

XIII. BOTANICAL EXPLORATION IN PALANAN WILDERNESS, ISABELA PROVINCE, THE PHILIPPINES: FIRST REPORT

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INTRODUCTION

The Palanan Wilderness is a large, circular wildlife reserve encompassing the land and sea within a 45 km radius centered around the Palanan Point in Isabela Province on the northeastern coast of Luzon Island. It was set aside by the Philippine government in 1979 to protect the fast diminishing indigenous fauna and flora of the Sierra Madre Range. Aerial reconnaissance shows that the wilderness consists of a nearly continuous canopy of rain forests extending all the way from the crests of Sierra Madre Range eastwards and downwards to the Pacific Ocean and is minimally interrupted by human settlements along the alluvial plain of Palanan River and a few landing points along the coast.

The flora of the Palanan Wilderness is representative of the Sierra Madre Range in northern Luzon. It is very diverse and largely undocumented. In 1961, Mr. H. GUTIERREZ of the Philippine National Herbarium collected briefly in the forested area between the towns of San Mariano and Palanan and made the only known collection of a unique monotypic Philippine fern, *Podosorus angustatus*. Later in 1968 the JACOBS & MENDOZA expedition to the vicinity of Dingalan and Baler South of the Palanan Wilderness made 421 collections, one fifth of which proved to be new to science. Botanically speaking, the area is at present still one of the least known regions in the country (Tan & Rojo, 1989).

Currently, the forests of the entire Sierra Madre Range are alarmingly threatened by logging operations and swidden agriculture. It is critically important that the original vegetation of Sierra Madre at the Palanan site is preserved both for scientific and environmental reasons.

In 1991, the Conservation International (USA), Leiden University (The Netherlands), and the Isabela State University (ISU-CVPED program) initiated a joint inventory of the plant resource of the Palanan Wilderness. A series of botanical expeditions were conducted from January to May, 1991. Plant specimens were collected and transect lines established to ascertain species diversity. Joining the expeditions were Dr. C.E. RIDSDALE (L), N. BAQUIRAB, V. DEJAN, and G. VAN DEN TOP, of ISU-CVPED. The logistics and funding were organized by Dr. L. HANNAH and Mr. V. MILAN of Conservation International, Manila Office.

FOREST TYPES

Several types of primary forest ecosystems exist in the Palanan Wilderness. We explored four of these, namely the lowland dipterocarp forest, forest over limestone substrate, forest over ultrabasic substrate, and beach forest.

1. *Lowland dipterocarp forest* — The lowland dipterocarp forest is by far the most extensive vegetational formation in the Palanan Wilderness. It is essentially a closed, high canopy forest. Though restricted to trees and other woody plants with girth diameters above 2.5 cm, the species diversity index was high, up to 150 species in a series of ten transect plots (equivalent to 0.1 ha) near the Palanan Point.

Locally, three subtypes could be distinguished. Their descriptions below do not correspond to the subtypes published by Whitford (1911) for the Philippine forests.

The first subtype occurs rather close to the coastline, immediately behind the Barringtonia formation on non-limestone substrate. The canopy was generally 30 to 35 m tall. While the largest trees attained a maximum girth diameter close to 100 cm, trunks usually were between 60–80 cm. Commonly encountered species were *Diospyros ahernii*, *Shorea contorta*, *Sterculia* cf. *cuneata*, and *Strombosia philippinensis*. Other common associates were *Antidesma* species, *Barringtonia pterita*, *Celtis luzonica*, *Diplodiscus paniculatus*, *Omphalea bracteata*, *Pterocarpus* species, and *Shorea polysperma*. The forest adjacent to Palanan Point best exemplified this subtype.

The second subtype occurs further inland, usually in protected depressions between ridges where limestone bedrock intersects with volcanic rock units. The trees were generally much taller, up to 45 m, and larger in girth diameter, commonly between 100 to 150 cm. While the dominant tree species of this subtype included those of the first subtype, one striking feature was the association with *Agathis philippinensis* ('almaciga'). The latter was the most gigantic tree species in the area with individuals reaching 200 cm in trunk diameter. In some sites, as many as 3 to 4 trees occurred within a 10 m² plot. The best examples of this subtype was found in Dikaclong and Disumangit.

The third subtype occurs in areas bordering the ultrabasic bedrock formation. This most probably represents a transitional type of forest. The trees were generally much closer to one another. In Digoyo, 63 trees were found in one 2 × 50 m² plot. The forest interior looked like a dense growth of slender poles. An extreme formation was observed on the relatively flat ridge of a peninsula across Bicobian where the crown canopy appeared more or less even and punctuated only by a few emergent trees. Tree height was from 25 m near Bicobian to 35 m at Digoyo site, with girth diameters varying between 30 to 70 cm. Dominant trees species seen at Bicobian were *Afzelia rhomboidea*, *Dehaasia triandra*, *Dillenia* sp., *Dimocarpus longan* var. *malesianum*, *Dipterocarpus* sp., *Hopea acuminata*, *Mangifera monandra*, *Planchonella firma*, *Podocarpus* sp., *Shorea contorta*, *S. palosapis*, and *Tristaniopsis*.

2. *Forest over limestone substrate* — Within the Palanan reserve, the most extensive karst terrain occurs in the vicinity of the Three Knobs – Kanaipang Hills area (approximate 16° 67' N, 122° 27' E). The tallest trees here were about 25 m and scattered along the narrow stretches of flat lands between the hills. Species of *Hopea* and *Shorea* were encountered in mixed stands of small diameter trees with spreading crowns. The forest floor had much growth of ferns and fern allies. Along steep slopes, trees were predominantly of the low diameter classes (under 15 cm) and rarely exceeding 15 m in height. Thorny shrubs and treelets belonging to *Maytenus* and *Sireblus* were rather common. On sheer cliffs, a peculiar herbaceous flora of *Begonia* and gesneriads was rather prominent.

3. *Forest over ultrabasic substrate* — The major geologic unit extending from Divilacan Bay down south to near Dinapigi is the ultrabasic formation. As soils from this substrate

are invariably associated with high concentration of phytotoxic heavy metals, a peculiar assemblage of plants adapted to such a hostile habitat can be found. So stunted were the trees on ultrabasic sites, as for example, the peninsula between Estagno and Aubarede Points, that the forest type is referred to as 'mossy forest' on local resource maps based on satellite imagery. We observed an extensive stretch of a low scrub formation (less than 1.5 m tall) along the eastern coast of the peninsula forming a sharp boundary with the adjoining tall forests outside the ultrabasic substrate.

At Lanay (17° 16' N, 122° 26' E) the dominant scrubby component was a *Xanthostemon* with large, bright red flowers. Other plants present included several low spreading to erect shrubs such as *Carallia* sp., *Decaspermum* sp., *Greeniopsis* sp., *Guettardella* sp., *Podocarpus polystachyus*, *Scaevola* sp. (with candelabrum-like mode of branching), *Timonius arboreus*, and *Xylopia densifolia*. Clearings inside this scrub formation were occupied by the acaulescent *Heterospathe brevicaulis*, the sclerophyllous *Lindsaea gueriniana*, *Macharina glomerata*, *Nepenthes* sp., and *Spathoglottis kimballiana* var. *angustifolia*.

A similar plant formation was seen on the ultrabasic coastal bluffs above Sobok Point (17° 14' 30" N, 122° 25' E) and Digoyo (16° 55' N, 122° 27' 30" E), but with a variable composition of the plant communities. Among the plants noted at Sobok Point were a mat-forming *Callicarpa* probably allied to *C. formosana*, *Canthium gynochthodes*, *Radermacheira coriacea*, *Terminalia* cf. *darlingii*, *Villaria* sp., and *Wendlandia* sp. At Digoyo, populations of *Adiantum opacum* with exceptionally large indusia covered the exposed rocky bluff. If our present collections can be taken as an indication, we predict that the ultra-basic flora of Palanan Wilderness will yield a substantially high percentage of novelties for the Philippine flora when fully collected.

4. *Beach forest* — Palanan is the last place on Luzon Island where the beach forest is still fairly intact. It was in most places dominated by *Barringtonia asiatica*. In some places, the dominance of *B. asiatica* was replaced by *Casuarina equisetifolia* as in the vicinity of Digoyo, or by *Pongamia pinnata* as in the coast north of Culasi. The stature of the beach forest observed was shorter and the structure simpler than all the preceding forest types. Associated trees were *Heritiera littoralis*, *Hernandia ovigera* (along Palanan Bay to Dipaguiden), *Lumnitzera littorea*, *Pemphis acidula*, *Planchonella obovata*, *Terminalia catappa*, and *Thespesia populnea*, to name a few. In areas where broad sandy beach was available, *Crinum asiaticum*, *Ipomoea pes-caprae*, *Messerschmidia argentea*, *Pandanus* sp., *Scaevola sericea*, and *Vitex trifolia* var. *simplicifolia* were frequently seen. However, craggy seaside bluffs and some offshore islets were commonly colonized by *Ficus peduncularis* var. *mearnsii*, *Hedyotis biflora*, and *Maytenus emarginata*.

5. *Freshwater plant communities* — There are three small freshwater lakes in Palanan Wilderness. These are indicated in the 1 : 50,000 topomap (Sheet 7476-I 'Digollorin Bay') as Almasigan, Kanataw and Digoyo. Of the three, only Lake Digoyo was visited by us.

Known to the Dumagat natives as Hanno, Lake Digoyo (16° 55' 36" N, 122° 27' 36" E) is rectangular in shape and about 100 × 40 m² at about 25 m altitude. The forest around the lake was of the limestone type described above. Submerged and semi-submerged ferns and species of *Acorus*, *Hypolytrum*, and *Scirpus* cover the muddy lakeshore. Further inland, several *Helminthostachys zeylanica* were found growing under the crowns of *Dillenia*, *Kopsia*, and *Pandanus*. Although doubtful, the lake is said to have a population of estuarine crocodiles.

NOTEWORTHY PLANT COLLECTIONS

The number of botanical specimens collected by us consisted of 190 numbers of bryophytes and 286 numbers of vascular plants. While the bulk of material has not been fully studied yet, a good number of them have turned out to be significant range extensions within the Philippines. Below we report on these noteworthy collections. Others which represent new additions to the country's flora or are new to science will be published separately. Voucher specimens are deposited at A, FH, L, and PNH, among others.

A. *Bryophytes*

1. *Cladopodanthus speciosum* (Dozy & Molk.) Fleisch. — third locality in the Philippines.
2. *Fissidens oblongifolius* Hook. f. & Wils. — new to Luzon.
3. *Fissidens zippelianus* var. *robinsonii* (Broth.) Iwats. & Suzuki — new to Cagayan Valley.
4. *Plagiomnium succulentum* (Mitt.) T. Kop. — new to Cagayan Valley.
5. *Thamnobryum negrosense* (Bartr.) Iwats. & Tan — new to N. Luzon.

B. *Pteridophytes*

1. *Adiantum opacum* Copel. — new to Luzon, previously known from Palawan and Borneo (Mt Kinabalu).
2. *Crypsinus stenophyllus* (Bl.) Copel. — new to N Luzon.
3. *Lindsaea gueriniana* (Gaud.) Desv. — new to Luzon. Co 3580 closely resembles *L. pellaeformis* Christ which is probably only an ecotype of *L. gueriniana*.
4. *Nannothelypteris camarinensis* Holtt. — new to N. Luzon, previously known only from the type from Camarines Norte in S. Luzon.

C. *Spermatophytes*

1. *Cycas chamberlainii* Br. et Kleinh. — second locality, on Mt Dipayag; previously known only from Mt Arayat in central Luzon.
2. *Dillenia reifferscheidia* F. Vill. — new to N Luzon.
3. *Dioscorea flabellifolia* Prain. — new to N Luzon.
4. *Erycibe terminaliflora* Elm. — new to Cagayan Valley.
5. *Fissistigma rufum* (Presl) Merr. — new to N Luzon.
6. *Gironniera subaequalis* Planch. — new to Luzon.
7. *Heterospatha brevicaulis* Fernando — second locality; first described in 1990 from Casiguran, Aurora Province, Luzon.
8. *Hoya imbricata* Decne — new to Cagayan Valley.
9. *Hoya obscura* Elm. — new to N Luzon.
10. *Mangifera monandra* Merr. — new to Cagayan Valley.
11. *Planchonella firma* (Miq.) Dub. — new to Cagayan Valley.
12. *Radermachera coriacea* Merr. — second locality; type from Baler, Quezon Province, Luzon.
13. *Semecarpus densiflorus* (Merr.) Steen. — new to N Luzon.
14. *Xylopiia densifolia* Elm. — new to Cagayan Valley.

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