

## THE PHILIPPINE RUBIACEAE GENERA: UPDATED SYNOPSIS IN INTKEY DATABASES OF THE DELTA SYSTEM

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### SUMMARY

Changes in generic concepts and delimitation resulted in 80 genera (6 of which are cultivated) of Philippine Rubiaceae. Generic descriptions of all genera are coded in DELTA format (Version 2000) and translated by the directive CONFOR into INTKEY database for interactive identification and information retrieval. The descriptions incorporate mostly compiled data of Philippine Rubiaceae species and observations on over 130 characters. Recently accepted classification (subfamily, tribes, and subtribes) and significant characters defined by Robbrecht (1988, 1993) are appended to the generic descriptions. The database is available on the World Wide Web at [http://www.uni-bayreuth.de/departments/planta2/wgl/delta\\_ru/index.html](http://www.uni-bayreuth.de/departments/planta2/wgl/delta_ru/index.html).

**Key words:** Rubiaceae, Philippines, DELTA, information retrieval, interactive identification, INTKEY.

### INTRODUCTION

The family Rubiaceae is the fourth largest in number among vascular flora comprising 659 genera and approximately 13,000 species (Robbrecht, 1988). In the Flora Malesiana region, it is estimated only second to the Orchidaceae with about 150 genera and 1,830 species. The most recent enumeration of Philippine Rubiaceae genera is nearly eighty years old (Merrill, 1923) and out of date in many respects. Furthermore, the dearth of generic descriptions essential to the understanding of Rubiaceae in the Philippines prompted us establish an automated databank for Philippine Rubiaceae genera under the DELTA system.

Among dicotyledonous flowering plants, Rubiaceae is the one with the largest number of indigenous species and four endemic genera (*Antherosteles* Bremek., *Greeniopsis* Merr., *Sulitia* Merr., and *Villaria* Rolfe). Merrill (1923) recorded 63 genera and 527 species of Rubiaceae in the 'Enumeration of Philippine Flowering Plants'. However, systematic rearrangements (Bremekamp, 1940b, 1952; Ridsdale 1978c, 1982, 1996; Tirvengadam & Sastre, 1979; Tirvengadam, 1983; Wong, 1984; Ali & Robbrecht, 1991; De Block et al., 1996) have resulted in the re-establishment and/or segregation of a number of genera. Recent evaluation for the Philippines resulted in a total of 80 genera (6 of which are cultivated) which comprises 12.1% of the Rubiaceae genera worldwide. In contrast, the number of species (about 510) has been reduced compared to Merrill's

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(1923) record due to several new synonymies provided in a number of revisions (Cowan, 1936; Bremekamp, 1940a, 1947a; Ridsdale 1978a–c, 1996; Jansen & Ridsdale, 1983; Johansson, 1988; Huxley & Jebb, 1993; Cabral & Bacigalupo, 1996).

The present study endeavours to contribute to the understanding of Philippine Rubiaceae. It also ascertains the comparability of this study with other research efforts both on the Philippine flora and on the Taxonomy and Systematics of Rubiaceae worldwide. Moreover, it also validates the new names and combinations with the view to help scientists or foresters interested to get acquainted with the various nomenclatural and taxonomic changes that have occurred in the Rubiaceae of the Philippines. This up-to-date information on the genera of Rubiaceae occurring in the Philippines is an important first step towards a comprehensive treatment of the family for the island and an important contribution to the Flora of the Philippines project, since no recent survey has been done after Merrill's (1923) work.

The lack of comprehensive generic descriptions for Philippine Rubiaceae and the need for an interactive identification tool combined with information retrieval have initiated the use of a DELTA database. The DELTA format is a versatile tool for the storage and management of descriptive taxonomic data (Dallwitz, 1980) while the DELTA system is an integrated set of programs based on the use of the DELTA format. It is advantageous for the first stage in a project as large as the Philippine Rubiaceae, because it is easily accessible and versatile enough to allow corrections and additions throughout the whole project.

#### MATERIAL AND METHODS

The DELTA format is mainly composed of 3 files (Dallwitz et al., 1999): 1) a character file (CHARS); 2) a specification file (SPECS), describing character traits like number and type of characters; and 3) a taxon description file (ITEMS). The data are gathered against a character list which can be viewed also on the website. The characters and character states were compiled mostly by consulting literature sources, direct observation, and measurements on herbarium specimens borrowed from the Philippine National Herbarium (PNH), the National Herbarium Netherlands (L), and the National Botanical Garden of Belgium (BR). The list encompasses a total of 139 characters used to generate a natural language description of the Philippine Rubiaceae genera. Likewise, the character list gives information on questions of character definition, and includes other comments which do not appear in the printed taxon descriptions.

For each genus, currently accepted synonyms and type species are given; as well as the subfamilial, tribal, and subtribal position of the genus according to Robbrecht (1988, 1993) and molecular data (Bremer et al., 1995; Bremer, 1996; Bremer & Thulin, 1998; Bremer & Manen, 2000; Andreasen & Bremer, 2000; Razafimandimbison & Bremer, 2002). Characters include habit and morphology of both vegetative parts and reproductive parts. Further data were added if available and include information on breeding systems, in particular, heterostyly (Bahadur, 1968, 1970), seed anatomy (Robbrecht, 1988, 1993), pollen structure (Robbrecht, 1988, 1993; Puff, 1993) as well as chromosome base number and ploidy level (Kiehn, 1996). Genus distribution, total number of species, and number of Philippine species are indicated as well as important references.

A sample of the genus descriptions, generated from the databank by CONFOR and typeset automatically, is appended to this article. However, the genus descriptions are continuously improved and revised in the database. Thus, new characters are added from time to time, and existing definitions are improved or rendered less inclusive as more precise data become available. Likewise, characters and character states which are still undesirably inclusive or clumsy will be improved in due course. Against this background, an internet-accessible database has obvious advantages. Moreover, only few images are presently included in the CIMAGES file, and new images are added continuously.

To be able to use the program INTKEY, for interactive identification and information retrieval generated by the directive CONFOR, a PC with Windows 95/NT or later version is needed and the program INTKEY, available at <http://biodiversity.uno.edu/delta>, must be installed.

## RESULTS

### *Revisions in Philippine Rubiaceae species*

During the extensive preliminary studies for the Rubiaceae of the Flora of the Philippines project as well as present revisionary work on Philippine *Mussaenda* Burm. ex L. and *Villaria*, a number of name and rank changes has become inevitable which will be discussed briefly in the following.

Generic revisions involving Philippine Rubiaceae were initialized by Bremekamp (1934, 1939, 1940a–d, 1947a, b) who published extensive Latin descriptions. Bremekamp (1934, 1939) published a monograph of the genus *Pavetta* L. with emphasis on delimitation against the closely related genus *Ixora* L. He added four new species of *Pavetta* to the Philippine record. Six years later, Bremekamp (1940b) published a preliminary account of the Philippine species of *Urophyllum* Jack ex Wall., *Pleiocarpidia* Schum. & Bremek., and *Praravinia* Korth. & Bremek. In his investigation of *Urophyllum*, he noticed four uncommon features: 1) long-pedicellate flowers arising singly or in groups from leaf axils; 2) presence of acaridomatia on the leaves; 3) different kinds of hairs in the corolla; and 4) linear instead of oblong or ovate anther shape. Based on the unusual character of syngenesious anthers, Bremekamp (1940a) introduced a new endemic genus to the Philippines in the same year – *Antherostele*.

The four genera mentioned are placed in the same tribe, *Urophylleae*. Moreover, Bremekamp (1940b) revised the genus *Williamsia* Merr. and included some *Urophyllum* species in the genus *Praravinia*. However, he stated that, compared to other genera, delimitation of *Urophyllum* presents more difficulties. Similarly, he encountered difficulties in the classification of the Philippine species which are imperfectly known to the present day. He refrained from describing several *Urophyllum* species since the herbarium specimens he studied lack reproductive parts (Bremekamp, 1940b). He also experienced the same difficulty in the treatment of the genus *Praravinia* and most of the descriptions were based on fruiting material only. In this regard, re-investigation of the closely related Philippine species of *Urophyllum* and *Praravinia* is needed.

Moreover, Bremekamp published a monograph on the genus *Acranthera* Arn. ex Meisn. (1947b) and *Streblosa* Korth. (1947a). He recognized a single species of *Acranthera* in the Philippines – *A. philippinensis* Merr. and added one new endemic

species and five new varieties of *Streblosa*. Another early work was made on a systematic arrangement of the closely interrelated Malaysian species of *Wendlandia* Bartl. ex DC. (Cowan, 1936). Out of four series in Cowan's classification, he grouped the Malaysian *Wendlandia* in one series – *Subinclusae* (anthers almost sessile). This series is further subdivided into two subseries, ser. *Tinctoriae* and ser. *Paniculatae*, both represented by Philippine species. In 1964, Jayaweera published his treatment of the rubiaceous genus *Mussaenda* of the Philippine Islands. He added two more *Mussaenda* species from Merrill's list (1923) endemic to the Philippines and recognized a variety of *M. macrophylla* Wall. However, Bahadur (1968) remarked that Jayaweera recorded heterostyly in all the *Mussaenda* species he studied but did not mention dioecism. Heterostyly and dioecism are common on the tribe Mussaendeae (Bahadur, 1968).

Four new genera (*Aidia* Lour., *Rothmannia* Thunb., *Oxyceros* Lour., and *Tarennoidea* Tirveng. & Sastre) from the heterogeneous assemblage constituting presently the genus *Randia* are added to the Philippine Rubiaceae list (Tirvengadam & Sastre, 1979; Ridsdale, 1996). However, Ridsdale's combinations in *Rothmannia* and *Oxyceros* included in Table 1 are not yet published. Fagerlind (1943) observed that revision of *Randia* s.l. would establish several new genera. *Randia* is now an exclusively American genus from which eight genera (*Aidia*, *Brachytome*, *Catunaregam*, *Ceriscoides*, *Fagerlindia*, *Kochummenia*, *Porterandia*, and *Rothmannia*) were split during a recent revision of the species of the Malay Peninsula (Wong, 1984). Six Philippine species of *Randia* are still of uncertain position (*R. lanceolata*, *R. loheri*, *R. rostrata*, *R. samalensis*, *R. stenophyllum*, and *R. ticaensis*). According to Ridsdale (pers. comm., 2001), Philippine *Randia* is under study and some of its species will be transferred to the genus *Hypobathrum*.

The genus *Ceriscoides* (Hook.f.) Tirveng. has a particularly complex history discussed by Tirvengadam (1978). Tirvengadam (1978, 1983) published studies in the tribe Gardenieae, mostly in the *Randia*–*Gardenia* assemblage for tropical Asia. *Gardenia* Ellis was formerly separated from *Randia* on the basis of ovary structure (one-celled in *Gardenia* and two-celled in *Randia*). Tirvengadam (1978) raised the section *Ceriscoides* of *Randia* to generic status accommodating J.D. Hooker's section *Ceriscoides* of *Gardenia*. In the Philippines she transferred only one species from *Gardenia* to *Ceriscoides* (Tirvengadam, 1983).

Most of the revisions on Philippine Rubiaceae species were made by Ridsdale (1978a–c, 1979, 1982, 1985, 1989, 1996). In 1978 he published a worldwide revision on *Mitragyna* Korth., *Uncaria* Schreb., and the tribe Naucleae (Ridsdale, 1978c) of which 6 genera (*Ludekia*, *Metadina*, *Myrmeconuclea*, *Neonuclea*, *Petrusadina*, and *Nauclea*) are represented in the Philippines. He revised the heterogeneous genus *Adina* and Philippine representatives were placed under *Metadina* and *Petrusadina*. His detailed revisions of *Nauclea* L. and *Neonuclea* Merr. (Ridsdale, 1978b, c, 1989) have set understanding and delimitations of both genera. He made one combination from *Neonuclea* to *Ludekia*, a new genus record to the Philippines. In 1979, he recognized the taxonomic position of *Sulitia* Merr., an endemic monotypic genus in the Philippines. He transferred the genus from the tribe Cinchoneae to the Gardenieae with reference to the position and form of its inflorescence. Moreover, he published a revision of *Badusa* (Ridsdale, 1982) describing a new species from Palawan, *B. palawensis*. However, he recognized *B. philippica* as dubious and taxonomic re-investigation revealed that this species is a synonym of *B. corymbifera* (Soerjarto et al., 1996) found in Tonga, Fiji to Solomon Island, and New Guinea.

Jansen & Ridsdale (1983) published a revision of the genus *Dolicholobium* A. Gray. They recognized the two Philippine representatives as conspecific. In 1985, Ridsdale described a new species of *Fagerlindia* Tirveng. (*F. emanuelssoniana* Ridsdale) and a new combination, *F. microcarpa* (Bartl. ex DC.) Ridsdale (*Gardenia micropora*). *Fagerlindia* had been segregated from *Randia* s.l. by Tirvengadam (1983). Ridsdale's (1996) recent published work deals with a review of *Aidia* in southeast Asia and Malesia. He described one new species and three new combinations for Philippine record. Ridsdale is currently making combinations in *Greeniopsis* Merr. and *Hymenodictyon* Wall. included in Table 1 which will be published in the near future.

Jansen (1984) published a synopsis of *Guettardella* Champ. ex Benth., where all the Philippine species of *Antirhea* were transferred to *Guettardella* as new combinations and one new species (*G. caudata*) was described. He assigned all Old World *Antirhea* species to *Guettardella* except for two species from the Mascarene Islands. Meanwhile, Chaw & Darwin (1992) made a systematic study of the palaeotropical genus *Antirhea* including the segregate genus *Guettardella*. Their extensive study resulted to 36 species of *Antirhea*, eight out of 13 species in Table 1 are new records for the Philippines.

Other revisions in the 1980s include *Knoxia* L. (Bhattacharjee & Deb, 1985; Puff & Robbrecht, 1989); *Prismatomeris* Thwaites (Johansson, 1987; Igersheim & Robbrecht, 1993); and *Caelospermum* Blume (Johansson, 1988), adding a new Philippine combination (*C. volubile*) from the closely related genus *Morinda* L.

Ali & Robbrecht (1991) published remarks on Asian and Australian taxa included in *Diplospora* DC. or *Tricalysia* A. Rich. ex DC. and showed that the two genera form an artificial assemblage of species. The Philippine *Tricalysia* species were all transferred to *Diplospora* leaving *Tricalysia* as an exclusively African genus. Two new combinations in *Diplospora* were made but the identity of *D. sessilis* is yet to be determined. *Discospermum* Dalzell which is recognized as a synonym of *Diplospora*, was upheld at generic rank (Ali & Robbrecht, 1991). It is represented by only one species, which had been transferred from *Gardenia* by Ali & Robbrecht (1991). Huxley & Jebb (1991a, b, 1993) published a series of tuberous epiphytes recognizing five genera (*Anthorrhiza*, *Hydnophytum*, *Myrmecodia*, *Myrmephytum*, and *Squamellaria*) and united them in a new subtribe, the Hydnophytinae, on the base of tuber cavity development and form of inflorescences. Three genera of the tuberous epiphytes (*Hydnophytum* Jack., *Myrmecodia* Jack., and *Myrmephytum* Becc.) are represented in the Philippines. Revisions are available for *Myrmephytum* (Huxley & Jebb, 1991b) and *Myrmecodia* (Huxley & Jebb, 1993). All previously described Philippine *Myrmecodia* species were subsumed under one species, *M. tuberosa* Jack. A revision of Philippine species of *Hydnophytum* is still wanting. In 1993, the tribal affiliation of *Scyphiphora* (Puff & Rohrhofer, 1993) was changed from tribe Knoxieae (subfam. Antirheoideae) to the tribe Gardenieae (subfam. Ixoroideae). Likewise, the tribe Schradereae was re-examined (Puff et al., 1993). Puff et al. (1993) concluded that *Lucinaea* DC. is a synonym of *Schradera* Vahl. In a follow-up study (Puff et al., 1998) all previously described Philippine *Lucinaea* species were transferred to *Schradera*. One new combination and one new endemic species (*Schradera elmeri*) were included for the Philippine record. Other generic revisions comprising Philippine genera are those of *Xanthophytum* Reinw. ex Blume (Axelius, 1990) and *Paederia* L. (Puff, 1991), but they did not result in name changes or additional records for the Philippines.

(Text continued on page 271)

Table 1. New taxa and name changes in Philippine Rubiaceae species since Merrill (1923).

| Revised name  | Old name   | Date of most recent revision             |
|---|--|--|
| <b><i>Aidia</i></b> Lour.                                       |  | Ridsdale, 1996                           |
| <i>A. acuminata</i> (Blume) K.M. Wong                           | <i>Randia umbellata</i> Elmer  |  |
| <i>A. auriculata</i> (Wall.) Ridsdale<br>var. <i>auriculata</i> | <i>Randia auriculata</i> (Wall.) K.Schum.  |  |
| <i>A. bakeri</i> (Merr.) Ridsdale                               | <i>Randia bakeri</i> Merr.   |  |
| <i>A. foveata</i> Ridsdale                                      |  |  |
| <i>A. pulcherrima</i> (Merr.) Ridsdale                          | <i>Randia pulcherrima</i> Merr.  |  |
| <i>A. racemosa</i> (Cav.) Tirveng.                              | <i>Randia racemosa</i> (Cav.) Fern.-Vill.  |  |
| <b><i>Antirhea</i></b> Comm. ex Juss.                           |  | Chaw & Darwin, 1992                      |
| <i>A. attenuata</i> (Elmer) Chaw                                | <i>Antirhea hexasperma</i> Roxb.<br><i>Guettardella hexasperma</i> (Roxb.)<br>M.E. Jansen    |  |
| <i>A. benguetensis</i> (Elmer) Valetton                         | <i>Guettardella microphylla</i> (DC.)<br>M.E. Jansen   |  |
| <i>A. caudata</i> (M.E. Jansen) Chaw                            | <i>Antirhea philippinensis</i> Elmer<br><i>Guettardella microphylla</i> (DC.)<br>M.E. Jansen |  |
| <i>A. edanoi</i> Chaw   | <i>Antirhea livida</i> Elmer   |  |
| <i>A. foveolata</i> Chaw  | <i>Antirhea microphylla</i> (Bartl. ex DC.)<br>Merr.   |  |
| <i>A. hexasperma</i> (Roxb.) Merr.                              | <i>Guettardella hexasperma</i> (Roxb.)<br>M.E. Jansen  |  |
| <i>A. livida</i> Elmer  | <i>Guettardella livida</i> (Elmer) M.E. Jansen   |  |
| <i>A. microphylla</i> (Bartl. ex DC.) Merr.                     | <i>Guettardella microphylla</i> (Bartl. ex DC.)<br>M.E. Jansen                               |  |
| <i>A. paxillata</i> Chaw  |  |  |
| <i>A. philippinensis</i> (Benth.) Rolfe                         | <i>Antirhea microphylla</i> sensu Merr.  |  |
| <i>A. ramosii</i> Chaw  | <i>Antirhea microphylla</i> sensu Merr.  |  |
| <i>A. tayabensis</i> Chaw                                       | <i>Antirhea livida</i> sensu Merr.   |  |
| <i>A. ternata</i> Chaw  |  |  |
| <b><i>Antherosteles</i></b> Bremek.                             |  | Bremekamp, 1940b                         |
| <i>A. banahaensis</i> (Elmer) Bremek.                           | <i>Urophyllum banahaense</i> Elmer   |  |
| <i>A. callophylla</i> Bremek.                                   |  |  |
| <i>A. grandistipula</i> (Merr.) Bremek.                         | <i>Urophyllum grandistipulum</i> Merr.   |  |
| <i>A. luzoniensis</i> (Merr.) Bremek.                           | <i>Urophyllum luzoniense</i> Merr.   |  |
| <b><i>Badusa</i></b> A. Gray                                    | Excluded by Merrill (1923)   | Ridsdale, 1982;<br>Soejarto et al., 1996 |
| <i>B. palauensis</i> Valetton                                   |  |  |
| <i>B. palawanensis</i> Ridsdale                                 |  |  |
| <i>B. philippica</i> (Cav.) S.Vidal                             | <i>B. corymbifera</i> (G.Forst.) A. Gray   |  |
| <b><i>Caelospermum</i></b> Blume (= <i>Coelospermum</i> )       |  | Johannson, 1988                          |
| <i>C. volubile</i> (Merr.) J.T. Johanss.                        | <i>Morinda volubilis</i> (Blanco) Merr.  |  |
| <b><i>Ceriscoides</i></b> (Hook.f.) Tirveng.                    |  | Tirvengadam, 1983                        |
| <i>C. curranii</i> (Merr.) Tirveng.                             | <i>Gardenia curranii</i> Merr.   |  |
| <b><i>Chassalia</i></b> Comm. ex Poir.                          |  | Deb & Krishna, 1982                      |
| <i>C. curviflora</i> (Wall.) Thwaites                           | <i>C. curviflora</i> (Wall.) Thwaites  |  |
| var. <i>ophioxylodes</i> (Wall.) D.B. Deb<br>& B. Krishna       |  |  |
| <b><i>Diplospora</i></b> DC.                                    |  | Ali & Robbrecht, 1991                    |
| <i>D. fasciculiflora</i> (Elmer) Elmer                          | <i>Randia fasciculiflora</i> Elmer   |  |
| <i>D. puberula</i> (Merr.) Ali & Robbr.                         | <i>Tricalysia puberula</i> Merr.   |  |
| <i>D. sessilis</i> Elmer  | generic position to be determined  |  |
| <i>D. tinagoensis</i> (Elmer) Ali & Robbr.                      | <i>Tricalysia tinagoensis</i> Elmer  |  |

Table 1 (continued)

| Revised name   | Old name   | Date of most recent revision |
|--|--|------------------------------|
| <b>Discospermum</b> Dalzell<br><i>D. whitfordii</i> (Elmer) Ali & Robbr.   | <i>Gardenia whitfordii</i> Elmer   | Ali & Robbrecht, 1991        |
| <b>Dolicholobium</b> A. Gray<br><i>D. philippinense</i> Trel.  | <i>Dolicholobium hirsutum</i> Elmer  | Jansen & Ridsdale, 1983      |
| <b>Fagerlindia</b> Tirveng.<br><i>F. emanuelssoniana</i> Ridsdale<br><i>F. microcarpa</i> (Bartl. ex DC.) Ridsdale                                       | <i>Gardenia microcarpa</i> Bartl. ex DC.   | Ridsdale, 1985               |
| <b>Greeniopsis</b> Merr.<br><i>G. discolor</i> Merr.<br><i>G. euphlebia</i> Merr.<br><i>G. megalantha</i> Merr.<br><i>G. multiflora</i> (Elmer) Merr.    | <i>Greeniopsis sibuyanensis</i> Elmer<br><i>Greeniopsis philippinensis</i> Merr.<br><i>Greeniopsis pubescens</i> Merr. | Ridsdale, unpublished        |
| <b>Hymenodictyon</b> Wall.<br><i>H. orixense</i> (Roxb.) Mabb.   | <i>Hymenodictyon excelsum</i> (Roxb.) Wall.  | Ridsdale, unpublished        |
| <b>Knoxia</b> L.<br><i>K. sumatrensis</i> (Retz.) DC.<br>var. <i>sumatrensis</i>   | <i>Knoxia corymbosa</i> Willd.   | Bhattacharjee & Deb, 1985    |
| <b>Ludekia</b> Ridsdale<br><i>L. bernardoi</i> (Merr.) Ridsdale  | <i>Neonauclea bernardoi</i> Merr.  | Ridsdale, 1978b              |
| <b>Metadina</b> Bakh.f.<br><i>M. trichotoma</i> (Zoll. & Mor.) Bakh.f.   | <i>Adina zschokkei</i> Elmer   | Ridsdale, 1978b              |
| <b>Mitragyna</b> Korth.<br><i>M. diversifolia</i> (Wall. ex G.Don) Havil.<br><i>M. speciosa</i> (Korth.) Havil.  | <i>Mitragyna rotundifolia</i> (Roxb.) Kuntze   | Ridsdale, 1978c              |
| <b>Mussaenda</b> Burm. ex L.<br><i>M. macrophylla</i> Wall.<br>var. <i>brevipilosa</i> Jayaw.<br><i>M. milleri</i> Elmer<br><i>M. pinatubensis</i> Elmer | <i>Mussaenda macrophylla</i> Wall.   | Jayaweera, 1964              |
| <b>Myrmecodia</b> Jack<br><i>M. tuberosa</i> Jack  | <i>Myrmecodia echinata</i> Gaudich.<br><i>Myrmecodia urdenatensis</i> Elmer<br><i>Myrmecodia sorsogonensis</i> Elmer   | Huxley & Jebb, 1993          |
| <i>M. tuberosa</i> Jack 'apoensis'<br>C.R. Huxley & Jebb<br><i>M. tuberosa</i> Jack 'sibuyanensis'<br>C.R. Huxley & Jebb                                 | <i>Myrmecodia apoensis</i> Elmer<br><i>Myrmecodia sibuyanensis</i> Elmer   |                              |
| <b>Myrmeconauclea</b> Merr.<br><i>M. strigosa</i> (Korth.) Merr.<br>var. <i>fluviatilis</i> Ridsdale   | <i>Myrmeconauclea strigosa</i> (Korth.) Merr.<br><i>Sarcocephalus fluviatilis</i> Elmer                                | Ridsdale, 1978b              |
| <b>Myrmephytum</b> Becc.<br><i>M. beccarii</i> Elmer<br><i>M. selebicum</i> (Becc.) Becc.  |  | Huxley & Jebb, 1991b         |
| <b>Nauclea</b> L.<br><i>N. orientalis</i> (L.) L.  | <i>Nauclea undulata</i> Roxb.<br><i>Nauclea elmerii</i> Merr.  | Ridsdale, 1978b              |

Table 1 (*continued*)

| Revised name                                | Old name   | Date of most recent revision |
|---|--|------------------------------|
| <b><i>Nauclea</i></b> ( <i>continued</i> )  |  |                              |
| <i>N. robinsonii</i> Merr.                  |  |                              |
| <i>N. subdita</i> (Korth.) Steud.           | <i>Nauclea junghuhni</i> (Miq.) Merr.<br><i>Nauclea multicephala</i> (Elmer) Merr.                         |                              |
| <b><i>Neonauclea</i></b> Merr.              |  | Ridsdale, 1978a              |
| <i>N. bartlingii</i> (DC.) Merr.            |  |                              |
| var. <i>bartlingii</i>                      | <i>Neonauclea ategii</i> (Elmer) Merr.   |                              |
| var. <i>cumingiana</i> (S.Vidal) Ridsdale   | <i>Neonauclea vidalii</i> (Elmer) Merr.<br><i>Neonauclea cordatula</i> Merr.                               |                              |
| <i>N. calycina</i> (DC.) Merr.              | <i>Neonauclea monocephala</i> Merr.  |                              |
| <i>N. circumscissa</i> Ridsdale             |  |                              |
| <i>N. formicaria</i> (Elmer) Merr.          |  |                              |
| <i>N. glabra</i> (Roxb.) Bakh.f. & Ridsdale | <i>Neonauclea nitida</i> (Havil.) Merr.<br><i>Neonauclea ovata</i> Merr.<br><i>Neonauclea venosa</i> Merr. |                              |
| <i>N. jagorii</i> Merr.                     |  |                              |
| <i>N. kentii</i> Merr.                      | <i>Neonauclea mindanaensis</i> Merr.   |                              |
| <i>N. lanceolata</i> (Blume) Merr.          | <i>Neonauclea oligophlebia</i> Merr.   |                              |
| subsp. <i>lanceolata</i>                    |  |                              |
| subsp. <i>gracilis</i> (S.Vidal) Ridsdale   | <i>Neonauclea gracilis</i> (S.Vidal) Merr.   |                              |
| <i>N. media</i> (Havil.) Merr.              |  |                              |
| <i>N. pseudocalycina</i> Ridsdale           |  |                              |
| <i>N. puberula</i> Merr.                    | <i>Neonauclea forsteri</i> (Seem.) Merr.   |                              |
| <i>N. reticulata</i> (Havil.) Merr.         |  |                              |
| <i>N. wenzelii</i> Merr.                    |  |                              |
| <b><i>Oxyceros</i></b> Lour.                |  | Ridsdale, unpublished        |
| <i>O. bispinosus</i> (Griff.) Tirveng.      | <i>Randia uncaria</i> Elmer<br><i>Randia williamsii</i> Elmer  |                              |
| <b><i>Paederia</i></b> L.                   |  | Puff, 1991                   |
| <i>P. foetida</i> L.                        |  |                              |
| <i>P. verticillata</i> Blume                |  |                              |
| <b><i>Pavetta</i></b> L.                    |  | Bremekamp, 1934              |
| <i>P. barnesii</i> Elmer                    |  |                              |
| <i>P. basilanensis</i> Bremek.              |  |                              |
| <i>P. brachyantha</i> Merr.                 |  |                              |
| <i>P. cumingii</i> Bremek.                  |  |                              |
| <i>P. dolichostyla</i> Merr.                |  |                              |
| <i>P. elmeri</i> Merr.                      |  |                              |
| <i>P. indica</i> L.                         |  |                              |
| <i>P. luzonica</i> Bremek.                  |  |                              |
| <i>P. membranacea</i> Blanco                |  |                              |
| <i>P. mindanaensis</i> Bremek.              |  |                              |
| <i>P. parvifolia</i> Vidal                  |  |                              |
| <i>P. phanerophlebia</i> Merr.              |  |                              |
| <i>P. subferruginea</i> Merr.               |  |                              |
| <i>P. williamsii</i> Merr.                  |  |                              |
| <b><i>Pertusadina</i></b> Ridsdale          |  | Ridsdale, 1978b              |
| <i>P. multifolia</i> (Havil.) Ridsdale      | <i>Adina multifolia</i> Havil.   |                              |
| <b><i>Pleiocarpidia</i></b> K. Schum.       |  | Bremekamp, 1940a, d          |
| <i>P. lanaensis</i> Merr.                   |  |                              |



Table 1 (continued)

| Revised name   | Old name  | Date of most recent revision     |
|--|---|----------------------------------|
| <b>Praravinia</b> Korth.   |   | Bremekamp, 1940a                 |
| <i>P. acuminata</i> (Merr.) Bremek.  | <i>Urophyllum acuminatum</i> Merr.  |                                  |
| <i>P. affinis</i> (Merr.) Bremek.  | <i>Urophyllum affine</i> Merr.  |                                  |
| <i>P. everettii</i> Merr.  | <i>Williamsia everettii</i> Merr.   |                                  |
| <i>P. glabra</i> (Merr.) Bremek.   | <i>Williamsia glabra</i> Merr.  |                                  |
| <i>P. loheri</i> (Merr.) Bremek.   | <i>Williamsia loheri</i> Merr.  |                                  |
| <i>P. longistipula</i> (Merr.) Bremek.   | <i>Williamsia longistipula</i> Merr.  |                                  |
| <i>P. lucbanensis</i> (Elmer) Bremek.  | <i>Urophyllum lucbanense</i> Elmer  |                                  |
| <i>P. microphylla</i> (Merr.) Bremek.  | <i>Urophyllum microphyllum</i> Merr.  |                                  |
| <i>P. mimica</i> (Merr.) Bremek.   | <i>Williamsia mimica</i> Merr.  |                                  |
| <i>P. mindanaensis</i> (Elmer) Bremek.   | <i>Williamsia mindanaensis</i> Elmer  |                                  |
| <i>P. multinervia</i> (Merr.) Bremek.  | <i>Williamsia multinervia</i> Merr.   |                                  |
| <i>P. negrosensis</i> (Merr.) Bremek.  | <i>Urophyllum negrosense</i> Merr.  |                                  |
| <i>P. panayensis</i> (Merr.) Bremek.   | <i>Williamsia panayensis</i> Merr.  |                                  |
| <i>P. pubescens</i> (Quisumb. & Merr.)<br>Bremek.                              | <i>Williamsia pubescens</i> Quisumb. & Merr.  |                                  |
| <i>P. quadribacteolata</i> (Merr.) Bremek.                                     | <i>Urophyllum quadribacteolatum</i> Merr.   |                                  |
| <i>P. sablanensis</i> (Elmer) Bremek.  | <i>Williamsia sablanensis</i> Elmer   |                                  |
| <i>P. stenophylla</i> (Merr.) Bremek.  | <i>Williamsia stenophylla</i> Merr.   |                                  |
| <i>P. triflora</i> (Quisumb. & Merr.) Bremek.                                  | <i>Williamsia triflora</i> Quisumb. & Merr.   |                                  |
| <i>P. viridescens</i> (Elmer) Bremek.  | <i>Williamsia viridescens</i> Elmer   |                                  |
| <b>Prismatomeris</b> Thwaites  |   | Ridley, 1939;<br>Johansson, 1987 |
| <i>P. brachypus</i> Ridl.  |   |                                  |
| <i>P. obtusifolia</i> Merr.  |   |                                  |
| <i>P. tetrandia</i> (Roxb.) K. Schum.<br>subsp. <i>tetrandia</i> J.T. Johanss. | <i>P. tetrandia</i> (Roxb.) K. Schum.<br>var. <i>philippinensis</i> Ridl.           |                                  |
| <b>Rothmannia</b> Thunb.   |   | Ridsdale, unpublished            |
| <i>R. graciliflora</i> (Merr.) Ridsdale  | <i>Randia graciliflora</i> Merr.  |                                  |
| <i>R. lagunensis</i> (Merr.) Ridsdale  | <i>Gardenia lagunensis</i> Merr.  |                                  |
| <i>R. leytenis</i> Ridsdale  |   |                                  |
| <i>R. merrillii</i> (Elmer) Ridsdale   | <i>Gardenia merrillii</i> Elmer<br><i>Gardenia negrosensis</i> Merr.                |                                  |
| <b>Schradera</b> Vahl ( <i>Lucinaea</i> DC.)                                   |   | Puff et al., 1998                |
| <i>S. monocephala</i> (Merr.) Puff,<br>Buchner & Greimler                      | <i>Lucinaea monocephala</i> Merr.   |                                  |
| <i>S. elmeri</i> Puff, Buchner & Greimler                                      | <i>Lucinaeae epiphytica</i> Elmer<br><i>Lucinaea involuocrata</i> Elmer             |                                  |
| <b>Scyphiphora</b> C.F. Gaertn.  |   | Puff & Rohrhofer, 1993           |
| <i>S. hydrophyllacea</i> C.F. Gaertn.  |   |                                  |
| <b>Spermacoce</b> L.   |   | Cabral & Bacigalupo,<br>1996     |
| <i>S. hispida</i> L.   | = <i>Borreria hispida</i> (L.) K. Schum.  |                                  |
| <i>S. ocymoides</i> Burm.f.  | = <i>Borreria ocymoides</i> (Burm.f.) DC.   |                                  |
| <i>S. verticillata</i> L.  | = <i>Borreria verticillata</i> (L.) G. Mey.<br><i>Borreria stricta</i> (L.) G. Mey. |                                  |
| <b>Streblosa</b> Korth.  |   | Bremekamp, 1947b                 |
| <i>S. axilliflora</i> Merr.  | <i>Streblosa glabra</i> Valetton  |                                  |
| var. <i>angustifolia</i> Bremek.   |   |                                  |
| var. <i>latifolia</i> Bremek.  |   |                                  |
| var. <i>laxiflora</i> Bremek.  |   |                                  |
| <i>S. palawanensis</i> Bremek.   |   |                                  |
| var. <i>merrilli</i> Bremek.   |   |                                  |
| var. <i>elmeri</i> Bremek.   | <i>Streblosa glabra</i> Valetton  |                                  |

Table 1 (continued)

| Revised name                                     | Old name                                   | Date of most recent revision |
|--|--|------------------------------|
| <b><i>Sulitia</i></b> Merr.                      |  | Ridsdale, 1979               |
| <i>S. obscurinervia</i> (Merr.) Ridsdale         | <i>Gardenia obscurinervia</i> Merr.        |                              |
| <b><i>Tarennia</i></b> Gaertn.                   |  | Bremekamp, 1934              |
| <i>T. bakeri</i> (Merr.) Bremek.                 | <i>Pavetta bakeri</i> Merr.                |                              |
| <i>T. luzoniensis</i> (D. Vidal) Bremek.         | <i>Pavetta luzoniensis</i> D. Vidal        |                              |
| <i>T. meyeri</i> (Elmer) Bremek.                 | <i>Pavetta meyeri</i> Elmer                |                              |
| <i>T. multinervia</i> (Merr.) Bremek.            | <i>Pavetta multinervia</i> Merr.           |                              |
| <i>T. pubescens</i> (Bartl.) Bremek.             | <i>Pavetta pubescens</i> Bartl.            |                              |
| <b><i>Tarennoidea</i></b> Tirveng. & Sastre      |  | Tirvengadam & Sastre, 1979   |
| <i>T. wallichii</i> (Hook.f.) Tirveng. & Sastre  | <i>Randia wallichii</i> Hook.f.            |                              |
| <b><i>Uncaria</i></b> Schreb.                    |  | Ridsdale, 1978c              |
| <i>U. acida</i> (Hunter) Roxb. var. <i>acida</i> |  |                              |
| <i>U. attenuata</i> Korth.                       | <i>Uncaria canescens</i> Korth.            |                              |
| <i>U. callophylla</i> Blume ex Korth.            |  |                              |
| <i>U. cordata</i> (Lour.) Merr.                  |  |                              |
| forma <i>insignis</i> (DC.) Ridsdale             | <i>Uncaria insignis</i> DC.                |                              |
| forma <i>sundaica</i> Ridsdale                   |  |                              |
| <i>U. lanosa</i> Wall.                           |  |                              |
| var. <i>appendiculata</i> (Benth.) Ridsdale      |  |                              |
| forma <i>ferrea</i> (Blume) Ridsdale             |  |                              |
| forma <i>philippinensis</i> (Elmer) Ridsdale     | <i>Uncaria philippinensis</i> Elmer        |                              |
| forma <i>setiloba</i> (Benth.) Ridsdale          | <i>Uncaria setiloba</i> Benth.             |                              |
| <i>U. longiflora</i> (Poir.) Merr.               |  |                              |
| var. <i>longiflora</i>                           |  |                              |
| var. <i>pteropoda</i> (Miq.) Ridsdale            | <i>Uncaria laevifolia</i> Elmer            |                              |
| <i>U. nervosa</i> Elmer                          |  |                              |
| <i>U. perrottetii</i> (A. Rich.) Merr.           |  |                              |
| <i>U. roxburghiana</i> Korth.                    |  |                              |
| <i>U. velutina</i> Havil.                        |  |                              |
| <b><i>Urophyllum</i></b> Wall.                   |  | Bremekamp, 1940a             |
| <i>U. acuminatissimum</i> Merr.                  |  |                              |
| <i>U. bataanense</i> Elmer                       |  |                              |
| <i>U. caudatum</i> Merr.                         |  |                              |
| <i>U. elliptifolium</i> Merr.                    |  |                              |
| <i>U. leytense</i> Merr.                         |  |                              |
| <i>U. memecycloides</i> (Presl) Rolfe            | <i>Urophyllum arboreum</i> (Reinw.) Korth. |                              |
| <i>U. mindoreense</i> Merr.                      |  |                              |
| <i>U. panayense</i> Merr.                        |  |                              |
| <i>U. platyphyllum</i> Elmer                     |  |                              |
| <i>U. reticulatum</i> Elmer                      |  |                              |
| * <i>U. spec. aff. reticulatum</i>               | Identity to be checked                     |                              |
| <i>U. subglabrum</i> Merr.                       |  |                              |
| <i>U. urdanetense</i> Elmer                      |  |                              |
| <b><i>Wendlandia</i></b> Bartl. ex DC.           |  | Cowan, 1936                  |
| <i>W. brachyantha</i> Merr.                      |  |                              |
| <i>W. luzoniensis</i> DC.                        | <i>Wendlandia uvariifolia</i> Merr.        |                              |
| var. <i>membranifolia</i> (Elmer) Cowan          | <i>Wendlandia membranifolia</i> Elmer      |                              |
| var. <i>williamsii</i> (Merr.) Cowan             | <i>Wendlandia williamsii</i> Merr.         |                              |
| <i>W. nervosa</i> Merr.                          |  |                              |
| <i>W. philippinensis</i> Cowan                   | <i>Wendlandia glabrata</i> DC.             |                              |

Table 1 (continued)

| Revised name                                | Old name | Date of most recent revision |
|---|----------|------------------------------|
| <b><i>Wendlandia</i></b> (continued)        |          |                              |
| <i>W. sibuyanensis</i> Cowan                |          |                              |
| <i>W. syringoides</i> Cowan                 |          |                              |
| <i>W. warburgii</i> Merr.                   |          |                              |
| <b><i>Xanthophyllum</i></b> Reinw. ex Blume |          | Axelius, 1990                |
| <i>X. ferrugineum</i> (DC.) Merr.           |          |                              |
| <i>X. fruticosum</i> Blume                  |          |                              |

Three other genera (*Hedyotis* L., *Oldenlandia* L., and *Plectronia* L.) included in Merrill's list (1923) are wanting revision. While revising the African *Oldenlandia* species of tribe Hedyotideae, Bremekamp (1952) split off the genus *Exallage* Bremek. He refrained from giving a full description of the genus because he could not include a study of the numerous Asian species in his study. In the Philippines, he transferred four species (*E. auricularia*, *E. philippinensis*, *E. perhispidata*, and *E. radicans*) to *Exallage* out of the 49 *Hedyotis* species listed by Merrill (1923) and only *E. auricularia* was provided with a description. The African *Exallage* is a well-defined genus based on the indehiscent fruit, etc. A similar variation exists in Asian *Hedyotis* s.l., the identities of which require a meticulous and laborious work to investigate.

In 1985, Bridson reinstated the genus *Psydrax* after evaluating the heterogeneous African species of *Canthium*. She divided the genus *Psydrax* into two subgenera, *Psydrax* (palaeotropical) and *Phallaria* (African). She revised only the African species, resulting in 36 species of *Psydrax* which include new combinations from *Canthium* and *Plectronia*. Seven years later, Bridson (1992) published a revision of the genus *Canthium* in tropical Africa with a complete list of all African epithets of *Canthium* and *Plectronia*. Furthermore, she indicated the group affinities of Malesian *Canthium* which is a good basis for revising the Asian species. The genera *Exallage* and *Psydrax* will be included in the Philippine Rubiaceae database when revisions for the Philippine species become available.

Table 1 summarizes all the changes in Philippine Rubiaceae species since Merrill (1923). The old names are written beside currently used names to enable the reader to compare and cross check. Detailed information of all the genera can be retrieved using the INTKEY database.

#### *Taxonomic position of the Philippine Rubiaceae genera*

Classification of the family Rubiaceae has been a point of dispute among contending taxonomic views (Schumann, 1891; Verdcourt, 1958; Bremekamp, 1966; Robbrecht, 1988, 1993) and for molecular data (Bremer et al., 1995; Bremer, 1996; Bremer & Thulin, 1998; Bremer & Manen, 2000; Andreassen & Bremer, 2000; Razafimandimbison & Bremer, 2002). This large family is still undertreated, many genera needing revision and the complexity of subfamilial and tribal classification remain unsettled (Robbrecht, 1993).

(Text continued on page 274)

Table 2. Subfamilial and tribal classification of Philippine Rubiaceae genera.

Subfamilies: **ANTI**rheoideae, **CIN**chonoideae, **COFF**eoideae, **GUET**tardoideae, **IXOR**oideae, **POMA**-zotoideae, **RUBI**oideae, **URO**phylloideae.

Tribes and subtribes: **ACR**anthereae, **ANTH**ospermeae-Coprosminae, **ARG**ostemmatae, **CIN**choneae, **COFF**eeae, **CON**damineae, **COP**tosapeltae, **GAL**ieae, **GAR**denieae-Gardeniinae/**Dip**losporinae, **GUET**tardeae, **HAME**lieae, **HED**ytotideae, **ISE**rteiae, **IXO**reae, **KNO**xieae, **LAS**iantheae, **MOR**indeae-Morindinae/**Pris**matomerideae/**Mitch**ella group, **MUS**saendeae, **NAU**cleae-Adininae/**Mytr**agyninae/**Nau**cleinae/**Unc**arinae, **OCT**otropideae, **OLD**enlandieae, **OPH**iorrhizeae, **PAE**derieae, **PAV**etteae, **POM**azoteae, **PSY**chotrieeae-**Psych**otriinae/**Hydn**ophytinae, **RON**deletieae, **RUB**ieae, **SCH**radereae, **SPE**rmacoceae, **URO**phyllea, **VAN**guerieae.

Classification according to different authors: (–), genus not mentioned by author; (?), of uncertain position; (=), same classification as previous author; (\*), cultivated; (x), *Portlandia* group (Robbrecht, 1993).

| Genus                | Schumann,<br>1891 | Verdcourt,<br>1958 | Bremekamp,<br>1966 | Robbrecht,<br>1988, 1993                | Molecular data |
|----------------------|-------------------|--------------------|--------------------|---|----------------|
| <i>Acranthera</i>    | CINC MUS          | CINC IXO           | IXOR ACR           | CINC ISE, 1988;<br>Insertae sedis, 1993 | (–)            |
| <i>Aidia</i>         | (–)               | (–)                | (–)                | IXOR GAR-G                              | (=)            |
| <i>Amaracarpus</i>   | COFF PSY          | RUBI PSY           | (=)                | RUBI PSY-P                              | RUBI PSY       |
| <i>Antherostele</i>  | (–)               | RUBI URO           | URO URO            | CINC URO                                | (–)            |
| <i>Antirhea</i>      | COFF GUE          | GUET GUE           | (=)                | ANTI GUE                                | CINC GUE       |
| <i>Argostemma</i>    | CINC OLD          | RUBI ARG           | (=)                | (=)                                     | (=)            |
| <i>Badusa</i>        | CINC CIN          | CINC CIN           | (?)                | CINC CON, 1988;<br>(x), 1993            | (–)            |
| <i>Bikkia</i>        | CINC CON          | CINC RON           | CINC CON           | (=), 1988; (x), 1993                    | (–)            |
| <i>Canthium</i>      | (–)               | CINC VAN           | IXOR VAN           | ANTI VAN                                | (–)            |
| <i>Ceriscoides</i>   | (–)               | (–)                | (–)                | IXOT GAR-G                              | (–)            |
| <i>Chassalia</i>     | COFF PSY          | RUBI PSY           | (=)                | RUBI PSY-P                              | RUBI PSY       |
| <i>Cinchona</i> *    | CINC CIN          | (=)                | (=)                | (=)                                     | (–)            |
| <i>Coelospermum</i>  | COFF MOR          | RUBI MOR           | RUBI MOR           | (=)                                     | RUBI MOR-Mo    |
| <i>Coffea</i> *      | COFF IXO          | CINC IXO           | IXOR COF           | IXOR COF                                | (=)            |
| <i>Coptosapelta</i>  | CINC CIN          | CINC CIN           | IXOR COP           | CINC COP                                | (–)            |
| <i>Cowiea</i>        | (–)               | (–)                | (–)                | IXOR OCT                                | (–)            |
| <i>Damnacanthus</i>  | CINC MOR          | RUBI MOR           | (=)                | RUBI MOR-Mi                             | (=)            |
| <i>Dentella</i>      | CINC OLD          | RUBI HED           | (=)                | (=)                                     | RUBI SPE       |
| <i>Diplospora</i>    | CINC GAR          | (=)                | IXOR GAR           | IXOR GAR-D                              | IXOR COF       |
| <i>Discospermum</i>  | (–)               | (–)                | (–)                | IXOR GAR-D                              | IXOR COF       |
| <i>Dolicholobium</i> | CINC CIN          | (=)                | (=)                | (=)                                     | (–)            |
| <i>Exallage</i>      | (–)               | (–)                | RUBI HED           | (=)                                     | (–)            |
| <i>Fagerlindia</i>   | (–)               | (–)                | (–)                | IXOR GAR-G                              | (–)            |
| <i>Galium</i>        | COFF GAL          | RUBI RUB           | (=)                | (=)                                     | (=)            |
| <i>Gardenia</i>      | CINC GAR          | (=)                | IXOR GAR           | IXOR GAR-G                              | (=)            |
| <i>Geophila</i>      | COFF PSY          | RUBI PSY           | (=)                | RUBI PSY-P                              | RUBI PSY       |
| <i>Greenea</i>       | CINC RON          | (=)                | (=)                | (=)                                     | (–)            |
| <i>Greeniopsis</i>   | (–)               | (–)                | (–)                | CINC COP                                | (–)            |
| <i>Guettarda</i>     | COFF GUE          | GUET GUE           | (=)                | ANTI GUE                                | CINC GUE       |
| <i>Gynochthodes</i>  | COFF MOR          | RUBI MOR           | (=)                | (=)                                     | RUBI MOR-Mo    |
| <i>Hamelia</i> *     | CINC GAR          | RUBI HAM           | (=)                | (=)                                     | CINC HAM       |
| <i>Hedyotis</i>      | (–)               | RUBI HED           | (=)                | (=)                                     | RUBI SPE       |
| <i>Hydnophytum</i>   | COFF PSY          | RUBI PSY           | (=)                | RUBI PSY-H                              | RUBI PSY       |
| <i>Hymenodictyon</i> | CINC CIN          | (=)                | (=)                | CINC COP                                | (–)            |
| <i>Hypobathrum</i>   | CINC GAR          | (=)                | IXOR GAR           | IXOR OCT                                | (–)            |
| <i>Ixora</i>         | COFF IXO          | CINC IXO           | IXOR COF           | IXOR PAV                                | IXOR IXO       |
| <i>Knoxia</i>        | COFF KNO          | RUBI KNO           | (=)                | ANTI KNO                                | RUBI SPE       |

Table 2 (continued)

| Genus                | Schumann,<br>1891 | Verdcourt,<br>1958 | Bremekamp,<br>1966 | Robbrecht,<br>1988, 1993          | Molecular data |
|----------------------|-------------------|--------------------|--------------------|-----------------------------------|----------------|
| <i>Lasianthus</i>    | COFF PSY          | RUBI PSY           | (=)                | RUBI PSY-P (tentatively included) | RUBI LAS       |
| <i>Ludokia</i>       | (-)               | (-)                | (-)                | CINC NAU-A                        | (=)            |
| <i>Metadina</i>      | (-)               | (-)                | (-)                | CINC NAU-A                        | (=)            |
| <i>Mitragyna</i>     | CINC NAU          | CINC CIN           | (=)                | CINC COP                          | CINC NAU-M     |
| <i>Morinda</i>       | COFF MOR          | RUBI MOR           | (=)                | (=)                               | RUBI MOR-Mo    |
| <i>Mussaenda</i>     | CINC MUS          | (=)                | (=)                | CINC ISE                          | IXOR MUS       |
| <i>Mycetia</i>       | CINC MUS          | RUBI HED           | (=)                | CINC ISE                          | RUBI ARG       |
| <i>Myrmecodia</i>    | COFF PSY          | RUBI PSY           | (=)                | RUBI PSY-H                        | RUBI PSY       |
| <i>Myrmeconuclea</i> | (-)               | (-)                | (-)                | CINC NAU-A                        | (=)            |
| <i>Myrmephytum</i>   | COFF PSY          | RUBI PSY           | (=)                | RUBI PSY-H                        | RUBI PSY       |
| <i>Nauclea</i>       | CINC NAU          | (=)                | (=)                | CINC NAU-N                        | (=)            |
| <i>Neonauclea</i>    | (-)               | CINC CIN           | (=)                | CINC NAU-A                        | (=)            |
| <i>Nertera</i>       | COFF ANT          | RUBI ANT           | (=)                | RUBI ANT-C                        | RUBI ANT       |
| <i>Oldenlandia</i>   | CINC OLD          | RUBI HED           | RUBI HED           | (=)                               | RUBI SPE       |
| <i>Ophiorrhiza</i>   | CINC OLD          | RUBI OPH           | UROP OPH           | RUBI OPH                          | (=)            |
| <i>Oxyceros</i>      | (-)               | (-)                | (-)                | IXOR GAR-G                        | (=)            |
| <i>Paederia</i>      | COFF PAE          | RUBI PAE           | RUBI PAE           | (=)                               | (=)            |
| <i>Pavetta</i>       | COFF IXO          | CINC IXO           | IXOR IXO           | IXOR PAV                          | (=)            |
| <i>Pentas*</i>       | CINC OLD          | RUBI HED           | (=)                | (=)                               | RUBI SPE       |
| <i>Pertusadina</i>   | (-)               | (-)                | (-)                | CINC NAU-A                        | (=)            |
| <i>Pleiocarpidia</i> | (-)               | RUBI URO           | UROP URO           | CINC URO                          | (-)            |
| <i>Posoqueria*</i>   | CINC GAR          | (=)                | (?)                | IXOR GAR-G                        | (?)            |
| <i>Praravinia</i>    | CINC MUS          | RUBI URO           | UROP URO           | CINC URO                          | RUBI URO       |
| <i>Prismatomeris</i> | COFF MOR          | RUBI MOR           | (=)                | RUBI MOR-P                        | (=)            |
| <i>Psychotria</i>    | COFF PSY          | RUBI PSY           | (=)                | RUBI PSY-P                        | RUBI PSY       |
| <i>Psydrax</i>       | (-)               | (-)                | (-)                | ANTI VAN                          | IXOR VAN       |
| <i>Rondeletia*</i>   | CINC RON          | (=)                | (=)                | (=)                               | (-)            |
| <i>Rothmannia</i>    | (-)               | (-)                | (-)                | IXOR GAR-G                        | (=)            |
| <i>Rubia</i>         | COFF GAL          | RUBI RUB           | (=)                | (=)                               | (=)            |
| <i>Saprosma</i>      | COFF PSY          | RUBI PAE           | (=)                | (=)                               | (-)            |
| <i>Schradera</i>     | CINC MUS          | RUBI SCH           | (=)                | (=)                               | (=)            |
| <i>Scyphiphora</i>   | CINC GAR          | RUBI KNO           | RUBI               | ANTI KNO                          | (-)            |
| <i>Spermacoce</i>    | COFF SPE          | RUBI SPE           | (=)                | (=)                               | (=)            |
| <i>Streblosa</i>     | (-)               | RUBI PSY           | (=)                | RUBI PSY-P                        | (-)            |
| <i>Sulitia</i>       | (-)               | (-)                | (-)                | IXOR GAR-G                        | (-)            |
| <i>Tarenna</i>       | (-)               | CINC IXO           | IXOR IXO           | IXOR PAV                          | (=)            |
| <i>Tarennoidea</i>   | (-)               | (-)                | (-)                | IXOR GAR-G                        | (-)            |
| <i>Timonius</i>      | COFF GUE          | GUET GUE           | (=)                | ANTI GUE                          | (-)            |
| <i>Uncaria</i>       | (-)               | CINC CIN           | (=)                | CINC COP                          | CINC NAU-U     |
| <i>Urophyllum</i>    | CINC MUS          | RUBI URO           | UROP URO           | CINC URO                          | RUBI URO       |
| <i>Villaria</i>      | CINC GAR          | (=)                | IXOR GAR           | IXOR OCT                          | (-)            |
| <i>Wendlandia</i>    | CINC RON          | (=)                | (=)                | (=)                               | (-)            |
| <i>Xanthophytum</i>  | CINC OLD          | RUBI OPH           | POMA POM           | RUBI HED                          | RUBI OPH       |

The latest accepted classification of Robbrecht (1988, 1993) is basically adopted here but molecular phylogenetic results were also incorporated. Refer to Table 2 for quick identification of Philippine Rubiaceae genera placements which are also included in the generic descriptions of the INTKEY database. The four subfamilies (Cinchonoideae, Ixoroideae, Antirheoideae, and Rubioideae) recognized by Robbrecht are all represented in Philippine Rubiaceae genera, subfam. Rubioideae being the largest in genus numbers. Of 44 tribes (five of which are tribus incertae as to subfamilial placement) in his list (Robbrecht, 1988), a total of 25 tribes are found in the Philippines.

In contrast to Robbrecht's (1988, 1993) classification, molecular data of Bremer (1996) suggest only three subfamilies (Cinchonoideae, Ixoroideae, and Rubioideae). Phylogenetic results showed that the members of subfam. Antirheoideae are nested among the three other subfamilies. Likewise, she made some modifications of the tribal groupings particularly in the subfamily Rubioideae. However, Bremer (1996) stated that there is a need for more genera of Rubiaceae to be analyzed to obtain strong evidence and relevant data for subfamilial revisions of Rubiaceae classification. Indeed, the impact of phylogenetic analyses show that Rubiaceae is still systematically unsettled.

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## APPENDIX: EXAMPLE FOR A GENERIC DESCRIPTION PRODUCED BY DELTA

*Mussaenda* Burm. ex L.

Type species: *Mussaenda frondosa* L.

Classification: Subfamily: Ixoroideae; Tribe: Mussaendeae (update from Bremer & Thulin, 1998).

Habit and vegetative parts: Trees, shrubs or undershrubs (rarely herbaceous), 1–8 m high, without succulent tuber. Spines absent. *Raphides* absent. Vegetative parts not foetid when bruised. Stem glabrous or pubescent, branched. Branches and branchlets pubescent (rarely glabrous). Adventitious roots on internodes absent. *Stipules* interpetiolar, not fused, entire to bifid, small to large, ovate to lanceolate or elliptic, pubescent, margin not hairy, colleters present (at the base), persistent or caducous. Leaves opposite or whorled (ternately), isophyllous or anisophyllous. Lamina membranous to papery, 4–20(–30) cm long, 2–10(–16.5) cm wide, ovate-lanceolate, or obovate; apex acute or acuminate or obtuse; base cuneate or obtuse, or rounded, decurrent on petiole or not; not ciliated on the margins; upper surface glabrous or pubescent, sparse; lower surface glabrous or pubescent, sparse or dense; subsessile or petiolate; lateral nerves prominent, 5–13(–18) pairs. Petiole 0.5–4(–7.5) cm long, pubescent, sparse or dense, not winged. *Domatia* absent.

Reproductive parts: *Inflorescences* present, axillary or terminal; flowering heads fascicled, on a branched axis; inflorescences cymes or thyrses; involucre bracts absent; interfloral bracts and bracteoles present. Flowers 5-merous, actinomorphic, bisexual, heterostylous, with semaphylls, not fragrant; pedicel absent or present, pubescent. *Calyx tube* extremely reduced (< 2 mm long) or cup-shaped to shortly tubular (> 2 mm long), hairs present; lobes short to well-developed (> 2 mm), equal, pubescent; colleters present. *Corolla* salverform or infundibular, 2–10 cm long; tube pubescent outside and inside; lobes linear-lanceolate or ovate; aestivation valvate; abaxial side pubescent; adaxial side pubescent; margin hairy or not hairy. Stamens inserted distal 1/4 of corolla tube or around middle (1/4–3/4 of corolla tube), separate, of equal sizes. Filaments distinct (> 1 mm), not hairy. Anthers dorsifixed, included in corolla tube, linear, dehiscing via longitudinally slits. Style included in corolla tube, terete or filiform, hairs present or absent. Stigmas lobate, 2, fusiform or linear, papillate. Ovary inferior, bilocular; placentation axile. Ovule per locule numerous, not pendulous. *Fruits* fleshy, not multiple, non-pyreniferous, berry, globose or ellipsoid; ridges or grooves absent; crown of calyx segments present or absent. *Seeds* numerous, angular, wingless, endospermic; exotestal cells isodiametric, with thickenings along the radial wall or in the inner tangential walls; isolated fibers absent.

*Pollen* binucleate, aperture 3 to > 3; colpate or porate.

*Chromosome basic number*  $x = 11$ , ploidy level 2.

Distribution – extending through the Old World tropics from Africa & Madagascar to India & Ceylon, China, Malaysia, the Philippines, Polynesia, New Guinea, and Australia.

Number of species – 190.

Philippine species – \**M. acuminatissima* Merr., \**M. albiflora* Merr., \**M. anisophylla* Vidal, \**M. attenuifolia* Elmer, \**M. benguetensis* Elmer, \**M. chlorantha* Merr., \**M. grandifolia* Elmer, \**M. lanata* C.B. Rob., \**M. macrophylla* Wall. var. *brevipilosa* Jayaweera, \**M. magallanensis* Elmer, \**M. milleri* Elmer, \**M. multibracteata* Merr., \**M. nervosa* Elmer, \**M. palawanensis* Merr., \**M. philippica* A. Rich., \**M. philippica* forma *aurorae* (Sulit), \**M. philippinensis* Merr., \**M. pinatubensis* Elmer, \**M. scandens* Elmer, \**M. setosa* Merr., \**M. vidalii* Elmer (\*endemic).

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