

Diversity and distribution of *Begonia* L. (Begoniaceae) species in Sarawak, Borneo

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Begonia penrissemsis – Sarawak's
limestone restricted species

Presentation outline

- Introduction
- Begonias Diversity
- Begonias Distribution
- *Begonia* research in Sarawak
- Acknowledgement
- References

INTRODUCTION - BEGONIACEAE

- Order: Cucurbitales
- a family of succulent or semi-succulent herbs
- monoecious
- widely cultivated as indoor or outdoor ornamental plants



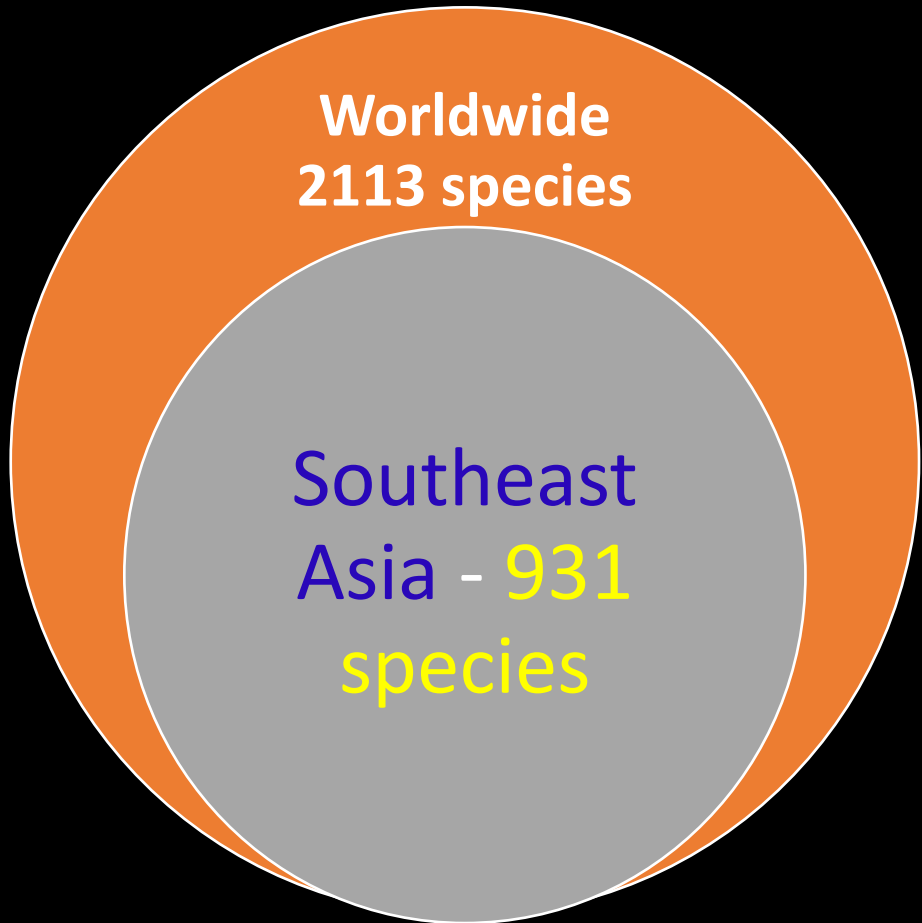
Female and male flowers

INTRODUCTION - BEGONIACEAE

- Consist of 2 genera:
 - (1) *Hillebrandia* – a monotypic genus endemic to Hawaii
 - (2) *Begonia* – **6th** largest flowering plants with 2113 species (Moonlight *et al.*, 2018; Hughes *et al.*, 2015-)
 - >10,000 cultivars
- **Geographical distribution - mainly confined to the tropical or subtropical regions**
- Habitats – moist lowland to montane forests



DIVERSITY of *Begonia* species



Area	No. of species
BORNEO (Hughes <i>et al.</i> , 2020; Julia <i>et al.</i> , 2022)	269
THE PHILIPPINES (Rubite, 2021)	104
PENINSULAR MALAYSIA (Kiew, 2015)	52
NEW GUINEA (Sands, 2009)	79
SUMATRA (Ardi & Hughes, 2010)	53
THAILAND (Phuttai & Hughes, 2017)	59
CHINA (Tian <i>et al.</i> 2018)	200

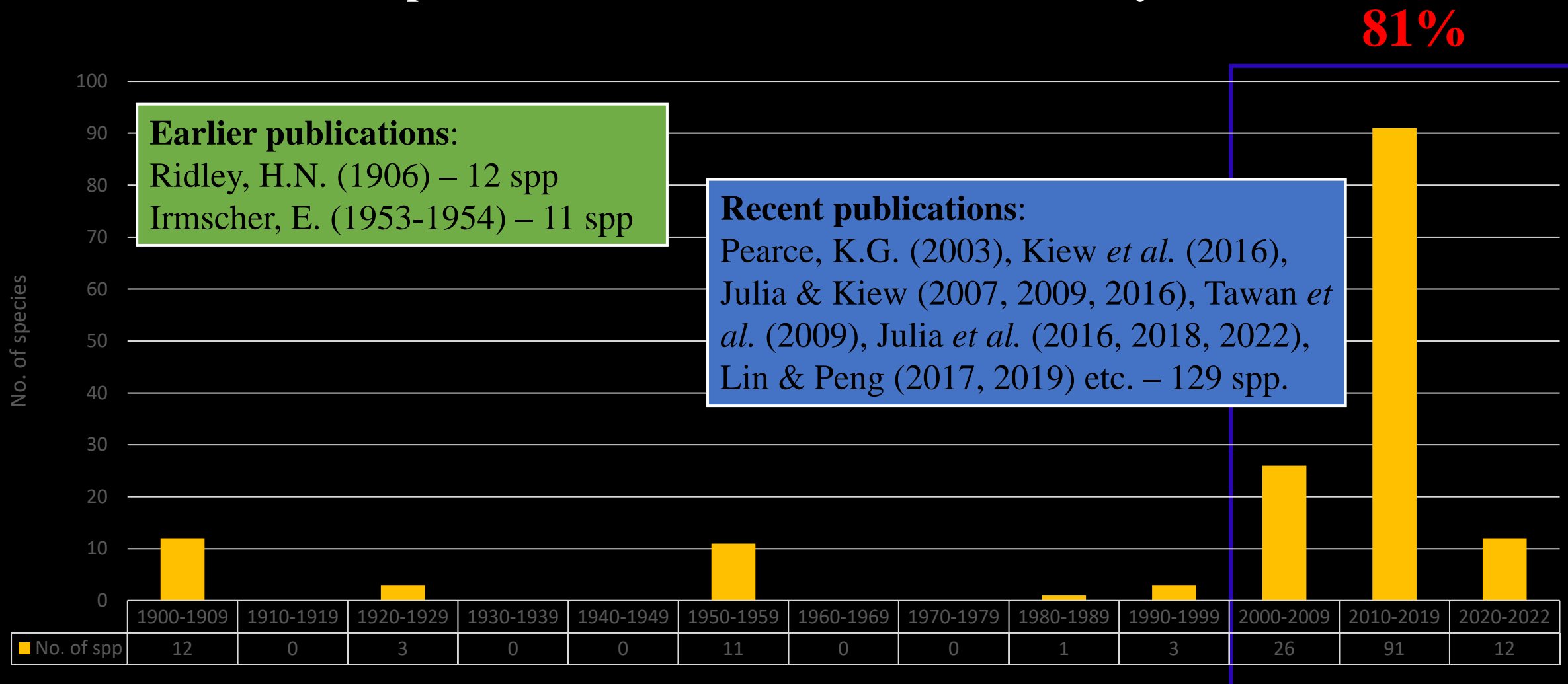
DIVERSITY of *Begonia* in Borneo



- All 269 species in Borneo are endemic to the island
- Only 7% (19 spp) of the species in Borneo is shared between two or more regions in Borneo
- *Begonia* flora of Borneo is expected to exceed 600 species (Julia & Kiew, 2014)

DIVERSITY of *Begonia* in Sarawak

Number of species described from Sarawak over the years



Sarawak *Begonia* – Sectional classification

Section	No. of species	Examples
<i>Diploclinium</i>	2	<i>B. havilandii</i> , <i>B. pyrrha</i>
<i>Jackia</i>	3	<i>B. andersonii</i> , <i>B. hosensis</i> , <i>B. natunaensis</i>
<i>Ridleyella</i>	5	<i>B. burttii</i> , <i>B. padawanensis</i> , <i>B. payung</i> , <i>B. serianensis</i> , <i>B. spelunca</i>
<i>Petermannia</i>	243	
<i>Platycentrum</i>	1	<i>B. chlorocarpa</i>
Affinity uncertain	6	<i>B. calcarea</i> Ridl., <i>B. fractiflexa</i> S.Julia & Kiew, <i>B. kanaensis</i> Kiew & C.Y.Ling, <i>B. linguae</i> S.Julia, <i>B. rubrotepala</i> S.Julia, <i>B. sadirensis</i> S.Julia & Kiew



(Source: Moonlight *et al.*, 2018)

B. chlorocarpa Irmsch. ex Sands

Sarawak *Begonia* – diverse habits

Cane-like begonia

Rossette begonia

Creeping begonia

Low erect begonia



Begonia melinauensis –
endemic to Melinau
limestone in G. Mulu NP

Begonia burttii – endemic to
limestone in Kuching

Begonia conipila – the first
Begonia species described
from G. Mulu NP in 2001

Begonia bayae from Batang
Ai NP

Sarawak *Begonia* – diverse leaves



Sarawak *Begonia* – habitats

Limestone forest



Lowland to montane forests

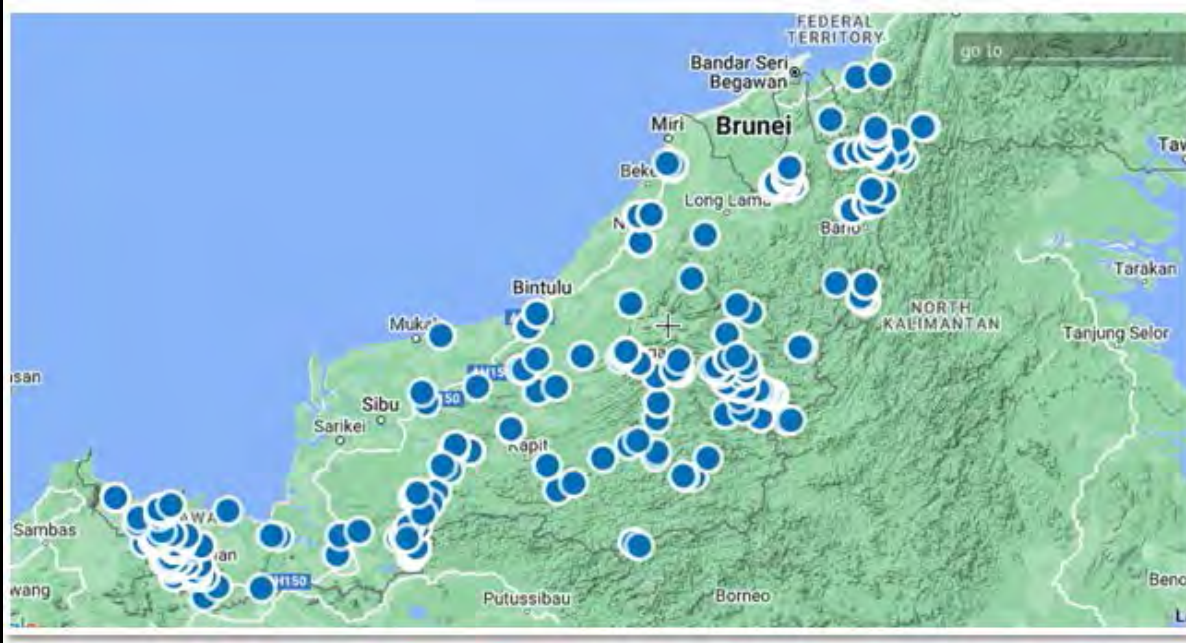


Forest around streams/waterfalls



Absent from peat swamp, *kerangas* / heath or coastal/beach forests!

Sarawak *Begonia* - DISTRIBUTION



- Begonias can be found all over Sarawak; however, most species are narrowly endemic or restricted to certain areas or habitats
- **91%** of the species in Sarawak are endemic to the state
- up to **40%** of the species are considered hyper-endemic
- **57%** of the species are very localized

Sarawak *Begonia* - DISTRIBUTION

Widespread species - 3%



Begonia baramensis Merr.



Begonia fuscisetosa Sands



Begonia calcarea Ridl.

Sarawak *Begonia* - DISTRIBUTION

Hyper-endemic species – 40%



Begonia armykapii S. Julia & Ling



Begonia benaratesis S. Julia



Begonia piring Kiew & S. Julia

Sarawak *Begonia* - DISTRIBUTION

Widespread but confined to
montane forest

Sarawak endemics - common on
limestone hills in southern Sarawak

Sarawak endemics - common on
limestone hills at
G. Mulu NP



Begonia chlorocarpa Irmsch. ex Sands



Begonia speluncae Ridl.



Begonia conipila Irmsch. ex Kiew

Begonia research in Sarawak

1. Survey of *Begonia* on limestone hills:

- Melinau limestone in Gunung Mulu World Heritage Site – 20 species
- Limestone hills in Central Sarawak (Bukit Sarang and Ulu Merirai) - 7 species
- Limestone hills in Kuching (Bau – Padawan – Serian) - 20 species



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The *Begonia* flora of Gunung Mulu and Gunung Buda National Parks, Sarawak, Borneo, including five new species

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Abstract

An account of the twenty *Begonia* species from the Gunung Mulu and Gunung Buda National Parks is presented with illustrated descriptions of five new species (*Begonia argenti*, *B. jokwantana*, *B. lansatensis*, *B. muluensis* and *B. vulgarioides*) and one new record (*Begonia chlorocarpa* Irmsch. ex Sands). A key for their identification is provided.

Keywords: Taxonomy, Begoniaceae, biodiversity, distribution, Malaysia

Begonia research in Sarawak

2. Re-searching and re-locate *Begonia* species described by Ridley (1906)

Begonia (Begoniaceae) from Kubah National Park and Environs,
Sarawak, Borneo, including a New Species

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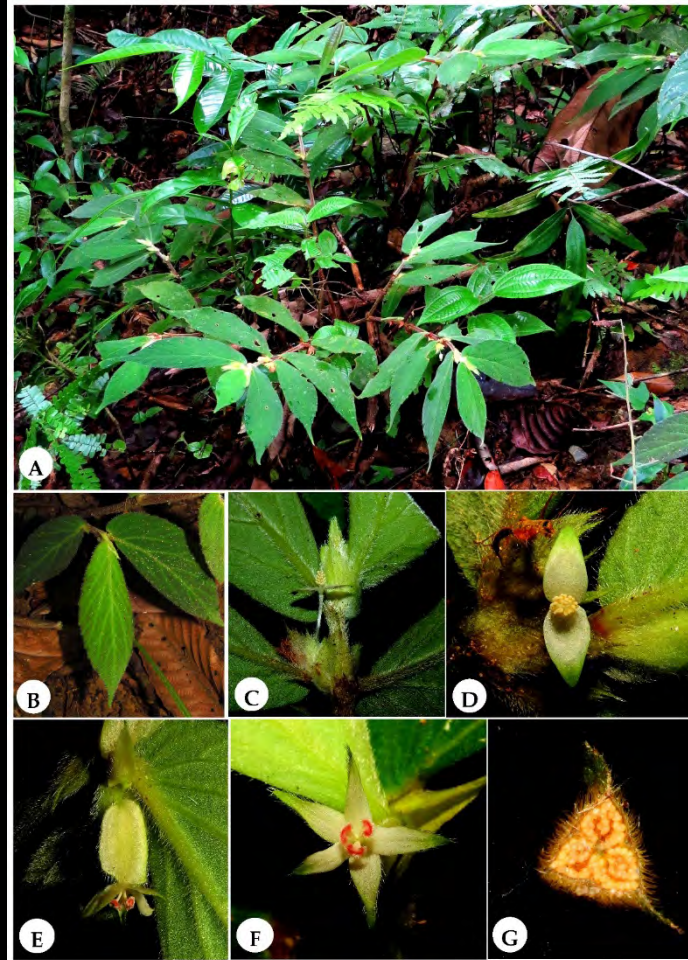
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Summary. Seven *Begonia* species were recorded from Kubah National Park and its environs including a new species (*Begonia matangensis* S. Julia & Kiew). Three species (*B. hullettii* Ridley, *B. propinqua* Ridley and *B. xiphophylla* Ridley) previously recorded by Ridley (1906) were re-collected and two species (*B. lailana* Kiew & Geri and *B. paoana* Kiew & S. Julia) are the new records for Kubah National Park. One species, *B. pubescens* Ridley, previously recorded by Ridley (1906), was not re-collected during the recent survey. Detailed descriptions of the species described by Ridley (1906) and the new species are provided and a key is provided for their identification. All species belong to section *Petermannia*. Following the guidelines for the IUCN categories and criteria, the conservation status of six



Begonia matangensis – new species
described from Kubah NP (2015)



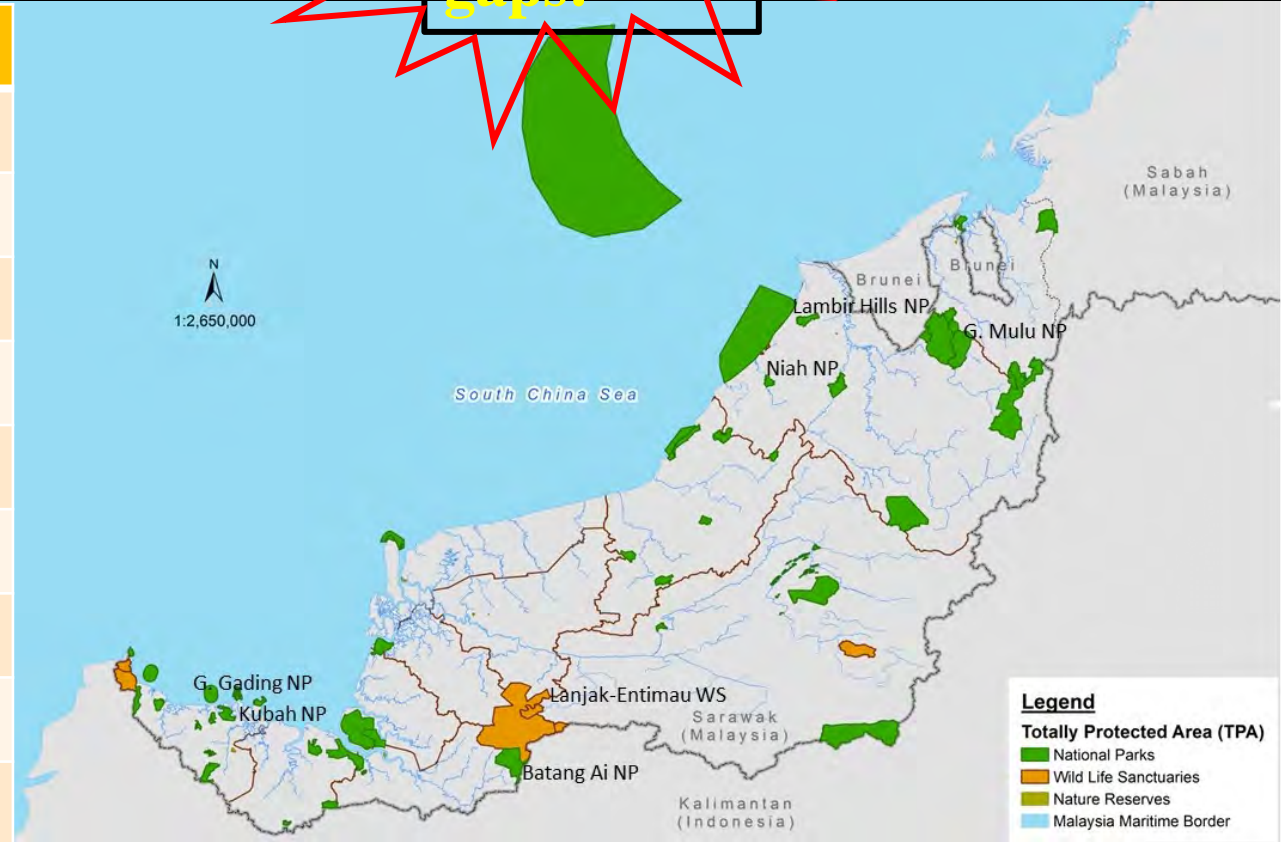
Rediscovery and unravel taxonomic
status of *B. promethea* (2017)

Begonia research in Sarawak

3. Begonia survey in selected Totally Protected Areas

Still many gaps!

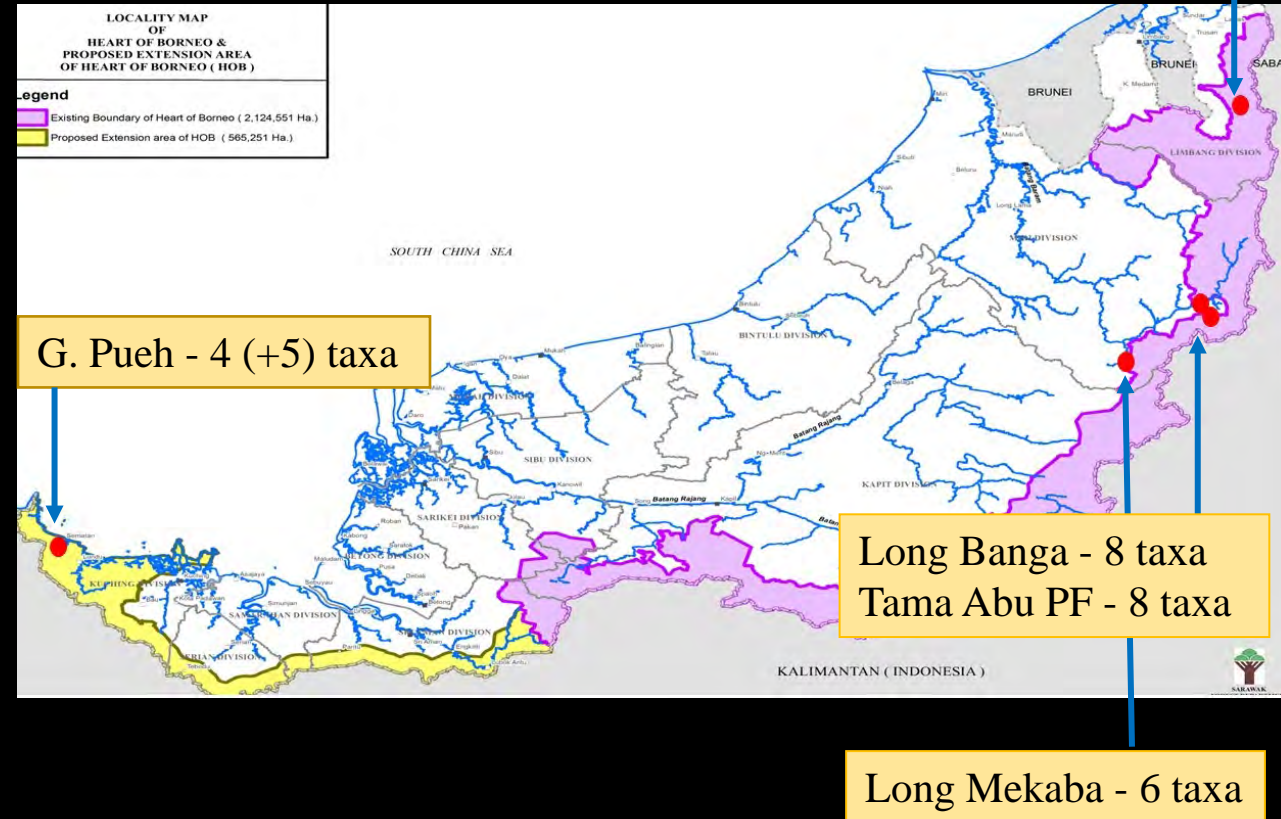
TPA	No. of spp.
Gunung Gading NP	2
Kubah NP (incl. Matang Wildlife Centre)	7
Santubong NP	2
Lanjak-Entimau Wildlife Sanctuary	11
Batang Ai NP	14
Lambir Hills NP	1
Niah NP (K.G.Pearce, 2000)	5
G. Mulu & G. Buda NP	20
Dered Krian NP (Bau limestone)	6



Begonia research in Sarawak

4. *Begonia* survey in forests outside TPAs (e.g., PFEs, HoB areas etc)

- New record for Sarawak – *B. papyraptera* Sands
- Many undescribed taxa



Begonia research in Sarawak – **What's next?**

 **More collecting of *Begonia* in TPAs**



 **Continue exploration and collection of *Begonia* in PFEs**



Begonia research in Sarawak – **What's next?**

 **Tackle taxonomic status of many complex species particularly in highly diverse Sect. *Petermannia***

Cane-like begonia with leaves broader than long, small fruits



Cane-like begonias with leaves longer than wide, large fruits



Small plants with short petiole that are in line with the midrib, female flowers almost sessile on the stem



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- Photo credits: Ling, C.Y., Bibian Diway



THANK YOU

Begonia andersonii Kiew & S.Julia (2007) – rare and endemic to limestone hills in Kuching Division

REFERENCES

- Ardi, W.H. & Hughes, M. 2010. *Begonia droopiae* Ardi (Begoniaceae), a New Species of *Begonia* from West Sumatra. *Gard. Bull. Singapore*, 62(1):19-24.
- Hughes M, Moonlight PW, Jara-Muñoz A, Tebbitt MC, Wilson HP, Pullan M. 2015-. *Begonia* Resource Centre. Online database available from <http://padme.rbge.org.uk/begonia/>
- Hughes, M., Girmansyah, D., Randi, A. & Ningsih, H.N.R. 2020. Eleven new records, three new species and an updated checklist of *Begonia* from Kalimantan, Indonesia. *Gard. Bull. Singapore* 72(1):33-58.
- Irmscher, E (1925) Begoniaceae. Asiatische Sektionen. In Engler, A. & Prantl, K. *Nat. Pflanzenfam.* (edn. 2)21, 575-579.
- Irmscher, E (1953) Systematische Studien ueber Begoniaceen des tropischen Suedamerikas, besonders Brasiliens. *Botanische Jahrbuecher fuer Systematik, Pflanzengeschichte und Pflanzengeographie*, 76:1–102.
- Julia S, Kiew R. 2014. Diversity of *Begonia* (Begoniaceae) in Borneo – How many species are there? *Reinwardtia* 14:233–236. DOI:[10.14203/reinwardtia.v14i1.420](https://doi.org/10.14203/reinwardtia.v14i1.420)
- Julia, S., Kiew, R. & Ling, C.Y. 2022. Additions to the *Begonia* flora of Sarawak, Borneo, I: Twelve New Species and A New Record. *Edin. J. Bot.*79, *Begonia* special issue, Article 410: 1–46. <https://doi.org/10.24823/EJB.2022.410>.
- Kiew, R. 2015. *Begonias of Peninsular Malaysia*. Natural History Publication (Borneo) and Singapore Botanic Garden.
- Moonlight PW, Ardi WH, Padilla LA, Chung K-F, Fuller D, Girmansyah D, Hollands R, Jara-Muñoz A, Kiew R, Leong W-C, Liu Y, Mahardika A, Marasinghe LDK, O’Connor M, Peng C-I, Pérez AJ, Phutthai T, Pullan M, Rajbhandary S, Reynel C, Rubite RR, Julia S, Scherberich D, Shui Y-M, Tebbitt MC, Thomas DC, Wilson HP, Zaini NH, Hughes M. 2018. Dividing and conquering the fastest-growing genus: Towards a natural sectional classification of the mega-diverse genus *Begonia* (Begoniaceae). *TAXON* 67 (2): 267–323. DOI:[10.12705/672.3](https://doi.org/10.12705/672.3)
- Phuttai, T. & Hughes, M. 2017. Four new species of *Begonia* (Begoniaceae) from Thailand. *Edin.J.Bot.* 74(2): 1-13. doi:10.1017/S0960428617000051
- Ridley, H.N (1906) *Begonias of Borneo*. *Journal of Straits Branch of the Royal Asiatic Society* 43: 1-92.
- Sands, M.J.S. 2009. The *Begonias* of new Guinea – an overview. *Blumea* 54:272-277. doi:10.3767/000651909X476274
- Tian, D., Xiao, Y., Tong, Y., Fu, Ng., Liu, Q & Li, C. 2018. Diversity and conservation of Chinese wild begonias. *Plant Diversity* 40(3):75-90.