most mesmerizing flowers among angiosperms. The flowers have infinite range of myriad variation in arrangement of floral appendages, which has been the principal source of within-family classification of taxa and sometimes confusion in understanding flower organization (Shankar, 2021a). The first collection of an intriguing orchid from Nepal in 1821 by Wallich (1828–1849) led Lindley to form a new genus, *Monomeria*. Lindl., along with type species *M. barbata* Lindl. The formation of *Monomeria*, separately from, but as an ally of the genus *Bulbophyllum*, was based on Lindley’s strong belief

of ‘an orchid that had no lateral petals’ and ‘an orchid with one male part or anther’ (Lindley, 1830, pp. 61–62; 1836, p. 527). *M. barbata*, was a remarkable curiosity owing to its ‘incomplete’ flower structure, and unique organization of appendages in the flower which prompted Reichenbach (1861, p. 265) to replace it under the genus *Epicranthes* as *E. barbata* (Lindl.) Rchb.f. Parish collected a similar specimen from Myanmar in 1871, and Reichenbach (1874, pp. 133–155) described it as *Monomeria crabro* C.S.P.Parish & Rchb.f. The striking similarity in flower morphology of *M. barbata* with *M. crabro* generated a discussion if the two taxa were different indeed, which ended with authoritative verdict of Hooker (1890, pp. 781–782). He concluded that both taxa were ‘same’ and maintained *M. barbata* along with *M. crabro* as its synonym. Later, King and Pantling (1898a, p.152; 1898b, p. 208) opined that *M. crabro* could at most be a variety of *M. barbata*. The binomial, *M. barbata*, reigned throughout twentieth century as newer habitats, east

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of Nepal, were discovered. *Monomeria* lost its distinction of ‘monotypic’ (the genus having only one species) after Schlechter (1915, p. 338), Kittredge (1984, p. 100) and Averyanov (1994, p. 285) transferred some species of *Bulbophyllum* to *Monomeria* (Table 1). However, most of these transfers were reversed by 2011. Only two taxa, viz., *M. barbata* (originally founded) and *M. longipes* (transferred from *Bulbophyllum*) remained under *Monomeria*. Ormerod (2011, pp. 42–49) founded a new species, *Monomeria fengiana* raising the tally to three accepted species of genus *Monomeria* (Table 1).

Vermeulen et al., (2014, pp. 101–113) in the wake of phylogenetic considerations effected transfer of *Monomeria* to *Bulbophyllum* with required changes in nomenclature of its species. The changes are accepted by *World Checklist of Selected Plant Families* (WCSP 2020), Plants of the World Online (POWO, 2020), and World Checklist of Vascular Plants (Govaerts et al., 2021), besides listing in International Plant Names Index (IPNI, 2020). Hence, *Bulbophyllum* subsumed *Monomeria*, which got its rank degraded to Section *Monomeria* (Lindl.) J.J.Verm., Schuit. and de Vogel *stat. nov.* (Vermeulen et al., 2014). Of three accepted species of *Monomeria*, *M. longipes* was reverted back to *B. longipes* and *M. fengiana* was renamed as *B. fengianum* (Table 1). The type species, *M. barbata* became synonym of *B. crabro*, entailing major loss of identity of the original, in terms of generic name, epithet, credit to founding author, basionym, homotypic synonym, and nomenclatural type and locality.

Hence, this article traverses through the historical journey of genus *Monomeria* along with its type species *M. barbata* from formation-to-fall over a period of two centuries. The article also evaluates the nomenclatural change that reduced the celebrated identity of *M. barbata* to merely a synonym of new binomial, *B. crabro*, to draw the attention of taxonomists to relook into the provisions of ICN for saving the identity of originally founded taxa and its authority from simple synonymy. Further, the article discusses the reasons which persuaded formation of new genus *Monomeria* for a taxon which looked very similar to and could have been assigned as a species of *Bulbophyllum* by Lindley (1830). Finally, the article furnishes photographic evidence of the similarity in floral morphology between the two collections of the same species, one from Northeast India (*M. barbata*) and the other from Myanmar (*B. crabro*), to affirm the resolution of confusion between the two taxa by Hooker (1890).

## 2 Methodology

An orchid specimen was collected from tropical moist-deciduous forest of ‘Khasi Hill Sal’ type (Tripathi and Shankar, 2014, pp. 1–20), from Nongkhylliem Wildlife Sanctuary (25°57'44.85" N, 91°50'12.14" E, 760 m) in Ri-Bhoi district

of the State of Meghalaya in Northeast India in May, 2016. The inflorescence had withered, but the dried scape with no developing fruits persisted at the time of collection. The orchid was grown in the North-Eastern Hill University, Shillong and on flowering was identified as *M. barbata* at Central National Herbarium, Botanical Survey of India, Howrah (abbr. as CAL) in January, 2020. A search of digital specimens in worldwide herbaria yielded only few results (Table 2). The protologue of this species, since its first discovery, was constructed through intensive literature search in Biodiversity Heritage Library (BHL, 2020), Internet Archive (Anonymous, 2020) and different flora of the region (Hooker, 1890; Kanjilal et al., 1940; Mathew, 1966; Hara, 1966, 1971; Ohashi, 1975; Pradhan, 1976, 1979; Hara et al., 1978; Balakrishnan, 1981 & 1983; Deb, 1981 & 1983; Joseph, 1982; Haridasan, 1985 & 1987; Burns-Balogh, 1988; Hegde, 1990; Hajra and Verma, 1996; Chowdhery, 1998; Chowdhury, 2005; Chowdhery et al., 2009; Singh et al., 2000, 2002; Yonzone et al., 2012; Kumar et al., 2013; Rokaya et al., 2013; Barooah and Ahmed, 2014; Mao et al., 2016, 2017; Singh et al., 2019; Sinha et al., 2019; Gogoi et al., 2021; Shankar, 2021b).

## 3 Results

The fructification in orchids is always reducible to floral appendages, viz., three *sepals*, three *petals*, a *column* consisting of three *stamens* grown firmly to one another, and to a single *style* and *stigma* (Lindley, 1831). All these floral appendages appear in different arrangement in different species, thus creating myriad forms of the flower as well as obsession among their lovers. Sometimes it is difficult to separate and count appendages within a flower, because the appendages cohere in intriguing manner. The most common unification is seen in form of *column*, *pollinium* (one or more stamens fused together) and *pollinarium* (*pollinia* + *stipe* + *viscidium*). In some taxa, male (*stamens*) and female (*style* and *stigma*) parts unite into a complex structure called *gynandrium*. In others, *anther* and *stigma* fuse to give rise to *gynostegium*. The most fascinating modification of a petal is *labellum* or lip, which can be divided variously into *hypochile*, *mesochile* and *epichile* in different orchids. The column may have a projecting part called *rostellum*, which acts as a barrier by separating the *stamen* from the *gynoecium* to discourage autogamy. To describe the structures arising from modifications, unifications and additional proliferations, the taxonomists have developed a rather complicated terminology.

### 3.1 The formation of the genus

Based on Wallich’s collection, Lindley (1830) founded a new genus, *Monomeria* Lindl. in the family of orchids along



**Table 1** The nomenclatural status of all orchid taxa associated with the genus *Monomeria* from their formation till date

Sl.	Founding binomial # (original name with which taxon founded)	Interval period binomials (synonyms)	Binomial in force today (currently accepted name since 2014)
Taxa founded under genus <i>Monomeria</i>			
1	<i>Monomeria barbata</i> Lindl., Gen. Sp. Orchid. Pl. 61 (1830)	1. <i>Epicranthes barbata</i> (Lindl.) Rchb.f., Ann. Bot. Syst. 6: 265 (1861) 2. <i>Monomeria crabro</i> C.S.P.Parish and Rchb.f., Trans. Linn. Soc. London 30: 143 (1874) 3. <i>Bulbophyllum monomeria</i> J.J.Verm. in Pridgeon et al. 33 (2014), <i>nom. inval.</i> (Heterotypic synonym)	<i>Bulbophyllum crabro</i> (C.S.P.Parish & Rchb.f.) J.J.Verm., Schuit. and de Vogel, <i>comb. nov.</i> , Phytotaxa 166: 106 (2014) Distr.: Assam, China South-Central, East Himalaya, Malaya, Myanmar, Nepal, Sikkim, Thailand, Tibet, Vietnam Synonyms: 3 <i>Nom. inval.</i> : 1
2	<i>Monomeria fengiana</i> Ormerod, Taiwania 56: 44 (2011)	—	<i>Bulbophyllum fengianum</i> (Ormerod) J.J.Verm., Schuit. and de Vogel, <i>comb. nov.</i> , Phytotaxa 166: 106 (2014) Distr.: China South-Central Synonyms: 1
Taxa founded under other genera, but were brought to genus <i>Monomeria</i>			
3	<i>Bulbophyllum kingii</i> Hook.f., Fl. Brit. India 5: 760 (1890)	1. <i>Acrochaene punctata</i> Lindl., Fol. Orchid. 2: 1 (1853) 2. <i>Phyllum kingii</i> (Hook.f.) Kuntze, Revis. Gen. Pl. 2: 677 (1891) 3. <i>Monomeria punctata</i> (Lindl.) Schltr. (1915), Orchideen Beschreib. Kult. Zücht.: 338 (1915)	<i>Bulbophyllum kingii</i> Hook.f., Fl. Brit. India 5: 760 (1890) Distr.: Assam, East Himalaya, Laos, Myanmar, Sikkim, Thailand Synonyms: 3
4	<i>Bulbophyllum longipes</i> Rchb.f. in W.G.Walpers, Ann. Bot. Syst. 6: 253 (1861)	1. <i>Henosis longipes</i> Hook.f., Fl. Brit. India 5: 771 (1890) 2. <i>Monomeria longipes</i> (Rchb.f.) Aver., Opred. Orkhid. V'etnama: 285 (1994) 3. <i>Monomeria longipes</i> (Rchb.f.) Garay, Hamer and Siegerist, Nordic J. Bot. 14(6): 641 (1994), <i>nom. inval.</i>	<i>Bulbophyllum longipes</i> Rchb.f. in W.G.Walpers, Ann. Bot. Syst. 6: 253 (1861) Distr.: Myanmar, Thailand Synonyms: 2 <i>Nom. inval.</i> : 1
5	<i>Acrochaene rimannii</i> Rchb.f., Gard. Chron., n.s., 17: 796 (1882)	1. <i>Ione salweenensis</i> Phillimore & W.W.Sm., Rec. Bot. Surv. India 4: 281 (1911) 2. <i>Monomeria rimannii</i> (Rchb.f.) Schltr., Orchideen Beschreib. Kult. Zücht.: 337 (1915) 3. <i>Sunipia salweenensis</i> (Phillimore & W.W.Sm.) P.F.Hunt, Kew Bull. 26: 184 (1971) 4. <i>Sunipia rimannii</i> (Rchb.f.) Seidenf., Nat. Hist. Bull. Siam Soc. 28: 8 (1980) 5. <i>Ione rimannii</i> (Rchb.f.) Seidenf., Opera Bot. 124: 54 (1995)	<i>Bulbophyllum rimannii</i> (Rchb.f.) J.J.Verm., Schuit. and de Vogel, <i>comb. nov.</i> , Phytotaxa 166: 105 (2014) Distr.: China South-Central, Myanmar, Thailand Synonyms: 6
6	<i>Bulbophyllum gymnopus</i> Hook.f., Fl. Brit. India 5: 764 (1890)	1. <i>Phyllum gymnopus</i> (Hook.f.) Kuntze, Revis. Gen. Pl. 2: 677 (1891) 2. <i>Drymoda gymnopus</i> (Hook.f.) Garay, Hamer and Siegerist, Nordic J. Bot. 14: 641 (1994) 3. <i>Monomeria gymnopus</i> (Hook.f.) Aver., Opred. Orkhid. V'etnama: 285 (1994)	<i>Bulbophyllum gymnopus</i> Hook.f., Fl. Brit. India 5: 764 (1890) Distr.: Assam, Bangladesh, China South-Central, East Himalaya, Laos, Myanmar, Thailand, Vietnam Synonyms: 3
7	<i>Bulbophyllum dichromum</i> Rolfe, Bull. Misc. Inform. Kew 1907: 128 (1907)	1. <i>Monomeria dichroma</i> (Rolfe) Schltr., Orchideen Beschreib. Kult. Zücht.: 338 (1915) 2. <i>Bulbophyllum jacquetii</i> Gagnep., Bull. Mus. Natl. Hist. Nat., sér. 2, 2: 145 (1930) 3. <i>Ione dichroma</i> (Rolfe) Gagnep., H.Lecomte, Fl. Indo-Chine 6: 437 (1933) 4. <i>Sunipia dichroma</i> (Rolfe) T.B.Nguyen and D.H.Duong, T.B.Nguyen (ed.), Fl. Taynguyen. Enum.: 205 (1984)	<i>Bulbophyllum dichromum</i> Rolfe, Bull. Misc. Inform. Kew 1907: 128 (1907) Distr.: Vietnam Synonyms: 4
8	<i>Bulbophyllum digitatum</i> J.J.Sm., Bull. Jard. Bot. Buitenzorg, sér. 2, 2: 18 (1911)	1. <i>Monomeria digitata</i> (J.J.Sm.) W.Kittr., Bot. Bot. Mus. Leafl. 30: 100 (1984 publ. 1985) 2. <i>Drymoda digitata</i> (J.J.Sm.) Garay, Hamer and Siegerist, Nordic J. Bot. 14: 641 (1994)	<i>Bulbophyllum digitatum</i> J.J.Sm., Bull. Jard. Bot. Buitenzorg, sér. 2, 2: 18 (1911) Distr.: New Guinea Synonyms: 2

All the names in the first and second columns are now synonyms to currently accepted name in the third column



with the *type* species, *M. barbata* Lindl. (Figs. 1, 2). The genus and species were briefly described in Latin, as Latin diagnosis was mandatory those days (Fig. 1). The formation of *Monomeria*, separately from the genus *Bulbophyllum* Thouars (1822), was based on Lindley's strong belief that '*the two lateral petals are entirely abortive and the foot of the column is attenuated and long*'. Lindley wrote the number of petals as zero (Fig. 1). The genus name was based on the presence of *mono*=one and *mer*=part, i.e., 'referring to one anther'.

It is evident from subsequent writings that Lindley's conviction of '*an orchid in which lateral petals are entirely abortive*' was popular. In drawing parallels between the genus *Maxillaria* and *Monomeria* (Supplementary Plate 1), Joseph Paxton noted entirely abortive petals (Harrison et al., 1833). The fascination of '*an orchid that had no lateral petals*' persisted with Lindley, throughout his life (Lindley, 1836; Supplementary Plate 2) and beyond in the nineteenth century.

### 3.2 The treatment of the genus during interval period

Subsequently, Reichenbach (1861) transferred *M. barbata* to a different genus and renamed it as *Epicranthes barbata* (Lindl.) Rchb.f., but did not spell out the reasons for transfer (Supplementary Plate 3). In fact, Reichenbach was in conformity with Lindley in considering this taxon as '*imperfect*' or '*incomplete*', and in according the '*habit of a large Bulbophyllum*' with '*the absence of petals*'. Since, no other species was known within the genus *Monomeria* by then, the existence of the genus *Monomeria* had theoretically come to an end. On the contrary, the name *E. barbata* could not sustain for long, because *M. barbata* was preferred by all subsequent workers including Reichenbach. This reduced *E. barbata* to a homotypic synonym of the legitimate name, *M. barbata*.

In 1871, C.S.P. Parish returned home from Myanmar along with collection of specimens, water-colour drawings and analytical sketches of many orchid species. His collection from the neighbourhood of Moulmein in Burma (now Mawlamyine in Myanmar) enthused Reichenbach (1874) to note rediscoveries of two species previously collected only once by Wallich from Nepal and described subsequently by Lindley. One of these was the rediscovery of *Monomeria*, based on the specimens and sketches strikingly close to *M. barbata*, but differing from it '*in having petals and a pollen mass attached to a stipe*', which was very similar to the pollen apparatus of the Vandae. Thus, based on these differences, Reichenbach (1874) founded a new species as *M. crabro* (Fig. 3) due to fancied resemblance of its flower to a hornet (*crabro* means hornet in Burma). This creation

added the second species to the genus *Monomeria* (Supplementary Plate 4).

However, Reichenbach (1874) realized that the Lindleyan dictum to *M. barbata* was a mistake due to miserable state of his specimen, because petals were observed not only in Moulmeinese plant, but also in Nepalese plant (Supplementary Plate 5). In fact, the meticulous drawings of Parish showed pollen mass attached to a *stipe* (Fig. 3), which was missing in the observations of Lindley (presumably due to poor specimens), and this difference was the principal basis of creation of *M. crabro* a species, separately from *Bulbophyllum*.

Few years later, Bentham (1881, pp. 281–360) studied the collections of both Wallich and Parish (Fig. 4a), and offered his verdict in favour of Lindley that:

I cannot help thinking, therefore, that the pollen (probably meant pollinaria) figured by Parish had become accidentally attached to some extraneous body mistaken for the stipe, a conjecture somewhat confirmed by the very exceptional manner in which the pollen appears attached to the supposed stipes, which, moreover, does not correspond in shape with that of the rostellum, from which it would have been detached.

Notwithstanding, Bentham was incorrect in concluding that the *stipe* was an '*extraneous body*', rather Lindley had missed *stipe* in his observations. In fact, my observations show that the helmet-shaped *anther cap* houses *pollinia* jointed by a common *stipe* inserted vertically in *rostellum* and held by a deep-yellow ovoid-globose *viscidium* (Fig. 4b). The brittle *stipe* has a tendency to detach with age and hence can be missed easily, if collection is done after a week following full expansion of the flowers (Fig. 4c).

While people were debating over the differences between *M. barbata* and *M. crabro* to be two different species, Bentham (1881) and Hooker (1890) included *M. barbata* in the '*Flora of British India*' (Fig. 5), based on two collections, viz., Wallich's collection from Nepal (#1978, mistakenly referred to as #1798, Fig. 5) and Parish's collection from Myanmar (Parish 312 K! not traceable in protologue; Reichenbach, 1874, Fig. 3). Hooker (1890) maintained the earlier legitimate name *M. barbata* and reduced *E. barbata* as well as *M. crabro* to its synonyms. He observed that '*I find no character whereby to distinguish M. crabro; the analysis of the lip in the plate does not conform to mine*' (Fig. 5). It is amply clear that: (i) Hooker did not agree with the analysis of Reichenbach to differentiate *M. crabro* from *M. barbata*, and (ii) Hooker described *M. barbata* based on the specimens and illustrations of others (Wallich and Parish) as he could not collect the species himself when he had visited Sikkim and other localities, such as, Khasi mountains



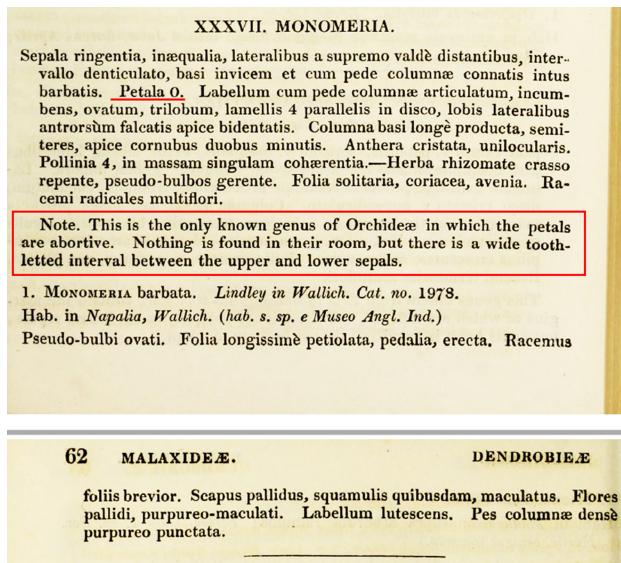
**Table 2** List of specimens of *M. barbata* evaluated in the present study from different herbaria in the world

Sl.#	Herbarium and specimen ID	Sample type	Collection date	Sheet or collection number	Collector	Location
1	K000974243	Sheet	1821	1978	N. Wallich	Nepal
2	K000974273	Sheet	1821	1978	N. Wallich	Nepal
3	K001114839	Sheet	1821	1978	N. Wallich	Nepal
4	G00434759	Sheet	1821	1978	N. Wallich	Nepal
5	CAL0000054299	Sheet	Feb, 1891	124	R. Pantling	Sikkim*
6	CAL0000054300	Sheet	Feb, 1891	452,824	R. Pantling	Sikkim*
7	CAL0000081609	Sheet	Feb, 1891	452,822	R. Pantling	Sikkim*
8	CAL0000081610	Sheet	Feb, 1891	452,823	R. Pantling	Sikkim*
9	CAL0000081611	Sheet	Jan 29, 1893	-	Dr. G. King	Sondai, Nepal#
10	CAL0000081612	Sheet	Jan 29, 1893	452,826	Dr. G. King	Sondai, Nepal#
11	CAL0000081613	Sheet	Jan 29, 1893	-	Dr. G. King	Sondai, Nepal#
12	CAL0000081614	Sheet	Jan 29, 1893	452,825	Dr. G. King	Sondai, Nepal#
13	K000597326\$	Sheet	Nov 20, 1910	202	A.F.G. Kerr	Thailand
14	K000597327\$	Sheet	Nov 12, 1911	202	A.F.G. Kerr	Thailand
15	K000597324\$	Sheet	Feb 01, 1929	0703	A.F.G. Kerr	Thailand
16	K000597325\$	Sheet	Dec 26, 1929	0778	A.F.G. Kerr	Thailand
17	K000597328\$	Sheet	Mar 28, 1930	0815	A.F.G. Kerr	Thailand
18	ASSAM097369	Sheet	May 20, 2016	US005006	Uma Shankar	Meghalaya, India

\*Collection from tropical valleys of Sikkim (exact location unknown) and grown in the Royal Botanic Garden, Calcutta (Source: Pantling's Orchids of the Sikkim Himalaya, Herb Hort. Bot. Calcuttensis)

#Collection from Sondai, Nepal at 700 feet and grown in the Royal Botanic Garden, Calcutta (Source: Dr. King's Collection, Flora of Assam, Herb Hort. Bot. Calcuttensis)

\$Image not available



**Fig. 1** Latin diagnosis of *M. barbata*, which was known as ‘the only orchid without lateral petals’ (Lindley, 1830). The genus and species were founded separately of *Bulbophyllum* on the basis of abortive lateral petals, long foot of the column and one male part. ( Source: BHL)

in Northeast India in 1850 (Hooker, 1855). Hooker also expressed doubt on Nepal as habitat of *M. barbata* most likely referring to Wallich's collection, as he wrote ‘*Possibly the Nepal habitat is an error*’ (Fig. 5). This suspicion, to me, appears untenable.

King and Pantling (1898a, p. 152, 1898b, t. 208) based on their collections (Table 2), expanded the taxonomic description of the genus *Monomeria* (Fig. 6) and its only species *M. barbata* and provided first coloured illustration (Fig. 7). They remarked under generic description that,

Two closely allied species—one from the Himalayan and Khasia Hills; the other from Burma. The Burmese one may only, however, be a variety, and that ‘This genus combines the habit of *Bulbophyllum* and of *Cirrhopetalum* with the caudiculate pollinia of *Vandea*. The broad very short fimbriate petals are its chief distinguishing character.

As no other accepted species of genus *Monomeria* was known by then (because *M. crabro* had already been reduced to a synonym of *M. barbata* by Hooker), the following conclusions can be drawn from these remarks. The Burmese collection of Parish was very similar to the Nepalese collection



**Fig. 2** Digital images of Wallich's specimens of *M. barbata*: a) K000974243, b) K000974273, and c) K001114839 (Source: Kew Resources), and d) G00434759 (Source: JSTOR)

of Wallich, but some morphological variation between the two persuaded King and Pantling (1898a, p. 152) to consider a possibility of the Burmese one being a variety of the Nepalese one. However, this varietal view was never pursued in future, and *M. crabro* continued to remain a synonym of *M. barbata*. Seidenfaden (1986, pp. 169–170) also opined that ‘Already Parish suspected *M. crabro* to be the same as Lindley’s taxon’.

In subsequent taxonomic literature, despite two new combinations offered by Reichenbach, respectively in 1861 and

1874, the legitimate name *M. barbata* Lindl. was consistently used for collections from newer localities, such as, Thailand (Kerr, 1911; Seidenfaden, 1986, 1997; Seidenfaden and Smitinand, 1961); Kayin, Mon and Taninthayi in Myanmar (Grant, 1895; Kress et al. 2003; Aung et al., 2020); Vietnam (Averyanov, 1998; Averyanov et al., 2000; Averyanov and Averyanova, 2003, 2013), Bhutan (Pearce and Crib 2002); Cameron Highlands in Malaysia (Abdullah, 2007) and China (Zhongguo 1984; Singchi et al., 2009; Xiaohua and Xiaodong, 2009; Xinqi et al. 2009; Xu et al., 2010).



**Fig. 3** First illustration of *M. crabro* in Reichenbach (1874). Legends: 1. Side view of flower, 2. Anterior view of column with petals, 3. Pollinarium from Rev. Parish's drawing, 4. Bud, 5. The same, lateral sepal taken away for showing column, petal and lip, 6. Lip, seen from above, 7. Lip, seen from underneath, 8. Column and anther fallen. (Source: BHL)

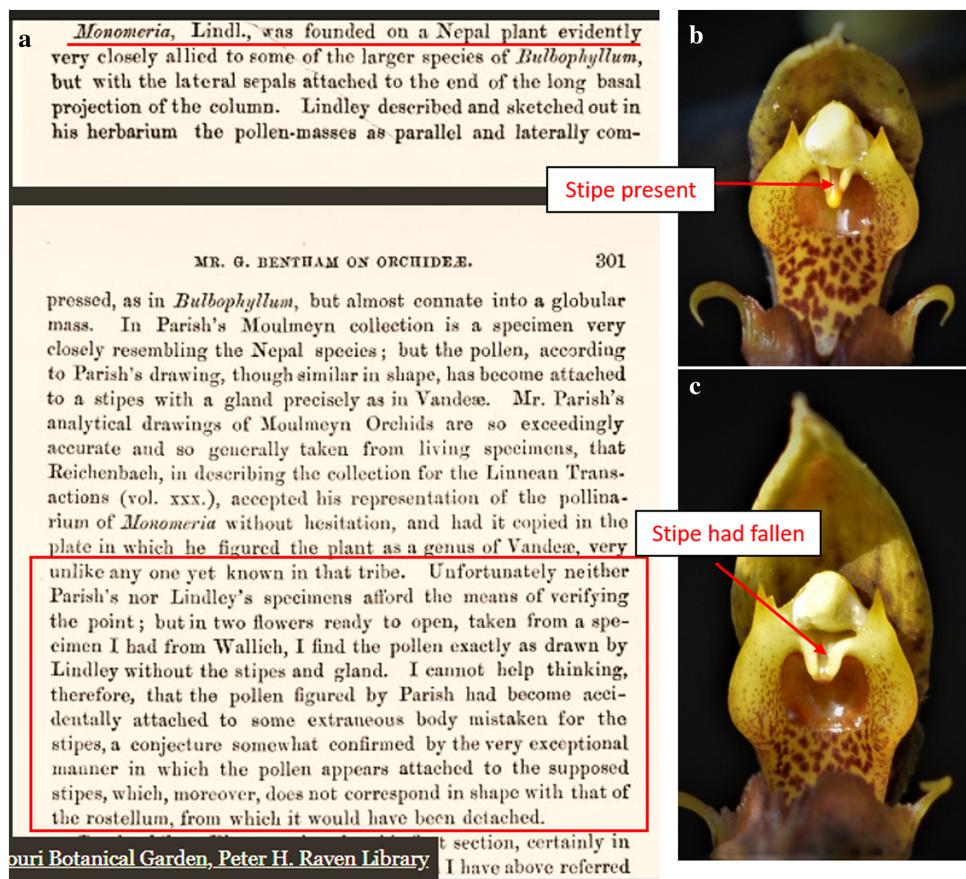
These discoveries highlighted that the species is distributed throughout the mountainous landscape of South Asia and Indo-China in the Indo-Malayan bio-geographical region, but it is rare in all localities because it was not spotted in early explorations and almost all explorers acknowledged meagre populations.

Between Nepal and Myanmar, Pantling was first to collect *M. barbata* from Sikkim in 1891 (Table 2). I consulted this collection at the Central National Herbarium (CAL) in January, 2020. The ASSAM Herbarium of BSI at Shillong offered no collection of *M. barbata* as on date. The plants collected by Pantling and those collected by King from Nepal in 1893 (Table 2) were grown in the Botanic Garden at Shibpur and were later sent to the Royal Botanic Garden, Kew, England (Supplementary Plate 6, Anonymous, 1909). It is quite probable that this interesting orchid got transferred to other botanical gardens as well as to individual plant lovers for multiplication. Most of the mentions of the occurrence of *M. barbata* in India by different authors were based on the collections in nineteenth century from Sikkim (King and

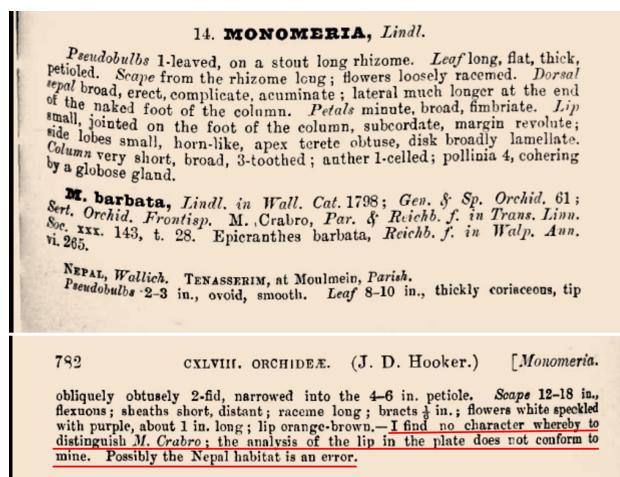
Pantling, 1898a, 1898b), such as in *Flora of Sikkim* (Hajra and Verma, 1996, p. 336), and *Orchids of Sikkim and North East Himalaya* (Lucksom, 2007, p. 984). Recently, *M. barbata* is claimed to have been collected from Tirap in Arunachal Pradesh (Chowdhery, 1998; Chowdhery et al., 2009, p. 349) and Darjeeling (Yonzone et al., 2012, pp. 1533–1550) in Eastern Himalayas. King and Pantling (1898a) made a reference to a collection of *M. barbata* from 'Khasia Hills by Rita', but without any accession number and date. This collection is not traceable in the protologue. Probably based on the details of King and Pantling (1898a), a subsequent report mentioned 'Khasia' a habitat and clarified that the petals are present, but reduced to few minute teeth situated on the foot of the column (Supplementary Plate 7, Rolfe, 1910, pp. 30–31). Recently, *M. barbata* has been rediscovered from Khasi Hills in Meghalaya, which is 125 years after the last collection by 'Rita' (Shankar, 2021a) and voucher specimen (Collection No. US005006) has been deposited (Fig. 8) in ASSAM herbarium (Accession No. 097369).

### 3.3 The fall of the genus

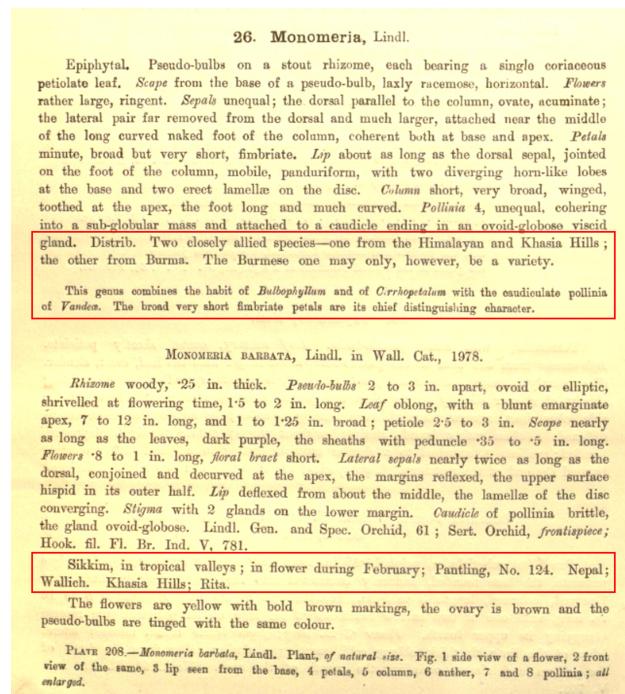
With the dawn of the twenty-first century, the efforts to rearrange taxa in phylogenetic scheme of classification gained momentum (APG 1998; APG II, 2003). The focus was on: (a) merging taxa which had close similarity, but were known by two or more valid names, (b) segregating taxa which were species complexes of two or more dissimilar entities, and (c) classifying taxa in clades. These exercises entailed transfers of taxa horizontally, i.e., from one to another family, genera and species, and vertically, i.e., merger and splits of taxa of different ranks. As molecular data exploded, rapid progress was made in revising phylogenetic scheme (APG III, 2009; APG IV, 2016). In the wake of compelling phylogenetic considerations, several allied genera were transferred to genus *Bulbophyllum* within the family of orchids. Hence, *Monomeria*, along with its species, was integrated with *Bulbophyllum* as shown in Table 1. The nominal *Monomeria* in the rank of genus was reduced to the status of a Section with new identity, *Monomeria* (Lindl.) J.J.Verm., Schuit. and de Vogel, stat. nov. (Vermeulen et al., 2014, p. 106). The most notable was the transfer of *M. barbata*, which was offered a new combination, *Bulbophyllum monomeria* (Pridgedon et al. 2014, p. 544), but it would be *nom. inval.* according to the Shenzhen Code of ICN (Turland et al., 2018). Subsequently, Vermeulen et al. (2014) introduced *Bulbophyllum crabro*, comb. nov., basing it on *M. crabro*



**Fig. 4** The controversy on stipe: **a.** views of G. Bentham on the genus *Monomeria* (Bentham, 1881), **b.** part of *M. barbata* flower showing stipe intact, and **c.** after stipe had fallen. (Source of 4a: BHL)



**Fig. 5** Description of the genus *Monomeria* and the only species *M. barbata* in 'The Flora of British India' by Hooker (1890). (Source: BHL)



**Fig. 6** Taxonomic description of *M. barbata* by King and Pantling (1898a). (Source: BHL)



(Reichenbach 1874). This automatically designated *M. barbata* and *E. barbata* as heterotypic synonyms of *B. crabro*. Hence, the current status of these taxa is as follows:

Genus and Section	: <i>Bulbophyllum</i> Section <i>Monomeria</i> J.J.Verm., Schuit. and de Vogel ( <i>fide</i> Vermeulen et al., 2014)
Generic name, epithet and authority of extant taxon	: <i>Bulbophyllum crabro</i> (C.S.P.Parish and Rchb.f.) J.J.Verm., Schuit. and de Vogel, <i>comb. nov.</i> ( <i>fide</i> Vermeulen et al., 2014)
Basionym	: <i>Monomeria crabro</i> C.S.P.Parish and Rchb.f. ( <i>fide</i> Reichenbach 1874)
Homotypic synonym	: <i>Monomeria crabro</i> C.S.P.Parish and Rchb.f. ( <i>fide</i> Reichenbach 1874)
Heterotypic synonyms	: <i>Monomeria barbata</i> Lindl. ( <i>fide</i> Lindley, 1830), <i>Epicranthes barbata</i> (Lindl.) Rchb.f. ( <i>fide</i> Reichenbach 1861)
<i>Nomen invalid</i>	: <i>Bulbophyllum monomeria</i> J.J.Verm. ( <i>fide</i> Vermeulen in Pridgedon et al. 2014, p. 33)
Type locality	: Moulmein, Myanmar; based on the type of basionym (Article 7.3 of ICN Turland et al., 2018)
Digitally accessible specimens of <i>M. barbata</i>	: CAL0000054299, CAL0000054300, CAL0000081609, CAL0000081610, CAL0000081611, CAL0000081612, CAL0000081613, CAL0000081614, K000597324, K000597325, K000597326, K000597327, K000597328, K000974243, K000974273, K001114839, G00434759, ASSAM097369 (Fig. 8)
Lectotype of <i>M. barbata</i>	: Figure 2b; K000974273 ( <i>fide</i> Shankar, 2021a)
Isolectotype of <i>M. barbata</i>	: Figure 2a, c, d; K000974243, K001114839, G00434759 ( <i>fide</i> Shankar, 2021a)
Lectotype of <i>M. crabro</i>	: Figure 3; an illustration in Transactions of the Linnean Society of London 30(1): 143, pl. 28. 1874 ( <i>fide</i> Shankar, 2021a; based on Article 9 of ICN Turland et al., 2018)
'First Basionym'	: <i>Monomeria barbata</i> Lindl. ( <i>proposed here</i> )

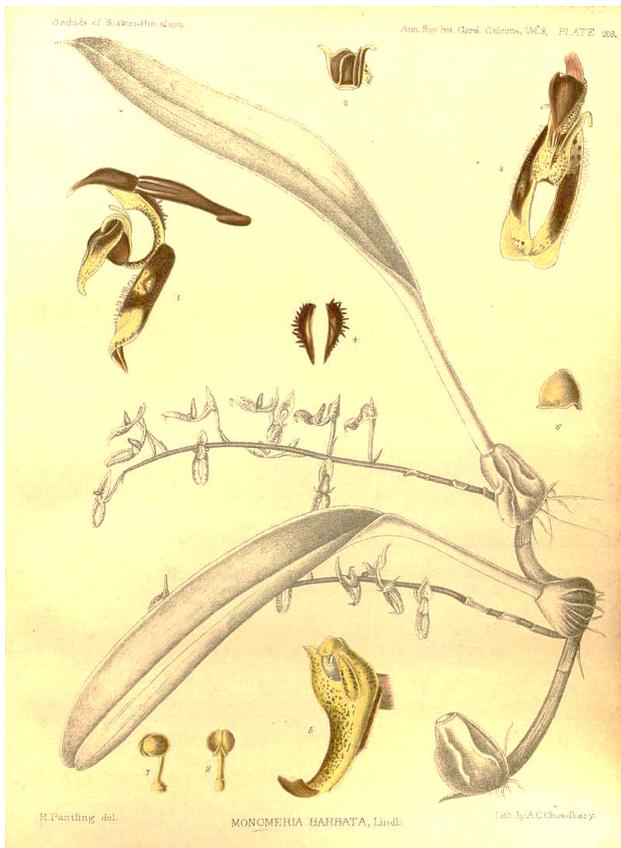
## 4 Discussion

The natural history unravels that the formation of genus *Monomeria* was driven by Lindley's obsession of '*the only orchid without lateral petals*', and based on this feature he chose not to classify Wallich's collection from Nepal as a species of the genus *Bulbophyllum*, despite compelling similarity. This obsession persisted with him through his life and was followed by others for long. In fact, Lindley's observation of '*tooth-letted interval between the upper and lower sepals*' (Fig. 1) in place of two floral appendages (i.e., petals) was due to the fact that the size of these appendages is naturally very small and can easily be confused by anyone for their absence not only in the dried herbarium specimens but also in live plants. Another variation from a typical orchid flower was the curved extension of the foot of the column which motivated botanists to maintain *Monomeria* a separate genus despite the initial effort of Reichenbach (1861) to transfer it to *Epicranthes* (Supplementary Plate 3).

There was a gap of fifty years until another collection of the same orchid was made by Parish from Myanmar in 1871. The drawings arranged by Parish, based on live collections while staying in Myanmar illustrated well the '*missing petals*', curved extension of column foot and a *pollinarium* with *stipe*. Reichenbach (1874) considered the presence of petals and of *stipe* in *pollinarium* as substantial features to designate Parish's collection the status of a different species of *Monomeria*, i.e., *M. crabro*. The next collection came twenty years later when R. Pantling found the orchid in tropical valleys of Sikkim in 1891, which was soon followed by G. King's repeat collection from nearby territory in Nepal in 1893 (Table 2). In their description, King and Pantling (1898a, 1898b) were modest in declaring that their collections, which they ascribed to *M. barbata*, also had Lindley's '*missing petals*' and a caudiculate *pollinarium* (Fig. 6) as in Reichenbach's *M. crabro* and both were the same species. Instead, King and Pantling chose to opine that *M. crabro* could at most be a variety of *M. barbata* (Fig. 6).

On the timeline, it is difficult to comprehend why King and Pantling (1898a) floated an idea of *M. crabro* being a variety of *M. barbata* despite the fact that Hooker (1890) had already resolved the confusion between the two by designating *M. crabro* as a synonym of *M. barbata* (Fig. 5). The probable reason could be that Hooker (1890) was more considerate of the morphological variation that orchid species show across geographical regions in comparison to Reichenbach (1874). Notwithstanding, the idea of one being a variety of the other did not gain momentum and *M. barbata* remained an accepted species (Supplementary Plates 6, 7). It was later that Schlechter (1915, p. 338) first published a black-and-white photograph of *M. barbata* from garden cultivation along with

a small description in German (Fig. 9a). Throughout the twentieth century, no fresh collection of *M. barbata* was added from India and Nepal, but it was explored from newer localities, such as, Thailand, Bhutan, Cameron Highlands in Malaysia, Gaoligongshan Mountains and Yunnan in south-western China and Vietnam. Vermeulen et al. (2014) provided coloured photographs of their *Bulbophyllum crabro* on Flickr and one of these is reproduced here (Fig. 9b). I found a specimen from Khasi Hills in Meghalaya in May, 2016, nearly 125 years after the last collection by ‘Rita’ in 1891 from Khasi Hills (King and Pantling, 1898a). The plant was grown at about 1450 m altitude in the campus of the North-Eastern Hill University, where it flowered, but did not fruit anytime (Shankar, 2021a). The floral morphology was studied in detail and a photograph is provided here for comparison (Fig. 9c). The credible similarity in flower morphology between the two collections would bring anyone in agreement with Hooker (1890) that the two belong to the same species.



**Fig. 7** First partially coloured illustration of *M. barbata* sketched by A.C. Chowdhary for King and Pantling (1898b). Legends: plant of natural size in the middle. 1. side view of a flower, 2. front view of the same, 3. lip seen from the base, 4. petals, 5. column, 6. anther, and 7. and 8. pollinia. (Source: BHL)

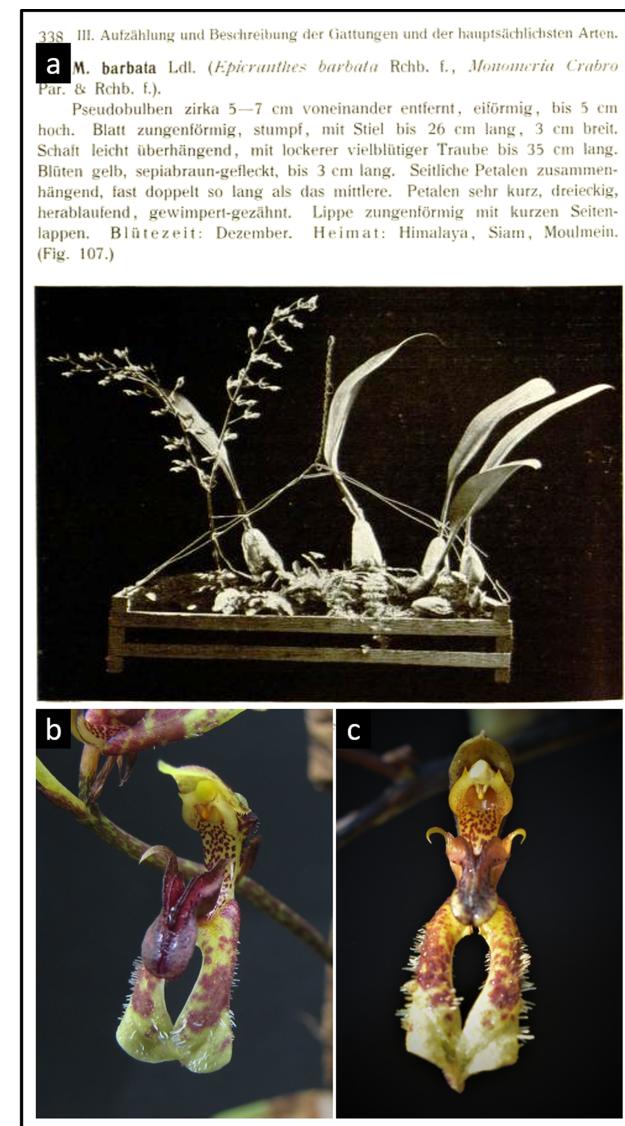


**Fig. 8** The specimen of rediscovery of *M. crabro* from Khasi Hills, Meghalaya after 125 years deposited to ASSAM herbarium (vide Accession No. 097369) by the author

In the first instance, the new combination by Vermeulen et al. (2014) can be questioned, because it ignored the preceding legitimate nomenclatural type, *M. barbata* (Lindley, 1830), according to the principle of priority vide Article 11.4 of the Shenzhen Code of ICN (Turland et al., 2018), which would suggest '*Bulbophyllum barbatum*' as a new combination. However, it will be a ‘*later homonym*’, because the binomial *Bulbophyllum barbatum* Barb. Rodr., Gen. Spec. Orchid 2: 119 (Rodrigues, 1881) already exists as an accepted taxon from Brazil in neotropics (Govaerts et al., 2021; POWO, 2020). Hence, Vermeulen et al. (2014) chose the next available valid name, *M. crabro*, as basionym for the new combination in accordance with Articles 11.4 and 41 of ICN (Turland et al., 2018).

Unfortunately, such a combination resulted in loss of original generic name (i.e., *Monomeria*), epithet (i.e., *barbata*), authority (i.e., Lindl.), the status of basionym (i.e., *M. crabro*, not *M. barbata*), the status of homotypic synonym (i.e., *M. crabro*, not *M. barbata*) and the identity of type locality (i.e., Myanmar, not Nepal), all in one go, to the dismay of the taxon, *M. barbata*, its first collector





**Fig. 9** Photographic illustration: **a.** first monochrome image of *M. barbata* by Schlechter (1915), **b.** first colour image of the flower of *B. crabro* by Vermeulen et al. (2014) from Myanmar, and **c.** first colour image of flower of *B. barbata*, *comb. nov.* from Khasi hills, northeast India (this study). (Sources: 9a from BHL, 9b from Flickr, 9c Uma Shankar)

Wallich and its founder, Lindley (1830), abruptly after existence for nearly two centuries. This brings up an excellent textbook example of '*the loss of the first to the subsequent*', challenging the philosophy of the principle of priority advocated in ICN. Almost a similar case is exemplified from pteridophytes in Article 11.4 of Shenzhen Code of ICN (Turland et al., 2018) in which transfer of *Polypodium tenerum* Roxb. to *Cyclosorus* Link would result in a *later homonym* due to the existence of *C. tener* (Fée) Christen., based on *Goniopteris tenera* Fée. The correct name is a heterotypic synonym, *C. ciliatum* (Wall.)

ex Benth.) Panigrahi, based on the next earliest legitimate name of the taxon at the same rank, *Aspidium ciliatum* Wall. ex Benth.

Although ICN offers conservation of names, at the same rank with the same *type*, *vide* Article 14 under limitation of the principle of priority, current provisions do not allow protection of identity of *M. barbata* from synonymy. Hence, I propose a new label of 'First Basionym' (or alternatively 'Disconym'), superior to the basionym, in ICN, to preserve the first discovery of the taxon along with *type* locality, original generic name, epithet, and the discoverer's authority. The designation of 'First Basionym' along with new combinations will allow anyone to unambiguously understand since when a taxon is known to science. For example, *B. crabro* with its basionym *M. crabro* is understood to have been known to science since 1874 after Reichenbach (1874), whereas this taxon is actually known since Lindley (1830). The 'First Basionym' will be applicable to all those new combinations in which the use of epithet of first coined name will result in a *later homonym*. It may also be used in cases where the first coined name was not validly published and hence rejected, but indicates the first discovery of the taxon.

## 5 Conclusion

This article digs the natural history of a lesser-known genus of orchids, *Monomeria* from its formation to fall. The study finds that the current provisions in the internationally accepted nomenclature of plants have resulted in severe loss of original identity of the genus and its *type* species, *M. barbata*, to a subsequently founded heterotypic binomial. The study also highlights the importance of completeness in specimen collection, availability of live specimens for taxonomic diagnosis, within-species variation across geographical ranges, trail of first discovery of a taxon, scope of relook at plant nomenclature, and seamless accessibility to digital archives of herbarium specimens and taxonomic literature.

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