Biogeography of Mindoro mosses

V.C. Linis

Abstract  The moss flora of Mindoro Island was updated based on the 2004–2006 expeditions conducted by the author. The island’s moss flora now consists of 282 species in 126 genera and 39 families, which is higher than Palawan but far less than those of Luzon and Mindanao. Generally, the flora is most abundant in the eastern rainy part of the island, especially along mid-elevations on the east-facing slope of the central mountain range in the transition zone between montane and mossy forests. Moss diversity is also greater in riverine forests than in inland forests at low elevations. Only three moss taxa, *Rhaecocarpus alpinus*, *Dicranoloma daymannianum* and *Distichophyllum noguchianum*, have their Philippine range restricted to the island. *Distichophyllum noguchianum* is a Philippine endemic. Floristically, the Mindoro moss flora is identified more with Luzon within the Philippine archipelago, while its sharing of other widespread Malesian taxa reinforced its role as an integral component of the Malesian flora. Reports of taxa with Australasian affinity show growing evidence for a Gondwanan influence on the island moss flora, although a tenuous one. Likewise, the presence of moss taxa such as *Acrosporion johannes-winkleri*, *Cryptodonium phyllogonioides* and *Glyptothecium sciuroides* in Mindoro, reinforce the important role of Palawan as link in the exchange of biota between Mindoro, Borneo and Peninsular Malaysia during the Pleistocene. Finally, the importance of the island in enriching the Philippine flora and the necessity to protect its remaining forests are discussed.

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INTRODUCTION

**Geological history of Mindoro Island**

The island of Mindoro is the seventh largest island in the Philippines with an area of 10 244 km² (Fig. 1). It is found southwest of Luzon Island and northeast of Palawan island between 12°9’ and 13°54’ NL and 120°1’ and 121°15’ EL (Fund for Assistance to Private Education 1975). A mountain range along its central axis divides the island into an eastern and western half. Situated along this range are two of the island’s highest peaks: Mt Halcon standing at 2 597 m is found in the northeast portion of the island, and Mt Baco located in the south-central portion of the island stands at 2 498 m. The climate of the island is tropically wet (National Geographic Society 1999). The eastern half of the island is generally rainy throughout the year with an annual rainfall of 2 500 mm. The western half of the island, on the other hand, has a marked dry season during the months of November up to February (Collins et al. 1991).

Mindoro’s mountainous interior, despite its varied physiographic attributes, is known to consist mainly of metamorphic rocks of continental crust origin uplifted since Mid-Eocene (Fernandez 1982). Calcareous and volcanic rocks are not extensive and are mostly confined to small areas near and along the island’s coasts. Geologically, Mindoro is interesting, because it was part of the Tertiary micro-continent, the North Palawan Block. Together with north-eastern Panay and Palawan, the Block was reported to have been positioned near the coast of China, forming part of the continuous continental shelf (Southeast Eurasian Margin) with Hainan and Taiwan during the Eocene some 50 million years ago (Holloway 1982). Because of the opening of the South China Sea in the Oligocene, Mindoro, north-eastern Panay and Palawan were pushed to their present day positions in the Philippine archipelago. The arrival of the North Palawan Block from its pre-drift position to its present mid- to late Pliocene (Hall 1996, 1998). Others such as Hamilton (1981) included only the south-western part of Mindoro Island in the North Palawan Block giving its northern portion a separate origin. However, Aurelio (2001) has suggested that this portion could have been formed by the collision of the North Palawan microcontinental plate and the Philippine Mobile Belt.

Tan et al. (1988) reported that the above events in Mindoro have strongly influenced the evolution of modern Philippine biota. First, the resulting island chains between Borneo and Luzon provided the necessary land bridge habitats for the two-way migration of plants and animals between the two large islands. Secondly, the drifting of the ancient North Palawan Block across the South China Sea might have carried with it some continental Asian plants and animals that have been incorporated into the Philippine biota.

**Bryological history of Mindoro Island**

The earliest report on Mindoro mosses was published by Brotherus in 1907. He listed thirty-two species of mosses from a collection made by Merrill during his ascent of Mt Halcon on November 1906. The following years, Bartlett, Ramos and Edaño also collected mosses from the island, mainly at Mt Halcon and the vicinities of Puerto Galera. Bartram (1939) included their collections in his publication of the Philippine moss flora. He described about 81 species of mosses in 56 genera and 25 families from the island.

Fifty years later Tan & Iwatsuki (1991) produced a new checklist of Philippine mosses representing the outcome of their renewed and exhaustive review of Philippine moss literature up to the end of 1990. In this checklist, the number of moss taxa from Mindoro increased to 121 species in 72 genera and 28 families. Tan & Mandia (2001) further increased the number to 140 species in 82 genera and 32 families based on a small collection made by the second author.

Key words  biogeography  bryophytes  diversity  Mindoro  mosses  The Philippines

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Between 2003 and 2006, the author organized four expeditions to study the moss diversity of Mindoro Island. During these expeditions a large number of mosses were collected from different localities (Table 1, Fig. 1), which resulted in the discovery of species not yet reported from the island. At present we accept 282 species of mosses for Mindoro island, which is still far less than Luzon and Mindanao, but considerably higher than that of Palawan. Perhaps this low number of moss species of Mindoro compared to Luzon and Mindanao clearly indicates our limited knowledge for Mindoro’s moss flora.

**MATERIAL AND METHODS**

Published information (Brotherus 1907, Bartram 1939, Tan & Iwatsuki 1991, Tan & Mandia 2001) and the unpublished data from the 2004 to 2006 collections of Mindoro mosses were used by the author to assign each individual species to a specific distribution pattern within Malesia and nearby regions as well as within the Philippines.

Voucher specimens of the collections made by the author are deposited at the Philippine National Herbarium (PNH) in Manila, with some duplicates sent to the National University of Singapore’s Herbarium of the Raffles Museum of Biodiversity Research (SINU) in Singapore.

### Table 1: List of collection localities in Mindoro Island.

<table>
<thead>
<tr>
<th>Locality No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Agricultural land close to shoreline near Calapan City, alt. sea level to 100 m, 13°24' N, 121°10' E</td>
</tr>
<tr>
<td>2</td>
<td>Mixed-agricultural and settlement area within Baco municipality, alt. 100–200 m, 13°17' N, 121°07' E</td>
</tr>
<tr>
<td>3</td>
<td>In second-growth lowland forest on slope facing north, alt. 200–800 m, 13°18' N, 121°02' E</td>
</tr>
<tr>
<td>4</td>
<td>In second-growth lowland forest on slope facing north, alt. 800–1200 m, 13°18' N, 121°01' E</td>
</tr>
<tr>
<td>5</td>
<td>In montane forest at Dulungan Ridge, alt. 1200–1800 m, 13°18' N, 121°57' E</td>
</tr>
<tr>
<td>6</td>
<td>Heath forest on summit of Mt Halcon, alt. 1800–2597 m, 13°15' N, 121°59' E</td>
</tr>
<tr>
<td>7</td>
<td>Shoreline of Lake Naujan, alt. 30 m, 13°10' N, 121°07' E</td>
</tr>
<tr>
<td>8</td>
<td>Agricultural surroundings alongside road, alt. 580 m, 13°09' N, 121°18' E</td>
</tr>
<tr>
<td>9</td>
<td>In second-growth lowland forest at Dumali Peak, alt. 650 m, 13°06° N, 121°30' E</td>
</tr>
<tr>
<td>10</td>
<td>Estuarine area facing east, alt. sea level to 2 m, 12°50' N, 121°28' E</td>
</tr>
<tr>
<td>11</td>
<td>Low beach forest mixed with settlements facing east, alt. 5–10 m, 12°42' N, 121°30' E</td>
</tr>
<tr>
<td>12</td>
<td>Agricultural area with Bongabong municipality, alt. 10–20 m, 12°39' N, 121°32' E</td>
</tr>
<tr>
<td>13</td>
<td>Along Bongabong river, alt. 20–50 m, 12°39' N, 121°26' E</td>
</tr>
<tr>
<td>14</td>
<td>Limestone cliff alongside road, alt. 50–200 m, 12°43' N, 121°22' E</td>
</tr>
<tr>
<td>15</td>
<td>Mixed grassland and agricultural developments along Bongabong River, alt. 100–300 m, 12°42' N, 121°21' E</td>
</tr>
<tr>
<td>16</td>
<td>Surrounding secondary lowland forest of So. Balle, alt. 200–400 m, 12°02' N, 121°55' E</td>
</tr>
<tr>
<td>17</td>
<td>In lowland forest along the middle reaches of Bongabong River, alt. 400–800 m, 12°49' N, 121°15' E</td>
</tr>
<tr>
<td>18</td>
<td>In lowland forest, alt. 800–1500 m, 12°52' N, 121°15' E</td>
</tr>
<tr>
<td>19</td>
<td>In montane forest, alt. 1500–2300 m, 12°55' N, 121°15' E</td>
</tr>
<tr>
<td>20</td>
<td>Low scrub and well-developed mossy forest on north side of the Mt Baco's summit, alt. 2300–2498 m, 12°50' N, 121°09' E</td>
</tr>
<tr>
<td>21</td>
<td>In lowland forest along Batangan River, alt. 500–1500 m, 12°48' N, 121°12' E</td>
</tr>
<tr>
<td>22</td>
<td>In montane forest, alt. 1500–1750 m, 12°46' N, 121°11' E</td>
</tr>
<tr>
<td>23</td>
<td>In montane forest, alt. 1500–1800 m, 12°44' N, 121°13' E</td>
</tr>
<tr>
<td>24</td>
<td>In lowland forest, alt. 700–1500 m, 12°40' N, 121°14' E</td>
</tr>
<tr>
<td>25</td>
<td>Along trail close to coastline facing east, alt. 1–5 m, 12°31' N, 121°25' E</td>
</tr>
<tr>
<td>26</td>
<td>On low scrub and grassland over limestone hills, alt. 1000–1200 m, 12°30' N, 121°23' E</td>
</tr>
<tr>
<td>27</td>
<td>In lowland forest at Knob Peak, alt. 700–1400 m, 12°29' N, 121°19' E</td>
</tr>
<tr>
<td>28</td>
<td>In secondary lowland forest along cliff facing the coast, alt. 500–600 m, 13°31' N, 120°56' E</td>
</tr>
<tr>
<td>29</td>
<td>In low scrub and secondary forest along coast facing east, alt. 1–5 m, 13°26' N, 120°43' E</td>
</tr>
<tr>
<td>30</td>
<td>In secondary forest along Creek close to Falls, alt. 500–600 m, 13°24' N, 120°40' E</td>
</tr>
<tr>
<td>31</td>
<td>In agricultural surroundings near Mamburao municipality, alt. 50 m, 12°39' N, 120°37' E</td>
</tr>
<tr>
<td>32</td>
<td>In secondary lowland forest along road facing west, alt. 100 m, 12°20' N, 120°30' E</td>
</tr>
<tr>
<td>33</td>
<td>In secondary lowland forest along dry creek, alt. 250 m, 13°26' N, 120°30' E</td>
</tr>
<tr>
<td>34</td>
<td>In secondary lowland forest along south slope of Mt Calavite, alt. 200 m, 13°25' N, 120°25' E</td>
</tr>
<tr>
<td>35</td>
<td>In montane forest surrounding the abandoned transmitter station at peak of Mt Calavite, alt. 200–1800 m, 13°28' N, 120°23' E</td>
</tr>
<tr>
<td>36</td>
<td>In agricultural area over limestone within Mamburao municipality, alt. 20 m, 13°13' N, 120°23' E</td>
</tr>
<tr>
<td>37</td>
<td>In mixed grassland and secondary lowland forest along slope facing west, alt. 670 m, 13°11' N, 120°44' E</td>
</tr>
<tr>
<td>38</td>
<td>On gravel and boulders alongside small creek, alt. 25 m, 13°01' N, 120°46' E</td>
</tr>
<tr>
<td>39</td>
<td>In secondary lowland forest, Brgy. Poppoy, Calintaan, alt. 80–150 m, 13°01' N, 120°54' E</td>
</tr>
<tr>
<td>40</td>
<td>In mixed agricultural and secondary lowland forest, alt. 500–600 m, 12°48' N, 120°50' E</td>
</tr>
<tr>
<td>41</td>
<td>On limestone alongside creek in secondary lowland forest, alt. 730 m, 12°45' N, 120°59' E</td>
</tr>
<tr>
<td>42</td>
<td>In lowland forest, alt. 600–700 m, 12°42' N, 120°59' E</td>
</tr>
<tr>
<td>43</td>
<td>In agricultural surrounding near San Jose City, alt. 20 m, 12°21' N, 121°03' E</td>
</tr>
<tr>
<td>44</td>
<td>In poor secondary lowland forest and grassland over limestone, alt. 900 m, 12°26' N, 121°08' E</td>
</tr>
</tbody>
</table>
Kroeber’s index [%K = C * (A+B) / 2AB * 50; A = number of taxa in first area, B = in second area, C number of shared taxa] was used for computing the percentage of similarity between pairs of areas, at the generic and species levels. However, for floristic comparisons of moss floras within the Philippine archipelago, the efforts were limited to the first six largest islands, because these are the only ones with adequate bryological information (Tan & Robinson 1990, Touw 1991, Yamaguchi 1993, Tan 1993, 1994, 1996, Tan & Lin 1995, Tan et al. 2000, Tan & Mandia 2001, Touw 2001, Linis 2004, Linis & Tan in print).

A detailed analysis of the similarity of Mindoro mosses with nearby islands and regions is also presented in this paper. This was demonstrated using a phenetic dendrogram based on Jaccard’s Coefficient of Similarity and UPGMA (Unweighted Pair-Group Mathematical Average) with the Multi-Variate Statistical Package v3.0.

RESULTS AND DISCUSSION

Diversity of mosses of Mindoro

The majority of the previous moss records from Mindoro Island came from Mt Halcon and Puerto Galera. Also, many collections were made from a few high peaks: Mt Halcon, Mt Baco and Mt Calavite. Vast areas of the island still have received little or no bryological investigation. Important areas like Mt Baco and adjoining areas as well as the entire southern and western areas of the island, consisting mostly of limestones, have no moss record at all. It is crucial therefore that Mt Baco, which has a national park status, and other relevant areas of the island worthy for bryological investigations are included in this study.

From the new collections made in 2004 to 2006, the total number of mosses known in the island has been increased to 282 species in 128 genera and 39 families (see Appendix). Worth mentioning are the 142 new records gathered for the island. Among these new records are Brauneofisia edentula, Cryptogonium phyllogonioides, Entodon rubicundus, Hymenodon apiculatus, Hyophila angustifolius, Papillaria leuconeura, Philonotis bartramnioides, Pogonatum subortile, Taxiphyllum arcuatum and Wijkia hornschuchii. Previous records of these taxa confined themselves to, either Luzon, some islands in the Visayas, or Mindanao. Thus, their findings in Mindoro have significantly extended their local ranges inside the country.

Also, the mosses of Mindoro are observed to be most abundant in the eastern rainy part of the island, along the eastern side of the central mountain range. One reason for their occurrence is that the evergreen lowland forests of the eastern slope are generally wetter compared to the drier, semi-deciduous pasturelands (Development Alternatives 1992). Due to these two factors, genera of semi-dry and anthropogenic habitats like Entodon, Gymnothorium, Hyophila, Pseudosymblepharis abound.

As of today, three moss taxa, namely Dichranoloma daymanianum, Distichophyllum nouchianum and Rhacocarpus alpinus have their Philippine range restricted to Mindoro.

Generally speaking, moss species in Mindoro are highest in diversity at mid-elevations on the east-facing slope of the central mountain range in the transition zone between montane and the mossy forests, while the number and diversity decreases towards the western side of the island, where grasslands and burnt landscapes become the main topographical feature. At lower elevations, moss diversity is also greater in riverine forests than in inland forests.

Floristic affinity of Mindoro moss flora intra-Philippines

The richness of mosses in different large islands of the Philippines is shown in Table 2. In counting the number of moss taxa for each island a conservative approach is adopted so that the resulting floristic affinities are not exaggerated.

By comparison, the Mindoro moss flora with 282 moss taxa ranks third in terms of species number after the moss floras of Luzon and Mindanao. This is followed by Panay and Negros, each with 130 and 161 moss taxa, respectively.

Table 3 shows the comparative floristic affinity of Mindoro with that of Luzon, Palawan, Panay, Negros and Mindanao. It is apparent from Table 3 that the composition of the Mindoro moss flora resembles that of Luzon most closely at the generic and species levels. The similarity is followed closely by the moss floras of Negros and Palawan; both islands are geographically located near Mindoro.

Table 2 Number of moss taxa reported from all large islands within the Philippines.

<table>
<thead>
<tr>
<th>Islands</th>
<th>Genera</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luzon</td>
<td>218</td>
<td>613</td>
</tr>
<tr>
<td>Mindanao</td>
<td>141</td>
<td>333</td>
</tr>
<tr>
<td>Palawan</td>
<td>94</td>
<td>219</td>
</tr>
<tr>
<td>Mindoro</td>
<td>128</td>
<td>282</td>
</tr>
<tr>
<td>Panay</td>
<td>68</td>
<td>130</td>
</tr>
<tr>
<td>Negros</td>
<td>89</td>
<td>161</td>
</tr>
<tr>
<td>Samar</td>
<td>53</td>
<td>92</td>
</tr>
<tr>
<td>Leyte</td>
<td>53</td>
<td>83</td>
</tr>
<tr>
<td>Cebu</td>
<td>52</td>
<td>82</td>
</tr>
<tr>
<td>Bohol</td>
<td>48</td>
<td>75</td>
</tr>
<tr>
<td>Sibuyan</td>
<td>52</td>
<td>82</td>
</tr>
<tr>
<td>Camiguin</td>
<td>50</td>
<td>82</td>
</tr>
<tr>
<td>Biliran</td>
<td>48</td>
<td>74</td>
</tr>
<tr>
<td>Sulu archipelagoes</td>
<td>54</td>
<td>88</td>
</tr>
</tbody>
</table>

Table 3 Kroeber’s index of taxon similarity (%K) between the moss floras of Mindoro and that of Luzon, Palawan, Panay, Negros and Mindanao (unshared: Mindoro/other island).

<table>
<thead>
<tr>
<th></th>
<th>Luzon</th>
<th>Palawan</th>
<th>Panay</th>
<th>Negros</th>
<th>Mindanao</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>shared</td>
<td>unshared</td>
<td>shared</td>
<td>unshared</td>
<td>shared</td>
</tr>
<tr>
<td>128 genera</td>
<td>123</td>
<td>95/5</td>
<td>79</td>
<td>15/49</td>
<td>64</td>
</tr>
<tr>
<td>%K genera</td>
<td>81.63</td>
<td>72.88</td>
<td>72.06</td>
<td></td>
<td>73.34</td>
</tr>
<tr>
<td>282 species</td>
<td>261</td>
<td>351/19</td>
<td>153</td>
<td>67/129</td>
<td>110</td>
</tr>
<tr>
<td>%K species</td>
<td>67.56</td>
<td>62.06</td>
<td>61.81</td>
<td></td>
<td>62.45</td>
</tr>
</tbody>
</table>
Tan & Iwatsuki (1991) already mentioned the strong Luzon connection of the Mindoro moss flora, even though Mindoro was then still incompletely known. Merrill (1928) also observed the same botanical affinity among the phanerogam floras of these two islands.

Between Mindoro and Luzon most of the unshared taxa are species that grow at high altitude (over 2,500 m), mostly in Northern Luzon. These taxa belong to the widespread, continental Asiatic and Himalayan genera, like Atrichum, Ceratodon, Dendrocyathophorum and Grimmia or the Malesian endemic and Australasian genera that reached Mindoro but not Luzon, such as Cryptogonium and Rhaccocarpus. The remaining unshared taxa either belong to local endemics that evolved separately in the two islands or the species are still undercollected.

It is unlikely that Negros came second in terms of degree of floristic similarity with Mindoro both at the generic and species levels. However, a large part of this island is still bryologically under-explored, thus the floristic affinity with Mindoro remains inconclusive. Much more collecting has to be done in this Visayan Island.

On the other hand, Palawan, where the local forests belong to the semi-dry and seasonally deciduous type of rainforests, harbour a less richer moss flora when compared to Mindoro. Some of the Mindoro taxa that are apparently absent in Palawan are the wet-loving mosses belonging to genera like Daltonia, Distichophyllum, Hymenodon and Neolinbergia, including a handful of genera that have successfully reached Mindoro from Luzon but not yet Palawan. The handful of Palawan mosses not found in Mindoro Island is obviously xeric or drought-tolerant. The other unshared taxa represent the South and East Malesian taxa that apparently failed to reach Mindoro from Palawan, such as Cassiothryon asperinum and Horikawahae redfearnii and the rest is likely to be an undercollection artefact.

Panay, despite its geographical proximity to Mindoro, came fourth in terms of degree of floristic similarity with Mindoro. Like Negros, however, a large part of this island is underexplored bryologically; hence its overall picture of floristic similarity with Mindoro remains inconclusive at present.

As expected, Mindanao came fifth in terms of floristic resemblance with the moss flora of Mindoro. The most obvious factors accounting for this relatively weak similarity are their different geological histories and distinct climatic conditions. There are several genera present in Mindanao that are absent in Mindoro. These are mostly the South Malesian and Australasian genera that reached only Mindanao in the Philippines such as Bryobrothera, Dawsonia, Ectropotheciopsis, Leskeodon and Meiotechicella. Other taxa are of limited ranges in Luzon and Mindoro but failed to reach other southern islands in the Philippine archipelago.

**Affinity of Mindoro moss flora extra-Philippines**

A UPGMA dendrogram (Fig. 2) demonstrates the overall floristic distances between Mindoro and nearby islands and countries outside the Philippines. The highest similarity is with the Malay Peninsula, Java, Sumatra, Borneo and the Lesser Sunda Islands. This shows the Mindoro moss flora to be an integral component of the (West) Malesian flora.

As to be expected, Sulawesi, New Guinea, Indochina, Mainland China, Taiwan and Mongolia came increasingly less close in floristic resemblance with Mindoro (Fig. 2). This similarity/dissimilarity between the Philippines and other areas can be explained in two ways. The taxa shared with other areas in the Philippines but not Mindoro are the widespread temperate East Asiatic mosses, including the Himalayan taxa, some of which have successfully penetrated the northern highlands of Luzon, but failed to reach the rest of the Philippines to the south. Second, there are taxa of southern affinity that were unable to reach Mindoro, but were able to penetrate only Mindanao in the southern Philippines.

There is little evidence of floristic influence from the Southern Hemisphere or Australasia on the Mindoro moss flora. Only *Rhaccocarpus alpinus* was collected from Mindoro showing the Gondwanan influence in the island’s moss flora albeit a tenuous one (Tan & Mandia 2001). The Mindoro record of this moss taxon also foretells the likely presence of this species in Palawan, for the species is also known from Sumatra, Borneo, and Sulawesi to New Guinea (Koponen & Norris 1986). *Rhaccocarpus alpinus* most likely reached Mindoro via a Borneo / Palawan route.

Only one endemic species, *Distichophyllum nuguichianum*, has been reported from Mindoro. Another taxon, *Neolinbergia* sp., was recently collected by the author from the island and appears endemic too. However, the endemic status of these two taxa has not been subjected to detailed evaluation and may become redundant.

A moss flora resembling that of Mindoro Island is expected for adjacent smaller islands like Sibuyan. A close bryological affinity between these two islands is apparent, but needs further substantiation by extensive collecting.

**CONCLUSION**

Floristically, the Mindoro moss flora has the highest resemblance with Luzon. Its strong relationship with Malesian areas show it to be an integral component of the Malesian flora. Reports of taxa with Australasian affinity show a growing evidence of the Gondwanan influence in the island though a tenuous one.

Until recently, two new records of moss taxa: *Rhaccocarpus alpinus* and *Dicranoloma daymannianum* were collected from Mindoro. These noteworthy discoveries demonstrate the role of the island as an important dispersal link within the Philippine flora. Seen in this light the conservation of the remaining forests of Mindoro has become more urgent if only to save these and future novelties.

It is sad, however, that despite the increase of threats to Mindoro’s forests only a number of nature reserves have been established in the island since 1936. All have been proven to be less than effective (Heaney & Regalado 1998). Other important sites worth conserving like Mt Halcon, Mt Calavite, Mt Malasimbo and intervening areas in the north and Pointed Peak with its immediate vicinities in the south remain unprotected.
REFERENCES


Linis VC, Tan BC. In print. The biodiversity and biogeography of mosses of Zambales Mountain Range and Mt Arayat, Luzon Island, Philippines.


Appendix A new checklist of Mindoro mosses alphabetically arranged by family, genus and species. (Note: numbers after species name indicates collection localities as defined in Table 1 and shown in Fig. 1).

Bartramioaceae

Brachytheciaceae

Bryaceae

Calymperaceae

Calyptraeaceae

Dicranaceae

Daltoniaceae

Dicranogoniaceae

REFERENCES
Dicranoloma assimile (Hampe) Paris 3, 4, 5, 6, 19
Dicranoloma billardi (Broth.) Paris 19, 20
Dicranoloma blumi (Nees) Paris 4, 5, 6, 19, 20
Dicranoloma braunii (Müll.Hal. ex Dozy & Molk.) Paris 4, 5, 18, 19
Dicranoloma brevisetum (Dozy & Molk.) Paris var. sanoamo (Broth.)
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Dicranoloma daymannianum E.B.Bartram 6
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Fissidens wichurae
Dicranoloma braunii
Hypnodendron reinwardtii
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Ectropothecium ferrugineum
Racomitrium lanuginosum
Dicranoloma brevisetum
Leucobryum aduncum
Trachythecium micropyxis
Taxiphyllum arcuatum
Hypnodendron milnei
Ectropothecium elegantipinnatum
Hypnaceae
Entodon plicatus

Entodontaceae

Leucobryum aduncum (Dozy & Molk.) Touw 6
Leucobryum aduncum (Dozy & Molk.) Touw 6
Leucobryum arkanianum Müll.Hal. ex Geh. 5
Leucobryum bowringii Mitt. 19, 20, 23, 27, 35
Leucobryum chlorophytum Müll.Hal. 4, 19, 20
Leucobryum javense (Broth.) Mitt. 3, 4, 5, 6, 18, 19, 20, 23, 24
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Ocotelephorium albido Müll. Hedw. 2, 3, 19, 27
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Aerobryopsis subdiluvergenis (Broth.) ssp. scariosa (E.B.Bartram) Nog. 4, 5, 6, 19, 23
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Barbela convolvins (Mitt.) Broth. 19, 20
Barbela elongata Williams 18, 19, 23, 35
Cryptopapillaria fuscosens (Hook.) Menzel 3, 4, 5, 6, 19
Floribundaria floribunda (Dozy & Molk.) M.Fleisch. 18, 19, 20, 23, 27
Floribundaria pseudofloribunda M.Fleisch. 19, 20
Meteoriopsis reclinata (Müll.Hal.) M.Fleisch. ex Broth. 21, 25
Meteoriopsis polytrichorum Dozy & Molk. 17, 19, 20, 24
Meteoriopsis subpolytrichum (Bsch.) Broth. 19, 20
Papillaria leucoreuna (Müll.Hal.) A.Jaeger 19, 20
Trachycladiella sparsa (Mitt.) Menzel 19, 20

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Homalodiscus flabelatum (Sm.) M.Fleisch. 4, 19, 35
Homalodiscus microcordatum (Mont.) M.Fleisch. 19
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Neckeropsis exserta (Hook, ex Schwä.) Broth. 27, 30, 32, 33, 34, 35, 37, 40
Neckeropsis gracilenta (Bsch. & Sande Lac.) M.Fleisch. 18
Neckeropsis lepinea (Mont.) M.Fleisch. 17, 19, 21, 24, 27
Pinnatella alopecuroides (Hook.) M.Fleisch. 18
Pinnatella ambiguia (Bsch. & Sande Lac.) M.Fleisch. 17, 18, 21, 24
Pinnatella kuhliana (Bsch. & Sande Lac.) M.Fleisch. 18
Pinnatella mucronata (Bsch. & Sande Lac.) M.Fleisch. 17, 18, 24

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Macromitrium bünell Nees ex Schwä. 4
Macromitrium cuspidatum Hampe 28
Macromitrium fasciculare Mitt. 5
Macromitrium foxworthyi Schwä. 19, 22, 35
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Macromitrium orthodoxicum Nees ex Schwä. 18
Macromitrium salamonum Müll.Hal. 19, 20
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Appendix (cont.)

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Barbula indica (Hook.) Spreng. 1, 26
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Glyphomitrium nymanianum M.Fleisch. 17
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Hyphila involuta (Hook.) A.Jaeger 1, 2, 3, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 25, 30, 31, 32, 33, 34, 35, 36, 37, 39, 40, 41, 42, 43, 44
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