

Co's Digital Flora of the Philippines: Plant Identification and Conservation Through Cybertaxonomy

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A compilation of an unpublished checklist of Philippine vascular plants prepared by the late Leonardo L. Co and the plant photographs he took form the foundation of the *Co's Digital Flora of the Philippines* (CDFP) website (www.philippineplants.org). The aim of CDFP is to present a continuously updated account of all native and naturalized species of vascular plants in the Philippines with diagnostic photographs for each taxon. The CDFP checklist currently contains *ca.* 10107 species in 2001 genera and 260 families. Of these, *ca.* 256 (96%) families, 1535 (77%) genera, and 3190 (28%) species are illustrated with photographs. To facilitate discussions on Philippine botany, a CDFP Facebook group was also created. It aims to popularize botany and increase the appreciation of plants in the wild. It also instills awareness in the Filipino people of the threats to the forests upon which their existence and survival greatly depends. Members of the group provide plant identification services to the general public free of charge. It is also a platform where members share plant photographs from all over the country for identification purposes and a tool for connecting students with professional botanists, regardless of their physical location. As such, CDFP in conjunction with this forum provides a conduit for citizen scientists to contribute to our understanding of the botanical diversity of the Philippines.

Key Words: checklist, conservation, cybertaxonomy, flora, Leonardo L. Co, Philippines, PhytoImages, plant photography

INTRODUCTION

The Philippines is one of the world's 25 biodiversity hotspots (Myers et al. 2000, Brooks et al. 2006, Webb et al. 2010). Unfortunately, the forests that harbour its remarkable biodiversity are in decline and this endangers the livelihoods of many Filipinos who depend on it for, amongst other things, food, water and protection against climatic extremes.

Efforts to mitigate this trend rely on knowledge of the organisms that compose these ecosystems, but a modern overview of the nearly 11,000 Philippine vascular plant species was, until recently, lacking.

Leonardo L. Co, a world-renowned Philippine plant taxonomist, devoted much of his life to studying the plant diversity of his country. His *magnum opus* was the most comprehensive enumeration of Philippine plants (i.e., a checklist) since that of Merrill (1923-1926). In

addition, he assembled a collection of nearly 11,000 plant photographs. Sadly, on 15 November 2010 Co's life was tragically ended before he could complete and publish his checklist.

In November 2011, Pelser, Barcelona and Nickrent launched the *Co's Digital Flora of the Philippines* (CDFP) website (Pelser et al. 2011 onwards; see www.philippineplants.org) to host Co's unpublished checklist and plant photographs. The aim of this website is to present a continuously updated account of all native and naturalized species of vascular plants in the Philippines with multiple diagnostic photographs for each taxon by which the species can be identified and to show morphological diversity across its distribution range. In this way, we honor Co's contributions to Philippine botany and conservation and hope to continue his legacy of generating and freely sharing botanical knowledge to stimulate biological education, research, and conservation. In this paper, we outline the background and structure of the website and report on the progress of the CDFP project.

Leonardo L. Co and Merrill's checklist

After spending much of his early career as an herbal doctor, acupuncturist, and botanist in the forests of northern Luzon, in 1991 Co joined Conservation International-Philippines as Field Botanist. He left CI in 1992 and became a consultant/botanist for various environmental impact assessment projects. In 1996, he returned to CI to become the Senior Botanist of its Biodiversity Analysis, Synthesis, and Monitoring program. Since 2000, he was the principal investigator of the Palanan Forest Dynamics Plot Project, Northern Sierra Madre Natural Park. In 2007, Co and colleagues founded the Philippine Native Plants Conservation Society, Inc. and he became its first president. In 2010, Co was hired officially as a museum researcher at the University of the Philippines – Diliman where he already had been an 'unofficial' resident curator of the PUH herbarium for many years.

Co was a very active plant taxonomist and collected more than 6,000 specimens under his name as well as many additional specimens that are filed in PUH under the names of the various consultancy projects with which he was involved.

Throughout Co's career, the only available comprehensive overview of the seed plants of the Philippines was Merrill's 4-volume *Enumeration of Philippine Flowering Plants* (1923-1926). Co took upon himself the Herculean task of revising Merrill's checklist. He added species that were not yet known during Merrill's time, updated the names to be in accord with modern usage, and provided additional details, such as information about distribution and literature references. Co's work on Merrill's checklist started with handwritten annotations

on his bound photocopies of Merrill's works (Figure 1). By early 2000, however, he had transcribed Merrill's original work into MS Word files. Co did not transcribe all of Merrill's original entries, but rather, he only copied data that he deemed relevant to the Philippine flora. For instance, synonyms not pertaining to Philippine literature and collections were not included by Co. As new plant collections and field observations were made and as additional taxonomic data appeared in the literature, Co updated the entries in the checklist (Figure 2). He also sought the taxonomic opinions of colleagues and friends who were experts in certain groups (e.g. hoyas, palms, orchids, ferns and lycophytes) and updated the names and collection and distribution data following their advice. Interestingly, Co did not always agree with the taxonomic treatments that he adopted in his checklist. He generally followed the global taxonomic consensus (particularly Flora Malesiana treatments) even if such treatments synonymized taxa that he considered distinct species.

Co organized his updated checklist as a collection of Microsoft Word files; one per plant family. He numbered and ordered these family files following the Engler and Prantl classification system, which is also used for arranging the herbarium collections at the National Herbarium of the Philippines (PNH), PUH, and many other herbaria. Citations of available literature for each family or genus, especially of revisions published in such journals as *Blumea*, *Flora Malesiana*, and the *Philippine Journal of Science*, were provided before the alphabetical listing of genera in each family and species in each genus.

Co used his checklist to provide data for various conservation initiatives (e.g., Fernando et al. 2008), but because he considered the checklist incomplete and only for personal use, he only shared it with selected people. His untimely death halted any intentions he may have had to publish this significant piece of work. Co was a perfectionist, and he did not appreciate it when his unpublished work was cited by others "...that is why it's unpublished!", he once blurted in frustration when, in the 1980s, his manuscript on a checklist of Philippine pteridophytes was cited without his permission.

The structure of CDFP

Co's Digital Flora of the Philippines (CDFP) is a free and publicly accessible, well-illustrated website that aims to provide up-to-date taxonomic information and a comprehensive overview of Philippine vascular plants. The foundation of this website is formed by Co's unpublished checklist and his collection of plant photographs. To this, additional pages were added, such as background information about Leonardo Co, Philippine biogeography, and the history of botanical exploration in the Philippines, but also PDFs of Co's original MS Word checklist files.

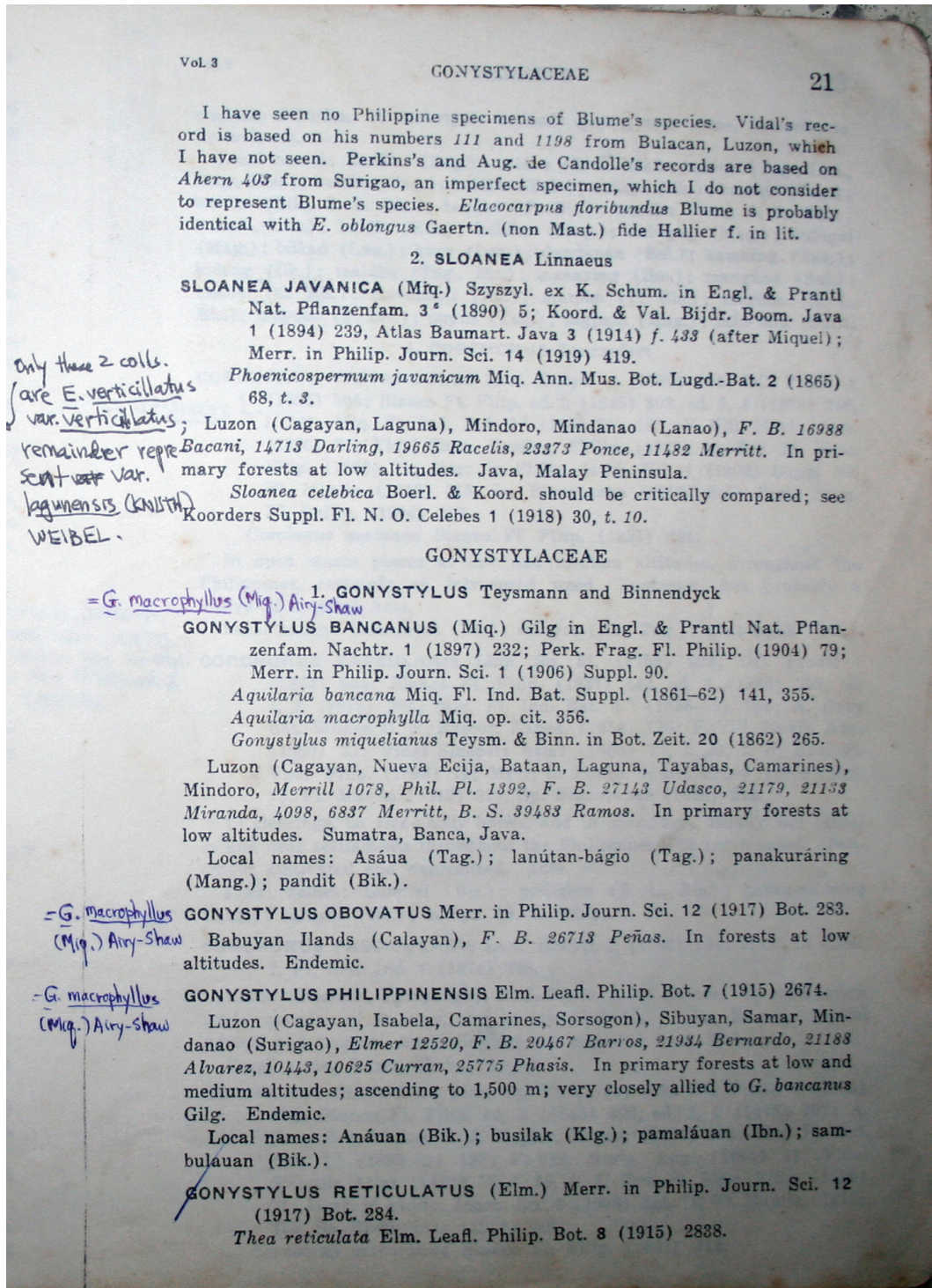


Figure 1. Page 21 of Co's personal copy of Merrill's *An Enumeration of Philippine Flowering Plants*, vol. 3 (1923) showing his handwritten annotations on *Gynostylus* (Gynostylaceae). Annotations in black ink refer to the *Elaeocarpus* treatment on page 20, not scanned.

173. GONYSTYLACEAE

Revision:

Airy Shaw, HK. 1953. *Thymelaeaceae-Gonystyloideae*. Flora Malesiana series 1, 4: 349-365.

1. *Gonystylus* Teijsmann & Binnendyck

***Gonystylus macrophyllus* (Miq.) Airy Shaw**, Kew Bull. (1947) 9; Fl. Males. ser. 1, 4 (1953) 354.
Gonystylus bancanus (Miq.) Gilg *in* Engl. & Prantl, Nat. Pflanzenfam. Nachtr. 1 (1897) 232;--Merr., EPFP 3 (1923) 21.

Gonystylus ovatus Merr., PJS 12 c (1917) Bot. 283; EPFP 3 (1923) 21. --Type: FB 26713 Peñas
Gonystylus philippinensis Elmer, LPB 7 (1915) 2674; --Merr., EPFP 3 (1923) 21. --Type: Elmer 12520

Sumatra, Banka, Java, Philippines. BABUYAN ISLS (CALAYAN), LUZON: Cagayan, Isabela, Nueva Ecija, Bataan, Laguna, Quezon, Camarines, Sorsogon, MINDORO, SIBUYAN, SAMAR, MINDANAO: Surigao. Primary forests from low altitudes to 1500m.

***Gonystylus reticulatus* (Elmer) Merr.**, PJS 12 c (1917) Bot. 284; EPFP 3 (1923) 21; --Airy Shaw, Fl. Males. ser. 1, 4 (1953) 354; --Thea *reticulata* Elmer, LPB 8 (1915) 2838. --Type: Elmer 13478

MINDANAO: Zamboanga, Agusan del Norte. Primary forests at low and medium altitudes, ascending to 900m.

Figure 2. Treatment of family Gonystylaceae in Co's checklist. Note the inclusion of synonyms that are relevant only to Philippine flora and exclusion of others originally included in Merrill's work.

Since the launch of the CDFP website in November 2011, Pelsner et al. have started editing, amending, and updating Co's checklist. Also, additional *in-situ* photographs were taken to put 'faces' to the plants in the checklist, increase the number of photos of diagnostic characters and show intra-specific morphological diversity.

Co's photographs, as well as those taken by the CDFP team and those generously contributed by many others, are deposited in PhytoImages (Nickrent et al. 2006 onwards; see www.phytoimages.siu.edu) and linked from the CDFP website. PhytoImages is a web interface that provides free access to scientific-quality plant photographs from all over the world with their associated meta-data (e.g., locality information, voucher data, latitude/longitude coordinates, captions, Google and VE maps and taxonomic data). The PhytoImages database currently contains over 14,000 images of ca. 520 families, 4032 genera and 14,000 plant species. It has various search functions and is managed and curated by professional botanists. Photographs and data stored in this website are publicly accessible for teaching, research, and conservation purposes. Plant photographs are searchable by taxonomic rank, country/locality, photographer and keywords. Search results are presented in various ways, but ultimately, an individual photo, with its associated metadata, is shown on a web page with a stable link. Each photo has a unique identifier (a DOL accession number). Because of these features, PhytoImages can be used as a source of images that are directly linked from external websites, such as CDFP, or

referred to in the literature. Individual images can also be accessed using a Google search of the DOL number or taxon name.

In addition to the checklist and the plant photographs that are linked to it from PhytoImages, CDFP is composed of a Facebook Group (<https://www.facebook.com/groups/philippineplants/>). This Group was created to be a forum for discussions on Philippine botany. Membership is open and members post plant photographs for identification and/or provide identifications for photos of unknown plants uploaded by others. The current 2206 members include professional botanists from all over the world, amateur plant enthusiasts, students, teachers, staff of non-governmental organizations and conservation groups, scientific, academic, and Philippine government institutions, members of horticultural societies, and private plant collectors. This social medium 'outpost' of CDFP provides an electronic infrastructure for remote training and mentorship for botany students from different parts of the Philippines by more experienced members who share their time and knowledge. This makes the CDFP Group a useful teaching tool. For example, one of us (LaFrankie) has made group membership compulsory for students in his plant taxonomy class. Topics of discussion include diagnostic characters used to identify plants, distributional, ecological, cultural, ethnobotanical and economic uses of Philippine plants, taxonomic status of names, threat status and endemism, and recent publications in the scientific literature.

Status and progress of the checklist

Co considered his checklist an unfinished work and most likely would have not regarded it complete enough for publication. In our opinion and that of Co's family, however, his death necessitated the publication of his files to prevent the loss of the wealth of taxonomic data that he generated throughout his career. In this context, publishing the checklist on a website provided an opportunity to continue to develop this work-in-progress as a living document. Another advantage that web-publication offered is the unlimited number of photographs that can be included to illustrate the checklist species. Furthermore, it would have taken a tremendous amount of work and therefore considerable time to produce a polished 'paper' version of the checklist that is suitable for printing. Finally, many of Co's botanical specimens at PUH are not yet mounted and distributed to other herbaria. Although this work is currently underway, it will take many years before it is completed and experts in the world's herbaria can study these specimens. By making Co's photographs accessible online, others can begin to analyze some of his biodiversity data.

As can be expected for a prematurely published manuscript, the CDFP checklist is indeed far from a polished document. There are numerous misspellings, parsing errors resulting from the conversion from Word files to html, and style and formatting inconsistencies. In addition, treatments of some taxonomic groups are current, whereas others still need to be revised. Type information is provided for many species, although it is still lacking for others. Co probably intended to provide this information for all species, judging from the frequency in which the string "--Type:" has been included without the actual citation of types. Co did not treat naturalized and cultivated species consistently. Sometimes these are included in the checklist, sometimes they are not. Sometimes they are presented under a separate heading, sometimes they are included with the native species. Despite these imperfections and its incompleteness, the CDFP checklist is a valuable resource. Especially, because it is the most up-to-date comprehensive list of Philippine vascular plants and because it is unique in being richly illustrated with plant photographs, most of which were taken in nature.

Although the efforts of the CDFP team were initially focused on publishing Co's checklist online and sorting, editing, uploading and linking his nearly 11,000 photographs, some progress has been made with updating the checklist with recent literature. In the future, we hope to secure funding that would allow skilled personnel to further develop and improve the site. Editing priorities include updating taxonomic treatments, amending distributional data, more explicitly highlighting Philippine endemics, and consistently reporting whether a taxon is native or introduced.

Status and progress of photographic documentation

Plant photographs provide opportunities to introduce people to plant diversity in an accessible, user-friendly way. Our aim is therefore to photographically illustrate as many species in the CDFP checklist as is possible. At the start of the CDFP project, most of its images were those taken by Co (10,963) during his fieldwork and throughout much of his career. These represented some 221 (82%) families, 1007 (50%) genera, and 1712 (17%) species of vascular plants. In the two years since his death, the number of photographs of Philippine plants has been tripled (currently, >33,927). This is the result of the cumulative efforts of the CDFP team and contributions of other botanists and plant enthusiasts. We increased the number of photos of pteridophyte families by 5%, genera by 20%, and species by 23%. For gymnosperms, all of the 7 families and 15 genera as well as 46% of the Philippine species are now illustrated. Likewise, for flowering plants, 96% of the families, 76% of the genera and 30% of the species are currently represented by photographs; an increase of 14%, 27%, and 14%, respectively (Figure 3). Table 1 shows an updated nominal count of Philippine vascular plants at different taxonomic ranks (family, genus, species) based on a classification system modified from APG 3 for flowering plants and Smith et al. (2006) with updates by Christenhusz et al. (2011) and Rothfels et al. (2012) for ferns and lycophytes.

In contrast to the photographs that are taken specifically for the CDFP project, it was never Co's intention to use his plant photographs as illustrations for his checklist. They were simply an identification aid to his botanical collections and possibly also a memory aid when doing his fieldwork. As a consequence, he usually took only one or two photographs of the habit or reproductive structures of a plant. In later years, when digital plant photography became mainstream, he started taking more photos per plant with a stronger emphasis on showing species-diagnostic characters. In addition to taking photographs of species that were not included in Co's collection, we are therefore further developing CDFP by more thoroughly photo-documenting species that are already covered.

The power of plant photography: noteworthy discoveries, range extensions, and new records of plants for the Philippines as a result of CDFP activities

Photography fieldwork by Pelsner, Barcelona, Callado and Nickrent for the CDFP project has resulted in some noteworthy discoveries in the form of possible new species and range extensions. This shows that plant photography fieldwork can be a more time- and resource-efficient way to generate biodiversity information than plant collecting. Of course, botanical photographs cannot replace plant specimens, although they can document

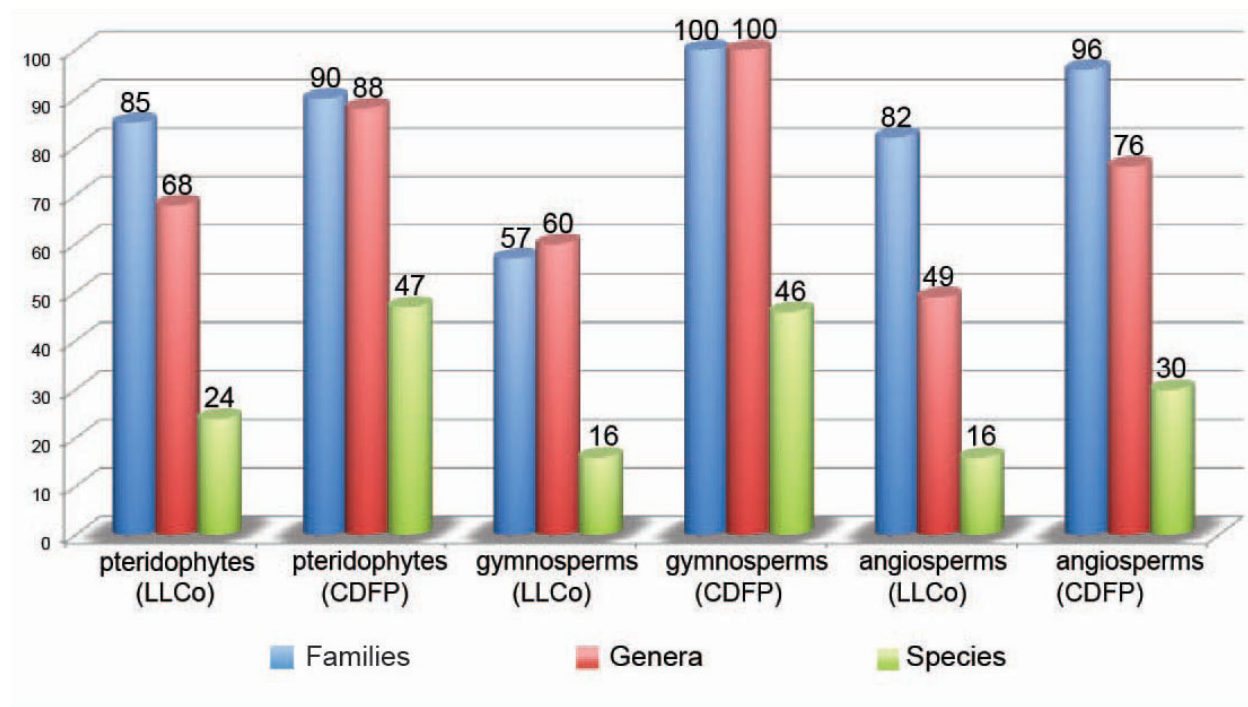


Figure 3. Progress of illustrating Philippine plants at different taxonomic ranks from the time of L. L. Co (ca. 1990s - Nov. 2010) to the present at CDFP website (as of 25 Sept. 2013).

Table 1. Nominal counts of Philippine plants at various taxonomic ranks at the CDFP website (www.philippineplants.org).

plant group	families	genera	species
pteridophytes	40	159	1034
gymnosperms	7	16	45
angiosperms	222	1826	9028
total	269	2001	10107

information that is not always well preserved on herbarium specimens, such as the habit of a plant, flower color, and the three-dimensional aspects of plant parts. The difficulty in obtaining collecting permits for biological specimens in the Philippines and the fact that forests are fast disappearing provide other sound reasons for documenting the Philippine flora through the lens of a camera. Because PhytoImages allows plant photographs and their associated data to be archived and handled in a similar way as physical plant specimens (e.g., organized in a classification system, unique accession numbers, electronic annotation slips, and geo-referenced locality information), these can form scientific quality vouchers for biodiversity-related studies.

Several species that are possibly new to science were photodocumented including a *Dendrobium* from Davao Oriental and several species from Antique Prov. on Panay

Island, namely, *Bulbophyllum* sp. sect. *Stachysanthes*, *Coelogyne* aff. *integerrima* Ames (Suarez & Cootes, pers. comm.), *Hoya* aff. *pubicalyx* Merr. (Apocynaceae; Siar, pers. comm.), *Crypteronia* aff. *paniculata* Blume (Crypteroniaceae), *Baccaurea* (Phyllanthaceae), and *Christisonia* (Orobanchaceae). We also photodocumented a possible new species of mistletoe (*Amyema nickrentii*, Loranthaceae, Pelser & Barcelona 2013) and a species of *Amorphophallus* (Araceae; Hettterscheid, pers. comm.) from Aurora Province in Luzon. Descriptions of these new taxa will be published separately.

New species records for the Philippines were also photodocumented in the CDFP. These include *Gastrodia verrucosa* Blume (Orchidaceae) from Antique Prov. in Panay (Plate 1; Schuiteman & Cootes, pers. comm.) and *Sarcolobus carinatus* Wall. (Apocynaceae; Plate 2) from Aurora Prov. in Luzon. Likewise, several new species records were also added to the flora of Panay, namely, *Hoya burtoniae* Kloppenb. (Apocynaceae; Aurige & Cajano, pers. comm.), and *Cirrhopetalum loherianum* Kraenzl. (Orchidaceae) (Suarez & Cootes, pers. comm.). *Helicia paucinervia* Merr. (Proteaceae; Plate 2), a species only known from a few collections was found in Baler, Aurora Prov.

Several range extentions for ferns were also confirmed, most of which were discovered within the limestone forests

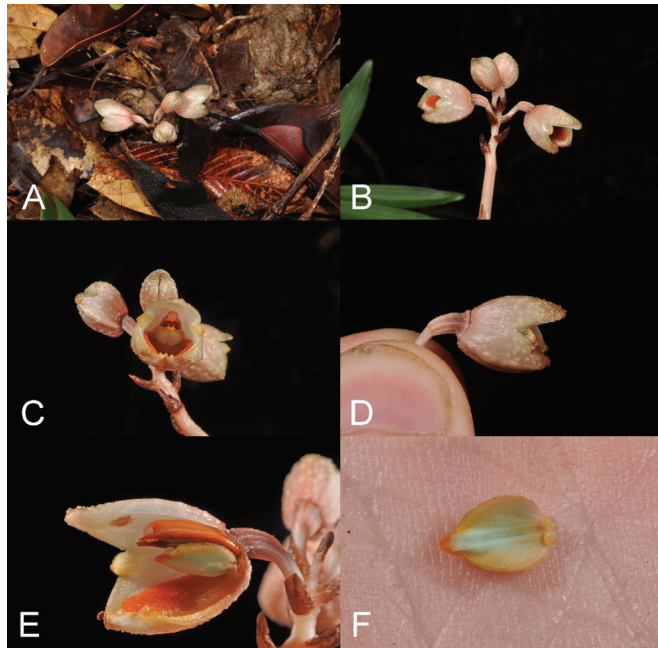


Plate 1. *Gastrodia verrucosa* Blume, new record to the Philippines. A. habit; B. inflorescence; C. frontal view of flower; D. lateral view of flower; E. longitudinal section of flower; F. labellum. Additional photographs of this plant can be viewed at www.phytoimages.siu.edu.

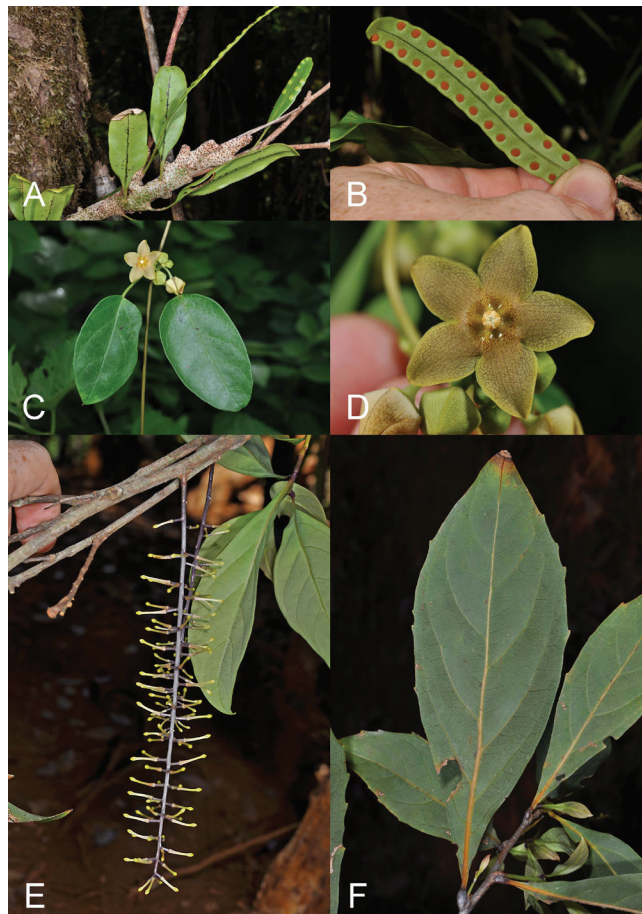


Plate 2. A, B. *Lecanopteris sinuosa* (Wall. ex Hook.) Copel.; C, D. *Sarcolobus carinatus* Wall.; E, F. *Helicia paucinervia* Merr.

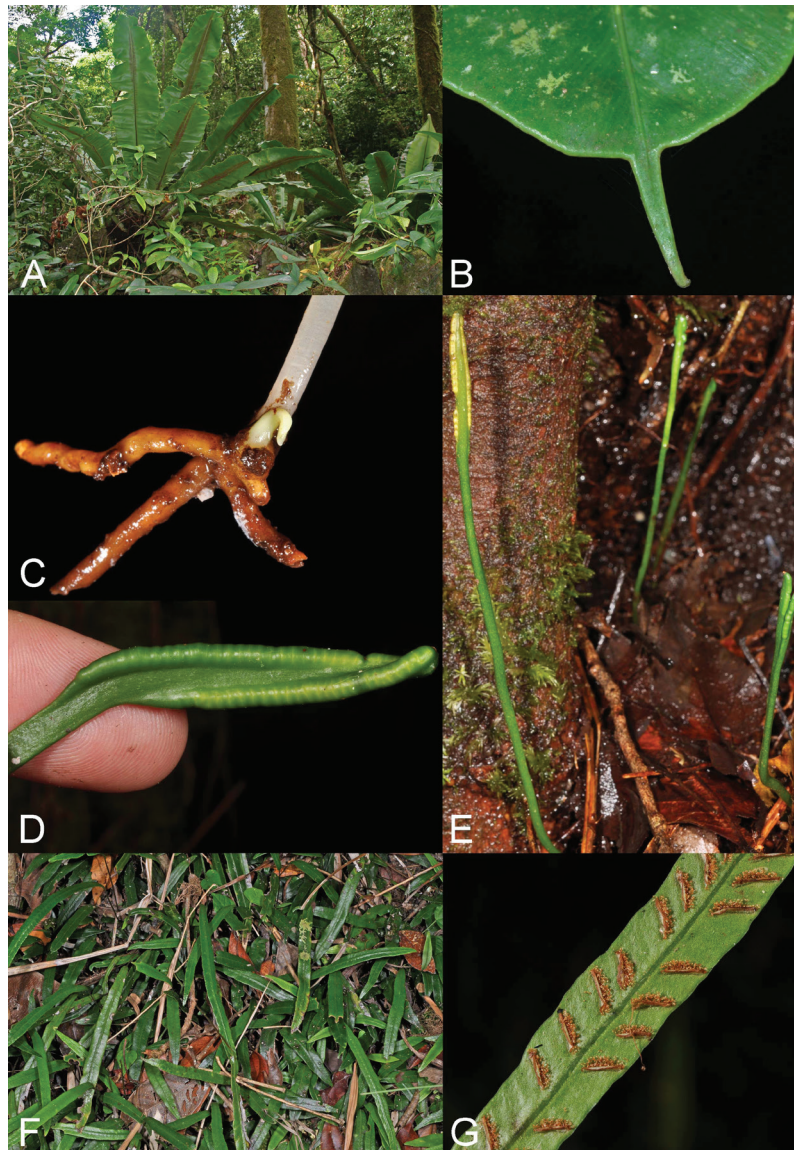


Plate 3. A, B. *Asplenium nidus* L. var. *curtisorum* (Christ) Holtt.; C-E. *Ophioglossum ramosii* Copel.; F, G. *Diplazium subsinuatum* (Hook. & Grev.) Tagawa.

of Barangay Aningalan (San Remegio, Antique Prov.), and are new species records for the island of Panay. These are *Pyrrosia rasamalae* (Racib.) Shing, only reported for northern Luzon (Hovenkamp et al. 1998), *Lindsaea ensifolia* Sw. ssp. *ensifolia*, a relatively rare species in the Philippines and thus far reported to occur only in Luzon, Palawan, Sibuyan, Bohol and Guimaras islands, and *Lecanopteris sinuosa* (Wall. ex Hook.) Copel. (Plate 2), a species previously found only in Luzon, Polillo, Sibuyan, Palawan, Leyte, Cebu, Negros, Mindanao. *Arthropteris repens* (Brack.) C.Chr., a species whose geographical range includes Mt. Kinabalu, N Borneo and New Guinea was confirmed to occur on Mt. Banahaw, Quezon Province, a new record for the Philippines. *Diplazium subsinuatum* (Hook. & Grev.) Tagawa (Plate 3, F&G), a

species known only from three disjunct populations in the Philippines (Price, 1990), i.e. *Ramos BS7761* (MICH, US) from Ilocos Norte, *Barcelona 991* (PNH) from Mt. Iraya, Batanes, *Price, M.G. 4667* (CAHUP?) from Mt. Madias in Panay, was found in Aningalan. This population is the southernmost of its range (Sri Lanka, India to China, Indochina, Taiwan to Japan, Thailand, Borneo, Philippines). Another poorly collected taxon, *Asplenium nidus* L. var. *curtisorum* (Christ) Holtt. (Plate 3, A & B), known only from four collections from Mindanao: *Copeland PPE 49* (UC, US) and *Clemens BS 15594* (US), and Samar: *Price and Hernaez 154* (CAHUP?), *194* (L), was found locally abundant in the limestone outcrops (rarely epiphytic) along Bulanao River in Northwest Panay Peninsula Natural Park. This variety differs from

the typical *A. nidus*, by the narrower sori and prominently caudate apex (acuminate in var. *nidus*). Lastly, plants believed to be *Ophioglossum ramosii* Copel. (Plate 3, C-E, Callado et al. 1210, PNH), a species described by Copeland (1935) and known only from the type (*Ramos BS14771*, Camiguin de Mindanao, destroyed) were found in the Cinchona Forest Reserve of Mt. Kitanglad Range Natural Park in Bukidnon, Mindanao at 1220-1230 m. *Ophioglossum ramosii* is unique in that its fronds have no distinction between stipe and lamina and fertile spikes are not associated with sterile segments. In Kitanglad, the plants are relatively smaller (compared with the type) and are sympatric with *O. intermedium* (Callado et al. 1210, PNH), a species with fertile spikes associated with sterile segments. Plants earlier photodocumented on Mt. Sibaliw in Northwest Panay Peninsula Natural Park are believed to also represent this species.

A different approach to documenting the Philippine flora

The rapid decline of Philippines' native ecosystems calls for urgent conservation actions and these require solid baseline information about plant diversity. Ideally, these data would be derived from comprehensive specimen-based taxonomic research that consists of species descriptions, literature references, identification keys and distribution information. However, considering the enormous plant diversity in the Philippines (*ca.* 2001 genera and over 10,000 species of vascular plants), such a 'traditional' approach would be extremely time consuming and would depend on substantial contributions of many taxonomic specialists. This is illustrated by the fact that despite several attempts towards a written flora of the Philippines in the last few decades, Merrill's works (1923-1926) remained the most recent and comprehensive printed account for the seed plants of this region. Similarly, comprehensive overviews of other plant groups are now significantly outdated (e.g., Bartram 1939 for mosses; Copeland 1958-1961 for ferns). It must be noted, however, that several florulas of specific areas in the Philippines or treatments of specific plant groups have been published in recent decades. For example, a revised edition of Merrill's (1912) *Flora of Manila* by LaFrankie is forthcoming, and he also recently published a generic-level account of the tree genera of tropical Asia (LaFrankie, 2010). An example of a recent taxon-specific treatment is *Philippine Native Orchid Species* (Cootes 2011), although this work was not intended to be a comprehensive account of all Philippine orchids. Although highly valuable, these publications only partially fulfill the need for a comprehensive and accessible overview of vascular plants in the Philippines. Recently, scientists at University of the Philippines brought new life to a Flora of the Philippines project (www.philippineflora.info). However, considering the urgent need for baseline data for conservation, waiting

for this effort to be completed is not an option and we have therefore chosen to use a very different, 'cybertaxonomic' approach. This approach allowed us to quickly develop Co's checklist and his plant photographs and those of others into an online illustrated checklist that can form a starting point for taxonomic treatments using traditional methodology.

The future of CDFP

The future of the CDFP project will be one driven by the needs and contributions of its users. The web-based nature of the project and its social media-based communication tools provide an ideal online environment for connecting people that are interested in the Philippine flora; either as part of their profession or simply as a hobby and regardless of their geographic location. Through their online contributions in the form of, for example, shared images, discussions, and taxon identifications, this community informs the CDFP editors about new data that need to be added to the checklist or the associated documents to keep these up to date and to improve content. In addition, they are a source of new plant photographs that can be used to improve taxonomic coverage. The >23,000 plant images that have been added since the start of the CDFP website are evidence of the success of this approach.

The online infrastructure of CDFP empowers its users by providing free and easy access to biodiversity information. From this point of view, CDFP forms another component in a growing list of online open-access sources of biological data, e.g., the Biodiversity Heritage Library (<http://www.biodiversitylibrary.org/>), open-access journals like *Blumea*, digitized herbarium specimens, and curated collections of plant photographs. An equally important avenue for empowering people, however, is the potential that the CDFP creates for involving plant enthusiasts at all levels in contributing biodiversity data. Increased access to affordable internet and other communication tools, such as cell phone cameras and digital cameras with GPS and macro-photography functionalities enables Filipinos to easily document and contribute biodiversity data. Professional and/or experienced botanists that are part of the CDFP community help with interpreting and collating these data and as such, CDFP is also a powerful learning environment. In November 2012, the CDFP team held a 3-day cybertaxonomy and plant photography workshop at Mindanao State University – Iligan that was partially sponsored by the Rufford Small Grants Foundation. The goals of this workshop was to show students how to use the CDFP as an entry point to biodiversity data and to provide them with the skills needed to begin contributing to CDFP. In the future, we plan to provide similar training in other parts of the Philippines as well.

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