Pruski, J.F. 2011. Studies of Neotropical Compositae–III. *Dichrocephala integrifolia* (Astereae: Grangeinae) in Guatemala, an exotic genus and species new to the Americas. Phytoneuron 2011-65: 1–9. Published 15 December 2011. ISSN 2153 733X

STUDIES OF NEOTROPICAL COMPOSITAE–III. *DICHROCEPHALA INTEGRIFOLIA* (ASTEREAE: GRANGEINAE) IN GUATEMALA, AN EXOTIC GENUS AND SPECIES NEW TO THE AMERICAS

JOHN F. PRUSKI
Missouri Botanical Garden
P.O. Box 299
St. Louis, Missouri 63166

ABSTRACT

Dichrocephala integrifolia is documented, based on three recent collections from Guatemala, as a genus and species new to the Americas. Genera of Astereae subtribe Grangeinae known in the Americas include *Egletes*, *Plagiocheilus*, and now *Dichrocephala*.

KEY WORDS: America, Asteraceae, Astereae, Central America, Compositae, Cuchumatanes, *Dichrocephala*, Grangeinae, Guatemala, Huehuetenango, Mesoamerica, Neotropics.

The genus *Dichrocephala* L'Hér. ex DC. (Compositae: Astereae: Grangeinae) was revised by Fayed (1979), who recognized four species, but Beentje (2002) recognized only three species. *Dichrocephala* was placed in Astereae subtribe Grangeinae Benth. & Hook. f. by Fayed (1979), Bremer (1994), Nesom (1994), and Nesom and Robinson (2007). Nesom and Robinson (2007) recognized 16 genera within the Old World-centered Grangeinae. Characters useful in recognizing Grangeinae are the often disciform capitula with marginal pistillate florets usually pluriseriate and with white corollas, phyllaries never prominently resinous-veined, epaleate receptacles usually convex to conical, papillose triangular style branch appendages, and compressed erostrate cypselae often (at least in the Americas) epappose or nearly so. Among American Grangeinae, *Dichrocephala* is diagnosed by disciform (vs. radiate or pseudobilabiate) capitula.

Nesom (2000) gave *Egletes* Cass. and *Centipeda* Lour. as the only American genera of subtribe Grangeinae, but Panero (2007) modified this by treating *Centipeda* as the only genus of the African-centered tribe Athroismeae present in the Americas. Robinson and Brettell (1973) transferred South American *Plagiocheilus* Arn. ex DC. from tribe Anthemideae to tribe Astereae. Nesom (1994) and Nesom and Robinson (2007) treated *Plagiocheilus* within subtribe Grangeinae, and *Egletes* and *Plagiocheilus* as the only genera of Grangeinae occurring in the Americas. Grau (1977) noted that within tribe Grangeinae, *Dichrocephala* and *Grangea* Adans. are noteworthy for occurring in both Africa and Asia. Fayed (1979) gave *D. integrifolia* as occurring in Africa, Asia, and the western Pacific region, with the species appearing to be introduced into Australia (e.g., Stanley & Ross 1986) and Europe (e.g., Davis & Grierson 1975; Tutin et al. 1976; Clement & Foster 1994).

Work preliminary to a treatment of Compositae for Flora Mesoamericana shows that *Dichrocephala integrifolia* has apparently become established in Guatemala. This new generic continental report is based on three recent collections (in two localities) of *D. integrifolia* made in Guatemala. The genus appears not to have been reported previously in the Americas, and it is not listed as occurring in the Americas in Bremer (1994), Cuatrecasas (1986), Dillon (2005), Fayed (1979), Nash (1976), Nesom (1994), Nesom (2000), or Nesom and Robinson (2007).

In Guatemala, *Dichrocephala integrifolia* appears to be restricted to the Atlantic watershed, a distribution which when combined with the prevailing trade winds coming from the east and closer proximity of Guatemala to Africa than to Asia, suggests that the species could have been introduced into the Americas from Africa. If this is indeed the case, we should expect *D. integrifolia* to

ultimately be found in the West Indies, as are other moderately uncommon alien Compositae [e.g., *Crassocephalum crepidioides* (Benth.) S. Moore and *Sclerocarpus africanus* Jacq.] that are presumed to have been introduced into the Neotropics from Africa. It should be noted, however, that in reporting *Adenocaulon* (Compositae: Mutisieae) as a genus new to Guatemala, Blake (1934) drew attention to its previously known distribution in only northern and western temperate North America, southwestern South America, and eastern Asia, suggesting possible long-distance dispersal to Guatemala from Asia. It is unknown whether *D. integrifolia* was introduced into the Americas from Africa or Asia or whether its introduction is the result anthropomorphic influences.

The purpose of this report is to document *Dichrocephala integrifolia* (Astereae: Grangeinae) as a genus and species new to the Americas, to provide a key (modified from that of Grierson & Springate 2001) to species of *Dichrocephala*, to give brief synonymy of *D. integrifolia*, and to provide generic and specific descriptions of it that may be inserted into the Guatemalan Astereae treatment by Nash (1976). In that treatment *D. integrifolia* would key closest to *Egletes* by its annual habit, tall receptacles, and usually lyrate-pinnatifid leaves.

DICHROCEPHALA L'Hér. ex DC.

Annual herbs, monoecious; stems leafy; herbage never stipitate-glandular. **Leaves** simple to often lyrate-pinnatilobed or lyrate-pinnatifid, alternate, sessile or petiolate; blade thinly chartaceous, venation pinnate, base sometimes subauriculate. **Capitulescence** in open cymes, racemes, or panicles, rarely monocephalous. **Capitula** small, globose, disciform; involucre campanulate or hemispherical to crateriform; phyllaries imbricate, subequal, ca. 2-seriate, without prominent resinous veins; receptacle convex to conical or obovoid, epaleate, sometimes enlarged in fruit. **Marginal florets** many-numerous, pluriseriate, pistillate; corolla tubular to nearly salverform (never pseudobilabiate), sometimes bulbous proximally, sparsely glandular, apex 2–3(–4)-denticulate. **Disk florets** fewer in number than marginal florets, bisexual; corolla campanulate or sometimes salverform, 4(–5)-lobed, lobes usually ascending to erect; anthers ecaudate, obtuse to sagittate basally, apical appendage broadly triangular; pollen echinate, tricolporate, non-lophate with tectum continuous; style branch stigmatic surfaces 2-banded proximally, sterile apical appendage triangular, shorter than to about as long as fertile portion. **Cypselae** isomorphic, obovate, compressed, erostrate, green maturing pale brown, glandular usually at least apically and/or basally, otherwise glabrous, margins thickly costate, faces smooth or less typically indistinctly 1–2-striatulate, fruit sometimes shortly stipitate-pedicellate; pappus absent or disks sometimes with 1–2(–few) short caducous smooth bristles. $x = 9$. 3 spp. Native to Africa, Asia, and western Pacific region; introduced into Australia, Europe, and now Guatemala.

Key to the species of *Dichrocephala*

1. Capitula usually 6–8 mm diam.; phyllaries pilosulose to pilose; marginal pistillate florets with corollas funnelform to nearly salverform ..... **Dichrocephala chrysanthemifolia**
1. Capitula 2–4 mm diam.; phyllaries glabrous or subglabrous; marginal pistillate florets with corollas tubular to urceolate.
   2. Herbs to 0.35 m tall; marginal pistillate florets with corollas ovoid or urceolate; leaves sessile, usually pinnatilobed ..... **Dichrocephala benthamii**
   2. Herbs to 0.8(–1.3) m tall; marginal pistillate florets with corollas tubular, cylindrical throughout; leaves usually petiolate, usually lyrate-pinnatifid ..... **Dichrocephala integrifolia**

DICHROCEPHALA INTEGRIFOLIA (L. f.) Kuntze, Revis. Gen. Pl. 1: 333. 1891. *Hippia integrifolia* L. f., Suppl. Pl. 389. 1781. **LECTOTYPE** (designated by Fayed 1979: 494): **INDIA.** *Anon. s.n.* (LINN-1039.1, IDC microfiche 177. 626.III.4).

Centipeda latifolia Cass. ex Less., *Cotula bicolor* Roth, *Cotula latifolia* Pers., *Dichrocephala bicolor* (Roth) Schltdl., *Dichrocephala latifolia* DC., *Ethulia integrifolia* (L. f.) D. Don, *Ethulia paniculata* Schkuhr, *Grangea bicolor* (Roth) Willd. ex Loudon, *Grangea latifolia* Desf., *Grangea latifolia* Lam. ex Poir. (non Desf.), *Hippia bicolor* (Roth) Sm.

Herbs 0.1–0.8(–1.3) m tall; stems erect or ascending to less commonly decumbent, simple or few-branched distally, pilose to sparsely villous or glabrate. **Leaves** usually petiolate; blade (2–)4–10 × (0.5–)1–6.5 cm, usually lyrate-pinnatifid and ovate or obovate in outline (figs. 1, 2), less commonly unlobed and lanceolate to elliptic, larger secondary veins closely spaced proximally and remote distally, surfaces sparsely arachnoid-pubescent or pilose to subglabrous, typically eglandular, sometimes slightly rugulose adaxially, base obtuse to attenuate, marginal lobes 1–2(–3) per side, each usually 1–3.5 × 0.3–2 cm with the proximal pair obviously the smallest, oblong to obovate, irregularly serrate or crenate, terminal lobe 3–5.5 cm long, ovate to cordate, apex acute to obtuse; petiole 1–3.5 cm long. **Capitulescence** 4–7 × 3–6 cm, loosely pyramidally paniculate, of several axillary branchlets usually terminated by a 3–9(–18)-capitulate cyme; peduncles 0.3–2.5 cm long, slender, often 1–2-bracteolate; bracteoles 1–2.5 mm long, linear-lanceolate. **Capitula** 2–4 × 2–4 mm, in early anthesis slightly bicolored with the corollas of the disk florets darker than in the marginal pistillate florets; involucre 1–1.3 mm long, crateriform; phyllaries 10–15, 0.4–0.7 mm diam., oblanceolate to oblong, glabrous or subglabrous, margins slightly scarious, sometimes fimbriate, apex acute to obtuse; receptacle in fruit globose or broadly obconical, flattened apically. **Marginal pistillate florets** 100+, 4–8+-seriate (fig. 3); corolla 0.4–0.7 mm long, tubular, cylindrical throughout, white, apical denticulations < 0.1 mm long, corolla moderately persistent and often deflected upwards; style weakly exserted. **Disk florets** 15–30; corolla 0.6–1.2 mm long, campanulate, 4-lobed, ochroleucous or chloroleucous (or lobes sometimes pinkish), tube shorter than limb, lobes 0.2–0.4 mm long; anthers 0.3–0.4 mm long, about 2.5–3 times long as wide, ovate-sagittate, yellowish or brownish, appendage minute, endothecial pattern indistinct, periclinal and polar cell walls seemingly thickened (fig. 4A); style branches 0.1–0.2 mm long, apex acute, papillose abaxially, papillae rounded apically (fig. 4B). **Cypselae** 1–1.5 mm long, longer than corollas, in fruit the outer cypselae often directed downward (by receptacle growth) and obscuring the shorter involucre, sparsely glandular distally or especially apically, apex obtuse to sometimes emarginate; pappus absent in ray florets, disk cypselae epappose or with 1–2 bristles 0.4–0.8 mm long. $2n = 18$.

American exsiccatae examined: **GUATEMALA. Baja Verapaz:** Reserva Natural, Río Escondido, Purulhá, 15°06’41”N, 90°11’02”W, 1500 m, 24 Apr 2010, *Holt E6843* (to be deposited in HULE and MO, photograph of an unmounted pressed specimen in MO), same locality, 2 Apr 2011, *Holt E9974* (to be deposited in HULE and MO, photograph of an unmounted pressed specimen in MO). **Huehuetenango:** Sierra de los Cuchumatanes, sin. elev., 15–23 Sep 2006, *Guerrero 72* (USCG, photograph in MO).

Distribution and ecology: *Dichrocephala integrifolia* is native to Africa, Asia, and the western Pacific region and has been introduced into Australia, Europe, and now Guatemala. It is expected in adjacent regions of Central America and in the West Indies. In Guatemala, *D. integrifolia* occurs in disturbed areas at mid-elevations and is known to flower in April and September.

Dichrocephala integrifolia is the most common species of the genus and is a taller plant with larger leaves when compared to the two other species [i.e., African-centered *D. chrysanthemifolia* (Blume) DC. and Asian-centered *D. benthamii* C.B. Clarke]. Each of the three species of *Dichrocephala* is known from both Africa and Asia. *Dichrocephala integrifolia*, although described with the epithet "integrifolia," has leaves that are usually lyrate-pinnatifid and serrate or crenate.

The basionym *Hippia integrifolia* was overlooked for much of the 1800s, and *Dichrocephala integrifolia* was often called *D. latifolia* DC. The name *D. latifolia*, however, was noted by Schlechtendal (1852) as an illegitimate replacement name for *Cotula bicolor* Roth (1800), and Schlechtendal (1852) provided the combination *D. bicolor* (Roth) Schltdl. and listed *D. latifolia* in synonymy. Use of the illegitimate name *D. latifolia* has, nevertheless, continued in several floras (e.g., Humbert 1960), although in other floras the nomenclaturally correct *D. bicolor* has on occasion been adopted (e.g., Kaur & Sharma 2004). Andrews (1956), Davis and Grierson (1975), Wild (1975), and Fayed (1979) treated *D. bicolor* and *D. latifolia* in taxonomic synonymy of *D. integrifolia*.

Because *Dichrocephala integrifolia* has traditionally been called *D. latifolia*, I consider it useful to list in synonymy the known homotypic synonyms of both *Hippia integrifolia* and *Cotula bicolor* and also to include *Grangea latifolia* Desf., which may be nomenclaturally independent of *C. bicolor*. Full synonymy with literature references and typology was given by Fayed (1979). Although Fayed (1979) recognized two subspecies of *D. integrifolia*, I see no obvious distributional or morphological trends and accordingly treat the species broadly and without infrataxa. The species is well-known and has been illustrated several times under several names, including as *Sphaeranthus africanus* L. sensu N.L. Burman, Fl. Ind. tab. 60, fig. 2, 1768, an illustration that by a decade predates the protologue of *D. integrifolia*.

ACKNOWLEDGEMENTS

I would like to thank Rosa Ortiz (MO) for kindly preparing for publication the figures, Guy Nesom (FNA) and Rosa Ortiz for reviewing the manuscript, and Jim Zarucchi (MO) and George Yatskievych (MO) for helpful comments. I would like to thank Julio Morales (USCG) for hosting me in Guatemala in 2008 to work on the project "Compartiendo tecnologías y desarrollando capacidades para gestión de la biodiversidad en Centroamérica," which was supported by the Norwegian Agency of Development (NORAD). Sune Holt (HULE) is thanked for allowing me to use his field photographs as well as for sending me photographs of the pressed specimens of his collections, which he will deposit in HULE and MO. Also, AnaLu MacVean (UVAL), Mario Véliz (BIGU), Jorge Jiménez (USCG), Sofia Ortiz (USCG), and José Juan Vega (USCG) are kindly thanked for their help in Guatemala in herbaria as well as in the field.

LITERATURE CITED

Andrews, F.W. 1956. The flowering plants of the Sudan, Vol. 3 (Compositae–Gramineae). Buncle & Co., Arbroath, Scotland.

Beentje, H.J. 2002. Compositae (part 2). Pp. 315–546. Flora of tropical East Africa. Royal Botanic Gardens, Kew.

Blake, S.F. 1934. New Asteraceae from Guatemala collected by A.F. Skutch. J. Wash. Acad. Sci. 24: 432–443.

Bremer, K. 1994. Asteraceae. Cladistics & Classification. Timber Press, Portland.

Clement, E.J. and M.C. Foster. 1994. Alien plants of the British Isles: a provisional catalogue of vascular plants (excluding grasses). Botanical Society of the British Isles, London.

Cuatrecasas, J. 1986. Un género nuevo de Astereae, Compositae, de Colombia. Anales Jard. Bot. Madrid 42: 415–426.

Davis, P.H. and A.J.C. Grierson. 1975. Compositae. Pp. 1–890 *in* P.H. Davis (ed.), Flora of Turkey and the East Aegean Islands, Vol. 5. Edinburgh Univ. Press, Edinburgh.

Dillon, M.O. 2005. Flora genérica de los páramos: Asteraceae (Compositae). Mem. New York Bot. Gard. 92: 96–180.

Fayed, A. 1979. Revision der Grangeinae (Asteraceae–Astereae). Mitt. Bot. Staatssamml. München 15: 425–576.

Grau, J. 1977. Astereae–systematic review. Pp. 539–565 *in* V.H. Heywood, J.B. Harborne, and B.L. Turner (eds.), The Biology and Chemistry of the Compositae, Vol. 1. Academic Press, London.

Grierson, A.J.C. and L.S. Springate. 2001. Compositae (Asteraceae). Pp. 1397–1632 *in* A.J.C. Grierson and D.G. Long. Flora of Bhutan, including a record of plants from Sikkim and Darjeeling, Vol. 2, part 3. Royal Botanic Garden, Edinburgh & Royal Government of Bhutan.

Humbert, H. 1960. Flore de Madagascar et des Comores (Plantes Vasculaires): 189e famille, Composées, Vol. 1: 1–338. Firmin-Didot, Paris.

Kaur, H. and M. Sharma. 2004. Flora of Sirmaur (Himachal Pradesh). Bishen Singh Mahendra Pal Singh Publishers, Dehra Dun, India.

Nash, D.L. 1976. Flora of Guatemala: Compositae tribe III. Astereae. Fieldiana, Bot. 24(12): 128–164, 483–495.

Nesom, G.L. 1994. Subtribal classification of the Astereae (Asteraceae). Phytologia 76: 193–274.

Nesom, G.L. 2000. Generic conspectus of the tribe Astereae in North America and Central America, the Antilles, and Hawaii. Sida, Bot. Misc. 20: 1–100.

Nesom, G. and H. Robinson. 2007 [2006]. XV. Tribe Astereae Cass. (1819). Pp. 284–342 *in* K. Kubitzki (ed.), The Families and Genera of Vascular Plants, Vol. 8. Springer, Berlin.

Panero, J.L. 2007 [2006]. XVIII. Tribe Athroismeae Panero (2002). Pp. 395–400 *in* K. Kubitzki (ed.), The Families and Genera of Vascular Plants, Vol. 8. Springer, Berlin.

Robinson, H.E. and R.D. Brettell. 1973. Tribal revision in the Asteraceae. X. The relationship of *Plagiocheilus*. Phytologia 26: 159–162.

Schlechtendal, D.F.L. von. 1852. Corollarium observationum in plantas hortenses Halae Saxonum anno MDCCCLII et jam prius cultas institutarum. Linnaea 25: 162–224.

Stanley, T.D. and E.M. Ross. 1986. Flora of south-eastern Queensland, Vol. 2. Queensland Department of Primary Industries, Brisbane.

Tutin, T.G., V.H. Heywood, N.A. Burges, D.H. Valentine, S.M. Walters, and D.A. Webb (eds.). 1976. Flora Europaea, Vol. 4. Cambridge Univ. Press, Cambridge.

Wild, H. 1975. The Compositae of the Flora Zambesiaca area, 4. Astereae. Kirkia 10: 1–72.

Figure 1. *Dichrocephala integrifolia*. Illustration reproduced from Lamarck, *Tabl. Encycl.* tome 2, 4(1): t. 699 top left, f. 1 sub "*Grangea,*" 1796. The larger leaf on the left was incompletely figured in Lamarck. A and B show details of capitula and C depicts an obovate epappose cypsela, albeit positioned upside down.

Figure 2. *Dichrocephala integrifolia*. Distal portion of stem showing capitulescence and lyrate-pinnatifid leaves. (photograph by Sune Holt, *Holt E9974*).

Figure 3. *Dichrocephala integrifolia*. Close-up of capitula showing the pluriseriate marginal pistillate florets with ascending tubular white corollas and the less numerous disk florets with pale green corollas. (photograph by Sune Holt, *Holt E6843*).

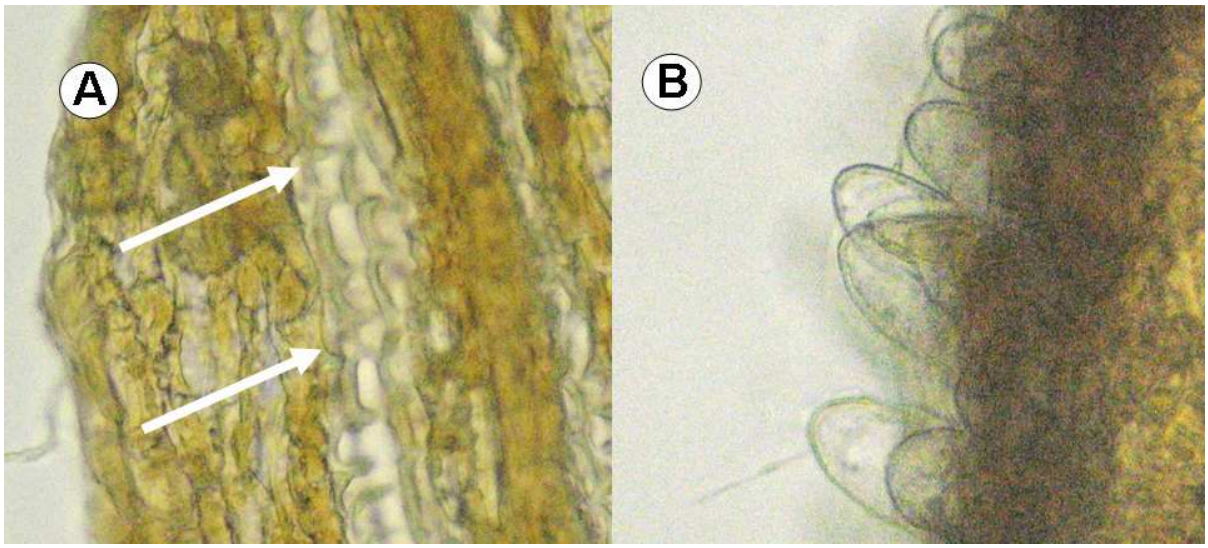

Figure 4. *Dichrocephala integrifolia* floral microcharacters. A. Anther theca with arrows pointing to the thickened endothecial cell walls. B. Abaxial style branch appendage papillae with rounded apices. (*Averyanov et al. VN 418*, MO).