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Three new distributional records of orchids from Mizoram, India – *Bulbophyllum lopalanthum* J.J.Verm., Schuit. & de Vogel, *Cymbidium bicolor* Lindl. And *Zeuxine flava* (Wall. ex Lindl.) Trimen

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Abstract
Three new reports of orchids have been identified during a field survey in Mizoram *viz. Bulbophyllum lopalanthum* J.J.Verm., Schuit. & de Vogel *Cymbidium bicolor* Lindl. And *Zeuxine flava* (Wall. ex Lindl.) Trimen. Taxonomic description of the species have been given with their classification along with photographs of each.

Keywords: Mizoram, new reports, orchids

1. Introduction
Orchids are well known worldwide for their distinctive flowers and constitute the largest flowering plant family. Orchid species can easily be recognized for their unique characteristics which play an important role in their life history and pollination (Adams and Lawson, 1993; Weston, *et al*., 2005) [1, 21]. Epiphytic orchids are mainly found growing on trees and shrubs in subtropical and tropical regions while terrestrial orchids prefer temperate and Mediterranean grasslands and forests (Arlott, 1978; Dressler, 1993; Ramirez, *et al*., 2007) [2]. More than 26000 species have been recorded from the orchidaceae family around the world (WCSPF, 2019).
Conservation of orchid species is crucial because they have considerable value in ornamental and medicinal markets. De and Medhi (2014) [6] have emphasized the conservation of rare and endangered orchids in north-eastern India by introducing approaches to remote sensing and GIS surveys to conserve genetic resources and by using biotechnological tools to promote disease resistance and high yield. Some endangered orchid species have already undergone major population declines (Cribb *et al*., 2003) [5] and, based on information such as the IUCN red list (IUCN, 2020) and policy recovery plans (e.g., Australian Government, 2019). Work on orchid conservation must concentrate on population montoring, species distribution and ecology, rather than the current trend in genetic diversity, propagation techniques and taxonomy (Wraith *et al*. 2019) [22]. A study conducted in Indonesia stressed that conservation efforts are very much needed at the local orchids are endangered by illegal harvest and not the local populace (Broto *et al*., 2020) [4].
Many researches have contributed to new distributions of orchid species around the World. Gogoi *et al*. (2015) [10] reported 398 specific and 6 intraspecific taxa belonging to 102 genera. Eria merguensis was reported from India by Singh *et al*. in 2013 and *Eria carinata* was identified as a new record for Mizoram by Roy *et al*. 2012 [18]. Karuppusamy *et al*. 2013 [13] discovered a new record of *Eria exilis* in southern India. Kumar *et al*. 2013 [8] and Panday *et al*. 2014 also identified seventeen new records of orchid I their study in Mizoram. Mao *et al*. (2009) [16] highlighted the wealth of northeast India with some orchid species being threatened in the region. Youssef *et al*. (2017) [23] recorded two new orchid species for the flora of Iraq: *Anacamptis papilionacea* (L.) R.M. Bateman, Pridgeon & M.W. Chase and *Dactylorhiza romana* (Sebast.) Soó. A new record of *Cymbidium bicolor* for Nagaland was identified by Deb *et al*. 2017 [7]. Zeuxine flava was also added to the plant wealt of Manipur by Devi *et al*., 2019 [8]. A recent study by Engels *et al*. 2020 [9] in south Amazon, Brazil led to identification of a new species *Mormodes matogrossensis*.

2. Materials and Methods
Field surveys were conducted by the authors throughout the Wildlife Sanctuaries and protected areas of Mizoram from 2016 onwards and have led to the discovery of three new orchid species in the state viz. *Bulbophyllum lopalanthum J.J. Verm., Schuit. & de Vogel, Cymbidium bicolor Lindl.* And *Zeuxine flava (Wall. ex Lindl.) Trimen*. A brief taxonomic description, distribution and phenology is provided.

3. Taxonomic treatment
3.1 *Bulbophyllum lopalanthum* J.J.Verm., Schuit. & de Vogel, Phytotaxa 166: 104 (2014); *Sunipia grandiflora* (Rolfe) P.F.Hunt, Kew Bull. 26: 184 (1971); *Ione grandiflora* Rolfe, Bull. Misc. Inform. Kew 1908: 413 (1908).
Description: An epiphytic herb1-2cm tall. Pseudobulbs 1 – 2 cm apart connected by small woody rhizomes, ovoid, less than 2 cm in size. Leaves solitary, notched at apex, oblong, 5 – 7 cm long, 1 – 2 width; Single flowered, purple colored, nerved with cream white. Lip dark purple, oblong.

Common Name: The lone bulbophyllum
Flowering: October – December
Ecology: In an open branch under light shade
Distribution: Himalaya to China (SE. Yunnan) and Indo-China
Specimen examined: Tawizo, Tawi Wildlife Sanctuary, Aizawl, Mizoram, Alt. 1596m, Lat. 23°33'46.6" N and 092°57'18.1" E. 15.12.2017. C. Remlalpeka & Kalidas Upadhyaya 01206.

3.2 *Cymbidium bicolor* Lindl. Gen. Sp. Orchid. Pl.: 164 (1833).
Description: A monopodial plant 20-50 cm long, epiphytic orchid found on a tree trunk. Stem fleshy with sheaths covered rhizome. Pseudobulbs ovoid, 4-8cm; Inflorescence arching, raceme, Sepals and petals pale yellow; flowers 2.5-4cm across, reddish-brown colored with white edge. Leaf green in color with a length of 30-40 cm and width 1-2 cm.
Common Name: The two colored cymbidium
Flowering: March – April
Ecology: Found in the branch of trees in large clusters, medium shade
Distribution: Himalaya to China (SE. Yunnan) and Indo-China
Specimen examined: Chhawrtui village, Champhai District, Mizoram, Alt. 1222m, Lat. 23°30'24.2" N and 093°04'21.9" E. 24.03.2017. C. Remlalpeka & Kalidas Upadhyaya 01203.

3.3 *Zeuxine flava* (Wall. ex Lindl.) Trimen, Syst. Cat. Fl. Pl. Ceylon: 90 (1885); *Monochilus flavus* Wall. Ex Lindl. Gen. Sp. Orchid. Pl.: 487 (1840); *Zeuxine aurantiaca* Schltr. Repert. Spec. Nov. Regni Veg. 19: 377 (1924).
Description: A terrestrial orchid 25 – 30 cm tall. Fleshy pseudostem 5 – 10 cm long, nodes enclosed in sheaths; rhizome creeping. Leaves 2 or 3 at nodes, oblong, 6 - 7 cm in length and 2 – 3 in width. Flowers yellow 0.2-0.4, sepals greenish yellow, ovate-lanceolate, obtuse. Petals oblong, obtuse Lip yellow oblong, curved at the base, winged.
Common Name: The Yellow Zeuxine
Flowering: December – February
Ecology: Under light to medium shade, top soil with leaf litters
Distribution: China (SW. Yunnan) to Indo-China
Specimen Examined: Tanhril, Aizawl, Mizoram, Alt. 812m, Lat. 23°44'07.8" N and 092°39'52.1" E. 06.03.2019. C. Remlalpeka & Kalidas Upadhyaya.

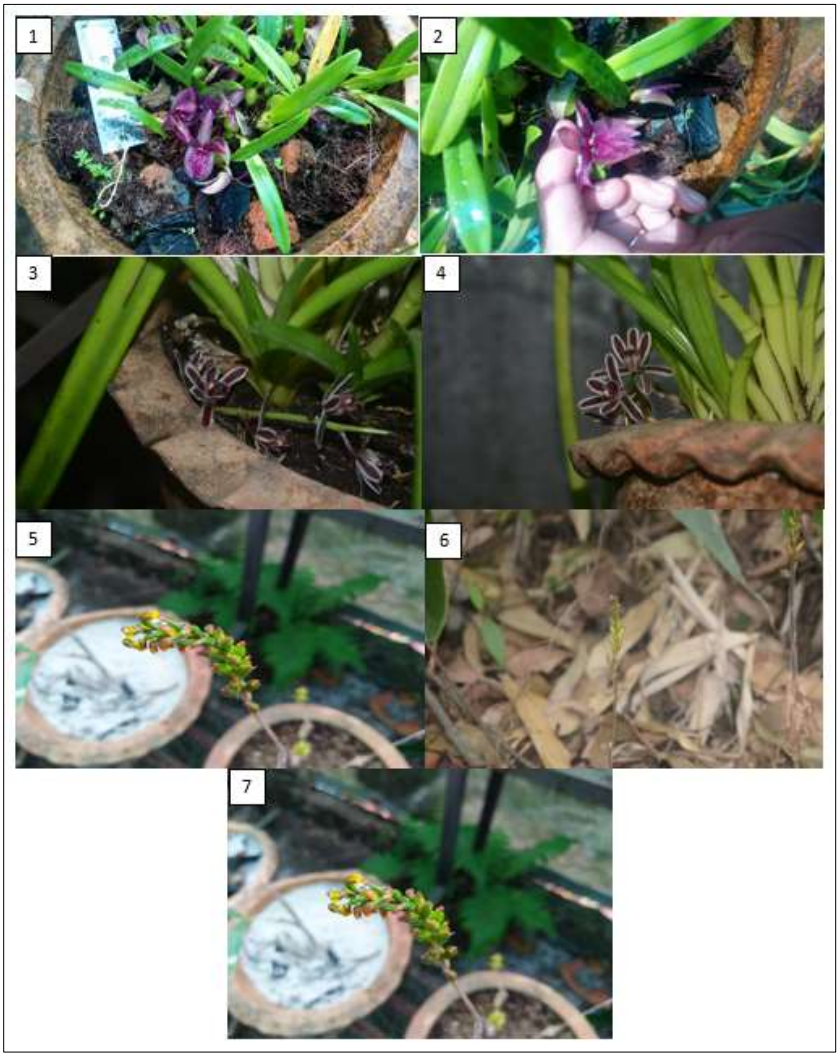

Fig 1 and 2: *Bulbophyllum lopalanthum* J.J.Verm., Schuit. & de Vogel; 3 and 4 - *Cymbidium bicolor* Lindl. 5, 6 and 7 - *Zeuxine flava* (Wall. ex Lindl.) Trimen.

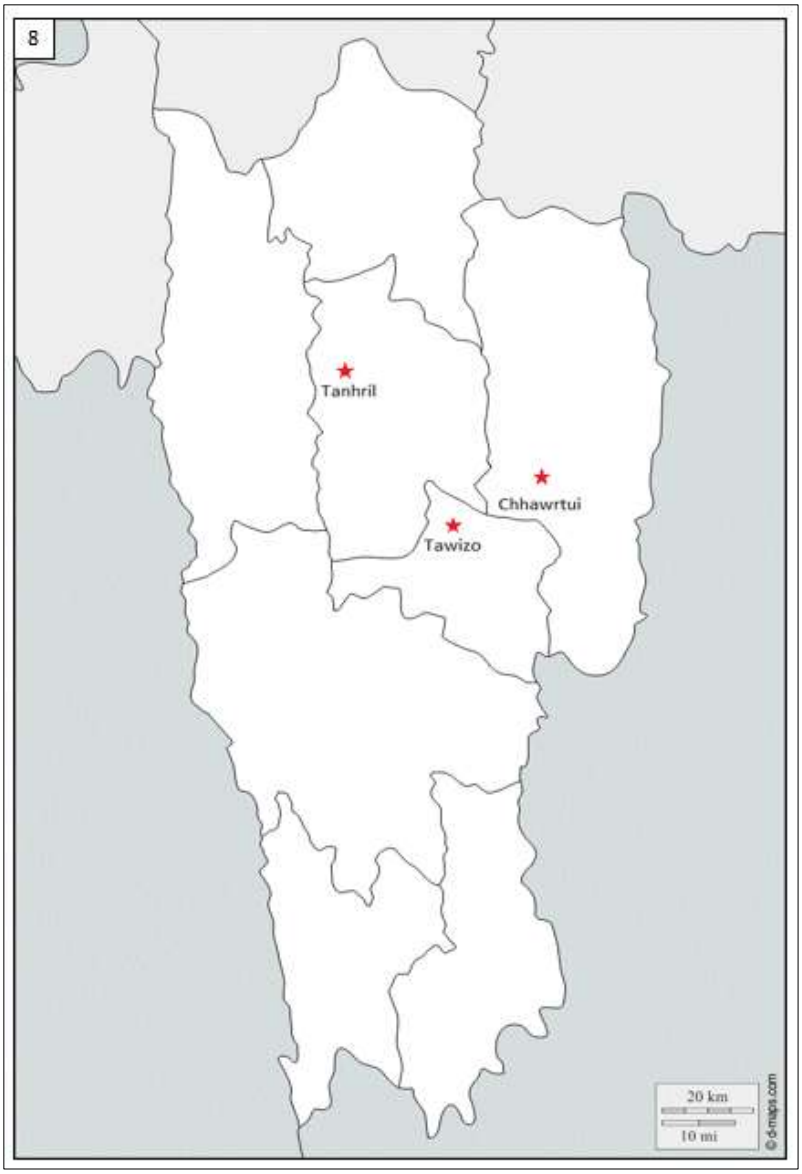

Fig 2: Map of Mizoram showing location of collection sites.

4. Conclusion

From the findings made during the field survey, it is evident that there is potential for more distribution of identified orchids within the state. Population study of orchids is a vital process which can help in conservation of threatened species. Past researches have yielded great results in identifying many new species and their distribution throughout the World. Further studies in the future is required as there is untapped resource of the flora and could aid in enhancing the present wealth of the state. The recent studies have shown lesser records around the Globe which could indicate that apart from smaller chances of findings, there could also be a population decline as well. Thus, field surveys in search of new findings along with the evaluation of current population and distribution of the orchid resources is needed for adding to the richness of the flora and their conservation as well.

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