

## POSSIBLE LOSS OF SOME SPECIES OF THE FAMILY LAMIACEAE FROM THE FLORA OF BANGLADESH

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### Abstract

Present investigation assesses 25 Lamiaceous taxa as possibly Extinct (EX) from the flora of Bangladesh due to various anthropogenic activities. The study based on long term field investigation, examination of preserved herbarium specimens at different national and international herbaria and consultation of relevant floristic literature. These taxa have been previously reported from the area of Bangladesh about 70 to 200 years ago. Since then there have been no subsequent reports of occurrence and no collected specimens are available at any herbaria. Furthermore, this species could not be relocated from elsewhere in Bangladesh. Among these 25 taxa, *Leucas mollissima* Wall. ex Benth. (= *L. decemdentata* (Willd.) Sm.) and *Elsholtzia incisa* Benth. (= *E. stachyodes* (Link.) Raizada and Saxena) have been reported from the area about 193 and 77 years ago respectively. 18 species (72%) have been reported from Sylhet; of which, 13 species, viz. *Aphanochilus blandus* Benth. (= *Elsholtzia blanda* (Benth.) Benth.), *Gomphostemma lucidum* Wall. ex Benth., *G. melissifolium* (Roxb.) Wall. ex Benth., *Plectranthus hispidus* Benth. (= *Isodon hispidus* (Benth.) Murata), *Plectranthus gerardianus* Benth. (= *Isodon lophanthoides* (Buch.-Ham. ex D. Don) Hara), *Leucas vestita* Benth., *Orthosiphon incurvus* Benth., *Phlomis rugosa* Benth. (= *Paraphlomis javanica* (Blume) Prain), *Geniosporum strobiliferum* Wall. ex Benth. (= *Platostoma coloratum* (D. Don) A.J. Paton), *Geniosporum parviflorum* Benth. (= *Platostoma palustre* (Blume) A. J. Paton), *Pogostemon parviflorus* Benth., *Dysophylla strigosa* Benth. (= *Pogostemon strigosus* (Benth.) Benth.), and *Scutellaria discolor* Wall. ex Benth. were named based on type specimens collected from area by Wallich's collectors, and *Microtoenia griffithii* Prain was named based on Griffith's collection from East Bengal (current Bangladesh) *Sinne loco*. Enumeration of these possibly extinct taxa is prepared with data on habit, habitat, phenology, global distribution, recorded localities, specimens examined, and notes with some photographs of type/herbarium specimens.

**Key words:** Lamiaceae, Flora, Extinct, Bangladesh.

### INTRODUCTION

Global biodiversity has been decreasing at an alarming rate and referred to as “biodiversity crisis”. Tropical forests has also been seriously imperiled by anthropogenic activities including deforestation and habitat destruction (Novacek and Cleland 2001, Brook *et al.* 2003). Human impact on nature has reached at such a high proportion that the world is today witnessing an unprecedented rate of species loss. Many more species are disappearing from the nature before their discovery and determination. *The 1997 IUCN Red List of Threatened Plants* revealed that about 34,000 (12.5%) of the world's vascular plant species are at risk of extinction (Walter and Gillett 1998). Later the 2004 IUCN Red List includes 11,824 species of plants, of which 8,321 are threatened. Pitman and Jorgensen (2002) stated if following IUCN criteria for proper assessment is done, about 50% of world's flora might be threatened at risk of extinction. However, only about 4% of the described plant species have been evaluated so far, of which about 3% are threatened (Baillie *et al.* 2004). The IUCN threatened Plants Unit at the Royal Botanical Gardens, Kew, has produced a global data of 50,000 plant species, of which around 20,000 species fall under threatened categories. However, the ‘biodiversity crisis’ created by human civilization has resulted in drastic reduction and extinction of biodiversity due to disappearance of habitats, pollution and over-exploitation. Over the past half a billion years, the world lost perhaps one species per million each year whereas the current annual rate of extinction is estimated to be 1,000 to 10,000 times faster. By 2050, the biodiversity loss is expected to be equivalent to 7% of the World's GDP (Braat and ten

Brink 2008). A conservative estimate of IUCN threatened plant Units shows that about 60,000 plant species (25%) would become either extinct or nearly extinct by the 2050 (Uberoi 2010). In the current wave of multiple threats, humans cannot predict the impact and consequences of plant extinctions. Even extinction of a single plant species may result in the disappearance of 30 associated species of plants and wildlife (USDA 1993). Recently, Pimm and Joppa (2015) estimated current plant extinction risk which is 27-33% while Brummit *et al.* (2015) presumed 21.44%.

Bangladesh is endowed with high plant resources as it lies in a transition of two mega-biodiversity hot spots Indo-Himalayas and Indo-Chinese. However, Bangladesh forests are highly vulnerable to anthropogenic disturbances and climate change (Khan 2003). It has been estimated that out of c.5000 angiosperm species, at least 8-10% are facing threats to extinction due to habitat loss, population pressure and over-exploitation of natural resources in Bangladesh (Khan 1991, Rahman *et al.* 2010, Rashid *et al.* 2014). Nevertheless, to arrest this process there have been no tangible steps taken (Khan *et al.* 2001). Therefore, it has been accentuated by Khan *et al.* (2001) and Rahman *et al.* (2010) that the first and foremost step in this direction is to make complete inventory of the threatened species with assessment of their conservation status in the flora in order to framing and implementing National Conservation Strategies.

The importance of inventory of threatened plants in Bangladesh was first focused on by Khan (1991) with a tentative list of 12 threatened vascular plants. Afterward, in 1997 IUCN Red List of Threatened plants included 24 vascular plant species from Bangladesh. Subsequently, Khan *et al.* (2001) published *Red Data Book of Vascular plants of Bangladesh* with 106 threatened plants. Thereafter, Rahman (2003) and Rahman *et al.* (2010) reported 18 and 58 species respectively as threatened in the wild under different IUCN Categories. However, family wise inventory of the threatened taxa has been initiated for the first time in Bangladesh by Rahman (2013). He listed 69 species (*i.e.*, 13.27% out of 520) in 13 angiosperm families presumed to be extinct from the flora of Bangladesh.

Lamiaceae (Labiatae), the mint family, is a large family of aromatic herbs and undershrubs containing many useful plants such as sage (*Salvia*) and mint (*Mentha*) known for the wealth of species with medicinal properties, which have been used since early times (Harley *et al.* 2004). The family has cosmopolitan distribution with 236 genera and about 7,173 species (Harley *et al.* 2004); 233 genera and about 6,870 species (Heywood *et al.* 2007); 252 genera and 6,800 species (Judd *et al.* 2008); 238 genera and 6,500 species (Mabberley 2008); and is regarded as being one of the most highly evolved plant families from the viewpoint of floral structure (Hedge 1992). In Bangladesh the family is represented by 86 species under 34 genera (Khanam 2009).

Walter and Gillett (1998) reported 733 Lamiaceous taxa (c.23%) as threatened all over the world. Ara *et al.* (2013) assessed *Achyrospermum wallichianum* (Benth) Benth. *ex* Hook. f., *Gomphostemma mastersii* Benth. *ex* Hook. f., *G. melissifolium* Wallich *ex* Benth., *G. velutinum* Benth. as Endangered (EN) and *Microtoena griffithii* Prain as Critically Endangered (CR) in the flora of Bangladesh.

While assessing the status of occurrence of all recorded Lamiaceous taxa for determination of their threatened categories, it revealed that 25 taxa have neither been further reported since their first record nor could be relocated from anywhere in Bangladesh including their recorded collection localities. Moreover, no representative specimens of these taxa could be found available in any herbaria. Hence, these taxa are presumed to be lost from the flora of Bangladesh.

## MATERIAL AND METHODS

Determination of the extinct Lamiaceous taxa has been done through long term repeated explorations throughout the flora, examination and consultation of the collected herbarium specimens

and relevant literature. Previous collection localities of the Lamiaceous taxa, especially botanically rich areas of Chittagong, Cox's Bazar, Chittagong Hill Tracts districts and greater Sylhet have been explored extensively.

Herbarium specimens lodged at different international, national and local herbaria have been examined critically. The relevant and up-to-date floristic literature since Sinclair (1956), such as, Khan and Afza (1968), Khan and Banu (1972), Alam (1988, 1995), Khan *et al.* (1984), Huq and Begum (1984), Huq and Khan (1984), Naderuzzaman and Islam (1984), Huq (1988), Khan *et al.* (1994), Rahman and Hassan (1995), Rahman and Uddin (1997), Yusuf *et al.* (1997), Dey *et al.* (1998), Uddin *et al.* (1998, 2003), Uddin and Rahman (1999), Rashid *et al.* (2000), Khan and Huq (2001), Rahman *et al.* (2001), Rashid and Mia (2001), Uddin and Hassan (2004, 2010), Khanam and Hassan (2005), Hossain *et al.* (2005), Alam *et al.* (2006), Momen *et al.* (2006), Khanam and Hassan (2008), Islam *et al.* (2009), Khanam (2009), Barbhuiya and Gogoi (2010), Tutul *et al.* (2010), Arefin *et al.* (2011), Rahman *et al.* (2010, 2012, 2013), Rahman *et al.* (2010a), Uddin *et al.* (2013), Rashid and Chowdhury (2013), Uddin *et al.* (2015), Arefin *et al.* (2017) have been consulted to trace the report of collection/occurrence of the Lamiaceous taxa of Bangladesh. In the result the following Latin words e.g. *s.l.* (*Sinne loco*) - without locality; *s.a.* (*Sinne anno*) - without date; *anno* - in the year, are used.

## RESULTS AND DISCUSSION

According to the present investigation 25 Lamiaceous taxa belonging to 14 genera were not relocated in their previous recorded localities and or elsewhere in the flora of Bangladesh. Since their first report between more than 70 years to about 200 years, no specimens are available at any herbaria. Among these 25 taxa *Leucas decemdentata* (Willd.) Sm. (*L. mollissima* Wall. *ex* Benth.) and *Elsholtzia stachyodes* (Link.) Raizada & Saxena (*Elsholtzia incisa* Benth.) have been reported from the area 193 and 77 years ago, respectively.

18 species (64%) have been listed from Sylhet by Nathaniel Wallich. Of which, following eight species *viz.* *Elsholtzia blanda* (Benth.) Benth., *Gomphostemma lucidum* Wall. *ex* Benth., *G. melissifolium* (Roxb.) Wall. *ex* Benth., *Isodon hispidus* (Benth.) Murata. (*Plectranthus hispidus* Benth.), *I. lophanthoides* (Buch.-Ham. *ex* D. Don) Hara (*Plectranthus gerardianus* Benth.), *Orthosiphon incurvus* Benth., *Paraphlomis javanica* (Blume) Prain (*Phlomis rugosa* (Benth.) Prain), and *Platostoma palustre* (Blume) A. J. Paton (*Geniosporum parviflorum* Benth.) are named based on type specimens collected from Sylhet by Wallich or his collectors. However, *G. melissifolium* is also recorded by Roxb. (1832) and Hook. f. (1885) from the same locality. Moreover, *G. lucidum*, *Platostoma palustre*, and *Scutellaria discolor* are reported from East Bengal (Current Bangladesh) as well by Griffith without citing any specific localities; and distributions of *O. incurvus* are also known from Rangamati and Cox's Bazar. The last specimen of this species was collected from Cox's Bazar in 1920 by J. M. Cowan.

*Anisochilus pallidus* Wall. *ex* Benth., *Colquhounia coccinea* Wall., *G. lucidum* Wall. *ex* Benth., *Isodon coetsa* (Buch.-Ham. *ex* D. Don) Kudo, *Microtoenia griffithii* Prain, *Pogostemon cruciatus* (Benth.) Kuntze, and *Scutellaria barbata* D. Don are only known from Griffith's collection from East Bengal (current Bangladesh - without citing specific localities). William Griffith made exploration in this area during 1835-36. Since then there have been neither further reports of occurrence of these species in Bangladesh nor any specimen available at any herbaria. However, earlier *G. lucidum* is named by Wallich based on type specimen collected from Sylhet in 1822.

Hooker (1885), Heinig (1925) and Mukerjee (1940) reported *Elsholtzia stachyodes* (Link.) Raizada and Saxena (*E. incisa* Benth.) from Chittagong; *Gomphostemma parviflorum* var. *farinosum* Prain is only known from the single specimen collected by Cowan (1920) from Chittagong; and *Orthosiphon*

*rubicundus* (D. Don) Benth. is reported from Chittagong by Heinig (1925). There have been no further reports of occurrence of these taxa since their last record and no specimen is available in any herbaria.

Considering the IUCN criteria (IUCN 2012) these 25 taxa have been assessed as possibly lost from the flora of Bangladesh.

***Enumeration of the possibly extinct Lamiaceous taxa of Bangladesh***

*Anisochilus pallidus* Wall. ex Benth., Pl. As. Rar. 2:18 (1830). Prain (1903); Khanam and Hassan (2008); Khanam (2009). Fig. 1a

An erect herb up to 1m high. Habitat: Forest areas; Fl. & Fr.: October to March.

Global distribution: Nepal, Bhutan, India, Myanmar, Laos, Vietnam, China (Khanam and Hassan 2008).

Recorded localities: East Bengal (Bangladesh) *Sine loco*; Status of occurrence: Possibly Extinct (EX).

Specimen examined: East Bengal (Bangladesh): *s.l., sine anno (s.a.), Griffith s.n.* (CAL).

Conservation status: This species is only known from Griffith's collection from East Bengal (current Bangladesh - specific locality is not cited) lodged at Central National Herbarium Kolkata (CAL).

William Griffith's exploration was made in this area during 1835-36. Since then there has been no further report of occurrence of this species in Bangladesh and no specimen is available at any herbaria.

Moreover, this species could not be relocated or collected from elsewhere Bangladesh.

*Colquhounia coccinea* Wall., Trans. Linn. Soc. London 13: 608 (1822). Khanam and Hassan (2008); Khanam (2009). Fig. 1b

A tall shrub, up to 3m high. Habitat: Forest areas; Fl. & Fr.: During winter season.

Global distribution: India, Myanmar, Nepal, Bhutan, Thailand, Tibet, (Khanam and Hassan 2008).

Recorded localities: East Bengal (Bangladesh) *Sine loco*; Status of occurrence: Presumed Extinct (EX).

Specimen examined: East Bengal (Bangladesh): *s.l., s.a., Griffith 4028* (CAL).

Conservation status: The species is only known from Griffith's collection from East Bengal (current Bangladesh - specific locality is not cited) preserved at Central National Herbarium Kolkata (CAL).

William Griffith made the exploration in the area during 1835-36. Since then there has been no further report of occurrence and no collection at any herbaria. Furthermore, this species could not be relocated or collected from elsewhere Bangladesh.

*Elsholtzia blanda* (Benth.) Benth., Labiat. Gen. Spec. 162 (1833). Khanam & Hassan (2008); Khanam (2009). *Aphanochilus blandus* Benth. (1830). Fig. 1c

An undershrub or herb, 60 to 100cm high. Habitat: Edges of forests; Fl. & Fr.: March to September

Global distribution: Continental Southeast Asia, Nepal, India, Myanmar, Thailand, South China and Malaysia (Khanam and Hassan 2008).

Recorded localities: Sylhet; Status of occurrence: Possibly Extinct (EX).

Specimens examined: Sylhet (Sillet): *anno 1829, Wallich*, Wall. Cat. n. 1550/b (Syntypes K000881697!, E00301391!, E00301392!)

Conservation status: This species is only known from Wallich's type specimen collected by Francis de Silva from Sylhet in 1829. Since then there has been no further report of its occurrence in Bangladesh and no specimen is available at any herbaria. Moreover, this species could not be relocated or collected from its recorded locality or from elsewhere Bangladesh.

*Elsholtzia flava* (Benth.) Benth., Labiat. Gen. Spec. 161 (1833). Khanam & Hassan (2008); Khanam (2009). *Aphanochilus flavus* Benth. (1829). Fig. 1d

A shrub, 100-150cm high. Habitat: Edges of forests; Fl. & Fr.: October to June

Global distribution: Pakistan, India and Nepal (Khanam & Hassan 2008).

Recorded localities: Sylhet; Status of occurrence: Presumed Extinct (EX).

Specimens examined: Sylhet (Sillet): *anno* 1829, *Francis de Silva*, Wall. Cat. n.1550 (E00301390!).

Conservation status: This species is only known from Wallich's specimen collected by Francis de Silva from Sylhet in 1829. Since then there has been no further report of its occurrence in Bangladesh and no specimen is available at any herbaria. Furthermore, this species could not be relocated or collected from its recorded locality or from elsewhere Bangladesh.

*Elsholtzia stachyodes* (Link.) Raizada & Saxena, Ind. For. 92: 309 (1966). Khanam and Hassan (2008); Khanam (2009). *Hyptis stachyodes* Link. (1822). *Elsholtzia incisa* Benth. (1833); Hooker, f. (1885); Heinig (1925); Mukerjee (1940).

A slender herb, up to 1m high, strongly aromatic. Habitat: The edges of rain forest; Fl. & Fr.: July to October

Global distribution: India, Nepal and Myanmar, Thailand (Khanam and Hassan 2008).

Recorded localities: Chittagong; *Status of occurrence*: Possibly Extinct (EX)

Specimens examined: No specimen is available at any herbaria.

Conservation status: This species was reported from Chittagong by J. D. Hooker in 1885, Heinig in 1925 and lastly in 1940 by Mukerjee. Since Mukerjee (1940) there has been no further report of occurrence of this species in Bangladesh and no specimen is available at any herbaria. Moreover, this species could not be relocated or collected from its recorded locality or from elsewhere Bangladesh.

*Gomphostemma lucidum* Wall. *ex* Benth., Pl. As. Rar. 2: 12 (1830). Hook. f. (1885); Khanam and Hassan (2008); Khanam (2009). Fig. 1e

A robust herb about 1-1.2m high. Habitat: Along slopes of hills; Fl. & Fr.: September to April.

Global distribution: India (Khanam and Hassan 2008).

Recorded localities: Sylhet; Status of occurrence: Presumed Extinct (EX).

Specimens examined: East Bengal (Bangladesh): *s.l., s.a., Griffith* 4038 (CAL); Sylhet (Sillet): *s.a., Francis de Silva*, Wall. Cat. n. 2156/2 (Type K001115340!).

Conservation status: This species is only known in Bangladesh from Wallich's type specimen collected by Francis de Silva from Sylhet in 1822 and Griffith's collection from East Bengal (current Bangladesh - specific locality is not cited) during 1835-36. Since then there has been no further report of occurrence of this species in Bangladesh and no specimen is available at any herbaria. Furthermore, this species could not be relocated or collected from its recorded locality or from elsewhere Bangladesh.

*Gomphostemma melissifolium* Wall. *ex* Benth., Pl. As. Rar. 2:12 (1830). Khanam and Hassan (2008); Khanam (2009). *Prasium melissifolium* Roxb. (1832). Fig. 2f

A prostrate or scandent herb, 0.5-2.5m high. Habitat: Slope of hills and near the stream in forests; Fl. & Fr.: September to April

Global distribution: India (Khanam and Hassan 2008).

Recorded localities: Sylhet; Status of occurrence: Probably Extinct (EX).

Specimens examined: Sylhet (Sillet): *anno* 1824, *Wallich*, Wall. Cat. n. 2157 (Isotypes K000928178!, BM000521976!, G00189095!).

Conservation status: This species is only known from type specimen collected by Francis de Silva from Sylhet and listed in Wallich's catalogue. Subsequently, Roxb. (1832) and Hooker (1885) also reported the species from the same locality. Since Hooker (1885) there has been no further report of its

occurrence in Bangladesh and no specimen is available at any herbaria. Moreover, this species could not be relocated or collected from its recorded locality or from elsewhere Bangladesh.

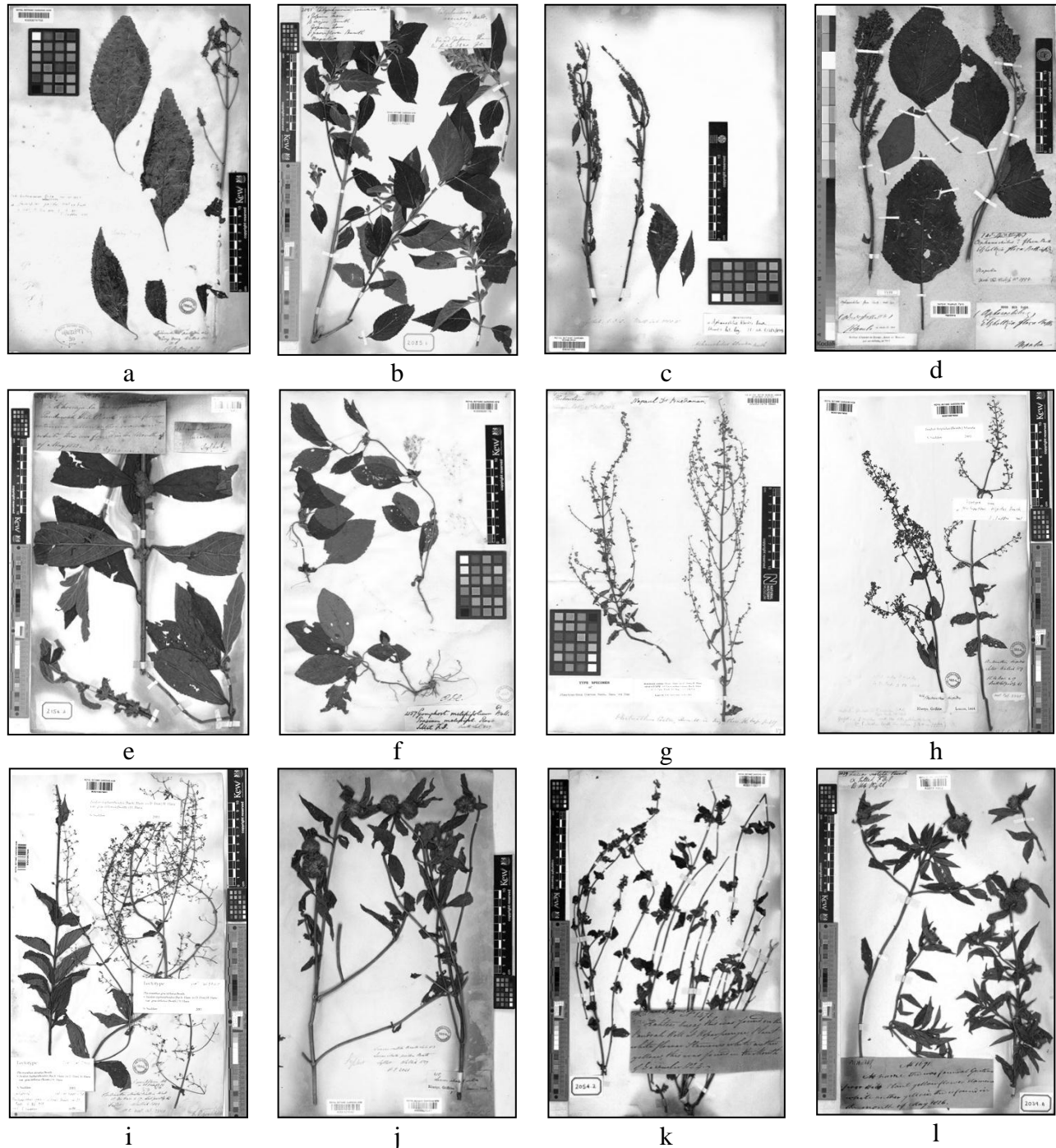


Fig. 1. Plant type: a. *Aniosochilus pallidus* (K000674759), b. *Colquhounia coccinea* (K001115081), c. *Elsholtzia blanda* (E00301392), d. *Elsholtzia flava* (P00737619), e. *Gomphostemma lucidum* (K001115340), f. *Gomphostemma melissifolium* (K000928178), g. *I. coetsa* (BM000521976), h. Syntype of *I. hispidus* (K 001067854), i. *Isodon lophanthoides* (K001067881), j. *Leucas ciliata* (K000929541), k. *Leucas decemdentata* (K001115011), l. *Leucas vestita* (K001114953).

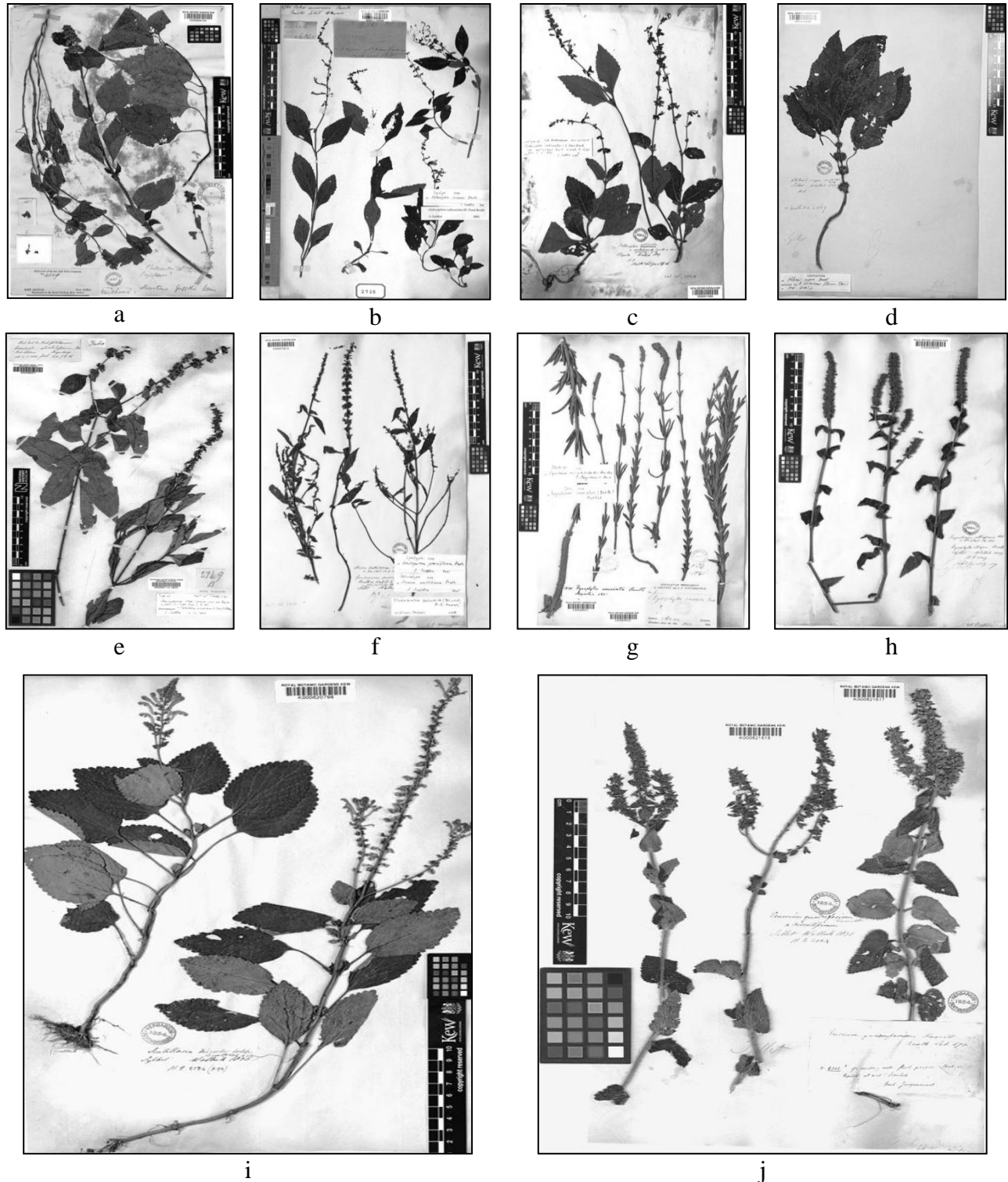


Fig. 2. Plant type: a. *Mirotoena griffithii* (K000928194), b. Syntype of *Orthosiphon incurvus* (K001116954), c. *Orthosiphon rubicundus* (K000911655), d. Lectotype of *Paraphlomis javanica* (K000898661), e. *Platostoma coloratum* (BM000950317), f. Syntype of *Platostoma palustre* (K000674619), g. *Pogostemon cruciatus* (K000848031), h. *Pogostemon strigosus* (K000848028), i. Syntype of *Scutellaria discolor* (K000820798) and j. *Teucrium quadrifarium* (K000821617).

*Gomphostemma parviflorum* var. *farinosum* Prain, Ann. Roy. Bot. Gard. (Calcutta) 3: 253 (1891).

An erect herb, 2.5-3.0m high. Habitat: Waste places; Fl. & Fr.: September to August

Global distribution: India and China (Khanam and Hassan 2008).

Recorded localities: Chittagong; Status of occurrence: Possibly Extinct (EX).

Specimens examined: Chittagong: Matamori, M. R. Range, 29.09.1920, *J. M. Cowan*, 855 (E).

Conservation status: this taxon is only known in Bangladesh from the single specimen preserved at Herbarium, Royal Botanic Gardens Edinburgh (E) collected by *J. M. Cowan* in 1920 from Chittagong. Since then there has neither been any specimen nor its further report from Bangladesh is available. This could not be relocated or collected from its recorded locality or from elsewhere Bangladesh.

*Isodon coetsa* (Buch.-Ham. ex D. Don) Kudô, Mem. Fac. Sci. Agr. Taihoku Imp. Univ. 2: 131 (1929).

Khanam and Hassan (2008); Khanam(2009). *Plectranthus coetsa* Buch.-Ham. ex D. Don (1825). Fig. 1g

An erect, perennial, strongly aromatic undershrub, 1.0-2.5cm high. Habitat: Hilly region; Fl. & Fr.: September to December.

Global distribution: India, Sri Lanka, Myanmar and Bangladesh (Khanam and Hassan 2008).

Recorded localities: East Bengal (Bangladesh) *Sine loco*; Status of occurrence: Probably Extinct (EX).

Specimens examined: East Bengal (Bangladesh): *s.l., s.a., Griffith* 3959 (CAL).

Conservation status: This species is first known from William Griffith's collection from East Bengal (now Bangladesh) deposited at Central National Herbarium Kolkata (CAL). However, specific collection locality and date are not mentioned on the herbarium sheet. Griffith's exploration was made in the area during 1835-36. Since then there has been no further report of in Bangladesh and no specimen preserved at any herbaria. This species could not be relocated or collected from elsewhere Bangladesh.

*Isodon hispidus* (Benth.) Murata, Act. Phytotax. Geobot. 24: 82 (1969). Khanam and Hassan (2008);

Khanam (2009). *Plectranthus hispidus* Benth. (1831). Hook. f., (1885). Fig. 1h

A stout herb, 1.0-2.5cm high. Habitat: Evergreen forests; Fl. & Fr.: September to February.

Global distribution: India and Myanmar (Khanam and Hassan 2008).

Recorded localities: Sylhet; Status of occurrence: Presumed Extinct (EX).

Specimens examined: Sylhet (Sillet): *anno* 1831, *Francis de Silva*, Wall. Cat. n. 2741 (Syntypes K001067854!, CAL!).

Conservation status: This species is only known from the type specimen collected from Sylhet in 1831 by Francis de Silva and deposited at Royal Botanic Garden Herbarium Kew (K) and Central National Herbarium Kolkata (CAL). Since then there has been no further report of its occurrence in Bangladesh and no specimen is available at any herbaria. Furthermore, this species could not be relocated or collected from its recorded locality or from elsewhere Bangladesh.

*Isodon lophanthoides* (Buch.-Ham. ex D. Don) Hara, Journ. Jap. Bot. 60: 235 (1985). Khanam and

Hassan (2008); Khanam (2009). *Hyssopus lophanthoides* Buch.-Ham. ex D. Don (1825); *Plectranthus gerardianus* Benth. (1830); *Plectranthus stocksii* Hook.f. (1885). Fig. 1i

A small herb. Habitat: Dry soil inside the forests; Fl. & Fr.: September to February.

Global distribution: Bhutan, India and Myanmar (Khanam and Hassan 2008).

Recorded localities: Sylhet; Status of occurrence: Possibly Extinct (EX).

Species examined: Sylhet: Mont. Sillet (Sylhet), *anno* 1829, *William Bruce.*, Wall. Cat. n. 2740 (Lectotypes K0011067856!, K001067881!, K001067946!, Isolectotype E00273786!).



Conservation status: This species is only from type specimen collected from Sylhet in 1829. Since then there has been no further report of its occurrence in Bangladesh and no specimen is available at any herbaria. Moreover, this species could not be relocated or collected from its recorded locality or from elsewhere Bangladesh.

*Leucas ciliata* Benth., Pl. As. Rar. 1: 61 (1830); Khanam and Hassan (2008); Khanam (2009). Fig. 1j  
Local name: Shetodron.

A tall robust herb, up to 0.3-1.0m high. Habitat: Waste marshy places; Fl. & Fr.: April to December  
Global distribution: Nepal, Bhutan, India and Myanmar (Khanam and Hassan 2008).

Recorded localities: Sylhet; Status of occurrence: Probably Extinct (EX).

Specimens examined: Sylhet: *anno*1829, Wall. Cat. n. 2046/B (K000929541).

Conservation status: This species is only from single specimen collected from Sylhet in 1829, preserved at the Royal Botanic Garden Kew Herbarium (K). Since then there is neither its report of occurrence in Bangladesh nor any specimen found at any herbaria. Furthermore, this species could not be relocated or collected from its recorded locality or from elsewhere Bangladesh.

*Leucas decemdentata* (Willd.) Sm., Cycl. 20 (2): 6 (1812). Fig. 1k

*Phlomis decemdentata* Willd. (1800); *Leucas mollissima* Wall. ex Benth. (1830). Khanam and Hassan (2008); Khanam (2009).

A slender herb with straggling branches. Habitat: Dry soil, along roadside; Fl. & Fr.: January to July.  
Global distribution: India, Malaysia, China and Sri Lanka (Khanam and Hassan 2008).

Recorded localities: Sylhet; Status of occurrence: Presumed Extinct (EX).

Specimens examined: Sylhet: Pandoah Hill, December 1824, Wall. Cat. n. 2054/2 (K001115011).

Conservation status: This species is only known from Wallich's specimen collected from Pandoah hill, Sylhet in 1824. Since then there has been no further report of its occurrence in Bangladesh and no specimen is available at any herbaria. Moreover, this species could not be relocated or collected from its recorded locality or from elsewhere Bangladesh.

*Leucas vestita* Benth., Pl. As. Rar.1: 61 (1830). Khanam and Hassan (2008); Khanam (2009). Fig. 11

A tall herb. Habitat: Dry soil in grasslands; Fl. & Fr.: January to July.

Global distribution: India.

Recorded localities: Sylhet; Status of occurrence: Possibly Extinct (EX).

Specimens examined: Sylhet (Sillet): May 1826, *Francis de Silva*, Wall. Cat. n. 2039/a (Type K001114953!).

Conservation status: This species is only known from Wallich's collection from Sylhet by Francis de Silva in May 1826; housed at the Royal Botanic Garden Kew Herbarium (K), and Central National Herbarium Kolkata (CAL). Since then there has been no further report of its occurrence in Bangladesh and no specimen is available at any herbaria. Furthermore, this species could not be relocated or collected from its recorded locality or from elsewhere Bangladesh.

*Microtoena griffithii* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 59(2): 310 (1896). Khanam and Hassan (2008); Khanam (2009). Fig. 2a

An erect herb, up to m high, glabrescent. Habitat: Waste places; Fl. & Fr.: October to June.

Global distribution: India (Assam) (Khanam and Hassan 2008).

Recorded localities: East Bengal (Bangladesh) *Sine loco*; Status of occurrence: Presumed Extinct (EX).

Specimens examined: East Bengal (Bangladesh): *s.l., s.a.*, Griffith 4059 (Type K000928194!).

Conservation status: The species is only known from Griffith's collection from East Bengal (current Bangladesh - specific locality is not cited) preserved at Royal Botanic Garden Herbarium Kew (K) and Central National Herbarium Kolkata (CAL). William Griffith's exploration was made in the area during 1835-36. Since then there has been no further report of occurrence in Bangladesh and no specimen is available at any herbaria. Moreover, this species could not be relocated or collected from elsewhere Bangladesh.

*Orthosiphon incurvus* Benth., *Pl. As. Rar.* 2:15 (1830). Khanam and Hassan (2008); Khanam (2009). Fig. 2b

An undershrub or shrub, up to 1m high. Habitat: Dry soil in forest areas; Fl. & Fr.: March to October.

Global distribution: India, Sikkim, Myanmar, and Nepal (Khanam and Hassan 2008).

Recorded localities: Cox's Bazar, Rangamati and Sylhet; Status of occurrence: Presumed Extinct (EX).

Specimens examined: Cox's Bazar: Garjania, June, 1920, *Cowan* 563 (E). Rangamati: Dmagiri S. West, 22.03.1876, *Lister* 268 (CAL); Kaptai, 07.10.1905, *D. Hooper* 26097 (E, CAL); Janglibag, 7.10.1905, *D. Hooper* 25043 (CAL). Sylhet: *anno* 1830, *William Bruce*, *Wall. Cat. n.* 2725 (Syntypes K001116954!, K000911667!, BM000588744!); .

Conservation status: Since its last collection in 1920 by J.M. Cowan from Garjania, Cox's Bazar there has been no further report of occurrence and no specimen is available at any herbaria. Furthermore, this species could not be relocated or collected from its recorded locality or from elsewhere Bangladesh.

*Orthosiphon rubicundus* (D. Don) Benth., *Pl. As. Rar.* 2: 14 (1830). Prain (1903); Heinig (1925); Khanam and Hassan (2008); Khanam (2009). Fig. 2c

*Plectranthus rubicundus* D. Don (1825).

An erect herb, up to 30-60cm high. Habitat: Forests; Fl. & Fr.: April-June.

Ecology: Growing inside the forests.

Global distribution: India, Myanmar, Nepal (Khanam and Hassan 2008).

Recorded localities: Chittagong; Status of occurrence: Possibly Extinct (EX).

Specimens examined: No specimen is available at any herbaria.

Conservation status: This species is reported from Chittagong by Heinig (1925). Since then there has been no report of occurrence of this species and no specimen is available at any herbaria. Moreover, this species could not be relocated or collected from its recorded locality or from elsewhere Bangladesh.

*Paraphlomis javanica* (Blume) Prain, *Ann. Roy. Bot. Gard. (Calcutta)* 9: 60 (1901).

*Leonurus javanicus* Blume (1823); *Paraphlomis rugosa* (Benth.) Prain (1901). Khanam and Hassan (2008); Khanam (2009); *Phlomis rugosa* Benth. (1830). Fig. 2d

A small almost glabrous herb. Habitat: Dry soil; Fl. & Fr.: During winter season.

Global distribution: India, China, Thailand, Philippines Malaysia (Khanam and Hassan 2008).

Recorded localities: Sylhet; Status of occurrence: Presumed Extinct (EX).

Specimens examined: Sylhet (Sillet): *anno* 1829, *Wallich*, *Wall. Cat. n.* 2067 (Lectotype K000898661!).

Conservation status: This species is only known from Wallich's type specimen collected from Sylhet in 1829 and lodged at the Royal Botanic Garden Kew Herbarium (K). Since then there has been no further report of its occurrence in Bangladesh and no specimen is available at any herbaria. Furthermore, this species could not be relocated or collected from its recorded locality or from elsewhere Bangladesh.

*Platostoma coloratum* (D. Don) A.J.Paton, Kew Bull. 52: 274 (1997).

*Geniosporum coloratum* (D. Don) Kuntze (1891). Khanam and Hassan (2008); Khanam (2009).

*Plectrunthus coloratus* D. Don (1825); *Geniosporum strobiliferum* Wall. ex Benth. (1830). Fig. 2e

An erect herb, up to 1m tall. Habitat: Waste places; Fl. & Fr.: April to October.

Global distribution: India, Bhutan, Nepal, and South-West China (Khanam and Hassan 2008).

Recorded localities: Sylhet; Status of occurrence: Presumed Extinct (EX).

Specimens examined: Sylhet (Sillet): *anno* 1831, *William Bruce*, Wall. Cat. N. 2749/B (Holotype K000674624!, Isotype BM000588749/B!).

Conservation status: This species is only known from Wallich's specimen collected from Sylhet in 1830 and lodged at the Royal Botanic Garden Kew Herbarium (K) and Natural History Museum London (BM). Since then there has been no further report of its occurrence in Bangladesh and no specimen is available at any herbaria. Moreover, this species could not be relocated or collected from its recorded locality or from elsewhere Bangladesh.

*Platostoma palustre* (Blume) A. J. Paton, Kew Bull. 52: 281 (1997).

*Mesona palustris* Blume (1826); *Geniosporum parviflorum* Benth. (1830). Khanam and Hassan (2008); Khanam (2009). Fig. 2f

A slender herb, 30 - 60cm high. Habitat: Along forest area; Fl. & Fr.: March to November

Global distribution: India (Assam) and Myamar (Khanam and Hassan 2008).

Recorded localities: Sylhet; Status of occurrence: Possibly Extinct (EX).

Specimens examined: East Bengal (Bangladesh): *s.l., s.a., Griffith* 3946/1 (CAL). Sylhet (Sillet): *anno* 1830, *Wallich*, Wall. Cat. n. 2750 (Syntypes K000674619!, BM000588478!).

Conservation status: This species is only known from Wallich's type specimen collected from Sylhet in 1830 and Griffith's collection from East Bengal (current Bangladesh - specific locality is not cited). William Griffith's exploration was done in the area during 1835-36. Since then there has been no further report of its occurrence in Bangladesh and no specimen is available at any herbaria. Furthermore, this species could not be relocated or collected from its recorded locality or from elsewhere Bangladesh.

*Pogostemon cruciatus* (Benth.) Kuntze, Revis. Gen. Pl. 2: 530 (1891). Khanam and Hassan (2008); Khanam (2009). *Dysophylla cruciata* Benth. (1830). Fig. 2g

An erect hirsute herb, about 45cm high. Habitat: On dry soil; Fl. & Fr.: October to March.

Global distribution: India, Myanmar and China.

Recorded localities: East Bengal (Bangladesh) *Sine loco*; Status of occurrence: Presumed Extinct (EX).

Specimen examined: East Bengal (Bangladesh): *s.l., s.a., Griffith* 3969 (K).

Conservation status: The species is only known from Griffith's collection from East Bengal (current Bangladesh - specific locality is not cited) preserved at the Royal Botanic Garden Kew Herbarium (K). William Griffith's exploration was done in the area during 1835-36. Since then there has been no further report of occurrence and no collection at any herbaria. Moreover, this species could not be relocated or collected from elsewhere Bangladesh.

*Pogostemon strigosus* (Benth.) Benth., Prodr. 12: 155 (1848). Khanam and Hassan (2008); Khanam (2009). *Dysophylla strigosa* Benth. (1830). Fig. 2h

An erect herb, 60-80cm high. Habitat: On moist places in forests; Fl. & Fr.: March to June.

Global distribution: India (Khasia) and Myanmar (Khanam and Hassan 2008).

Recorded localities: Sylhet; Status of occurrence: Possibly Extinct (EX).

Specimens examined: Sylhet (Sillet): *anno* 1829, *Francis de Silva*, Wall. Cat. n. 1549 (Type K000848028!).

Conservation status: This species is only known from Wallich's type specimen collected from Sylhet in 1829. Since then there has been neither further report of its occurrence in Bangladesh nor any specimen is available at any herbaria. Furthermore, this species could not be relocated or collected from its recorded locality or from elsewhere Bangladesh.

*Scutellaria barbata* D. Don, *Prodr. Fl. Nepal.* 109 (1825).

*Scutellaria rivularis* Wall. *ex* Benth. (1831); Khanam and Hassan (2008); Khanam (2009).

An ascending herb, up to 15-20cm high. Habitat: moist places in forests; Fl. & Fr.: October to February.

Global distribution: India, Sri Lanka, Myanmar and Bangladesh.

Recorded localities: East Bengal (Bangladesh) *Sine loco*; Status of occurrence: Presumed Extinct (EX).

Specimens examined: East Bengal (Bangladesh): *s.l.*, *s.a.*, *Griffith* 4018 (CAL). *Gangachora*, 26.04.1809, *S. Coll.*, Wall. Cat. n. 2140/C (K).

Conservation status: The species is only known from Wallich's collection from Gangachora in 1809 and Griffith's collection from East Bengal (current Bangladesh - specific locality is not cited) preserved at Central National Herbarium Kolkata (CAL). William Griffith made his collections in the area during 1835-36. Since then there has been no further report of its occurrence in Bangladesh and no specimen is available at any herbaria. Moreover, this species could not be relocated or collected from its recorded locality or from elsewhere Bangladesh.

*Scutellaria discolor* Colebr., *Pl. As. Rar.* 1:66(1830). Khanam and Hassan (2008); Khanam (2009). Fig. 2i

An annual herb, 20-60cm high. Habitat: streams, shady and moist places in forests; Fl. & Fr.: September to February.

Global distribution: India, China, Thailand, Malaysia and Myanmar (Khanam and Hassan 2008).

Recorded localities: Sylhet; Status of occurrence: Possibly Extinct (EX).

Specimens examined: East Bengal (Bangladesh): *s.l.*, *s.a.*, *Griffith* 4017 (CAL); Sylhet: *anno* 1830, *Francis de Silva*, Wall. Cat. n. 2134/2 (Syntype K000820798!); 10.10.1872, *C. B. Clarke* 18504 (CAL).

Conservation status: This species is known from Wallich's type specimen collected from Sylhet in 1829. The last report of its occurrence in Sylhet was done by *C. B. Clarke* from Sylhet in 1872. Since then there has been no further report of its occurrence in Bangladesh and no specimen is available at any herbaria. Moreover, this species could not be relocated or collected from its recorded locality or from elsewhere Bangladesh.

*Teucrium quadrifarium* Buch.-Ham., *Prodr. Fl. Nepal.* 108 (1825). Hook. f. (1885); Khanam and Hassan (2008); Khanam (2009). Fig. 2j

An erect perennial herb, stem hirsute. Habitat: Waste marshy places, forest slopes; Fl. & Fr.: March-June.

Global distribution: India, Indonesia (Sumatra), Myanmar, Nepal and China.

Recorded localities: Sylhet; Status of occurrence: Presumed Extinct (EX).

Specimens examined: Sylhet: *anno* 1830, *Francis de Silva*, Wall. Cat. n. 2029 (K000821618).

Conservation status: This species is only known from Wallich's collection made by Francis de Silva in 1830 from Sylhet. Since then there has been no further report of its occurrence in Bangladesh and no specimen is available at any herbaria. Moreover, this species could not be relocated or collected from its recorded locality or from elsewhere Bangladesh.

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