

STUDIES IN THE EUPATORIEAE (ASTERACEAE). LXIV.

THE GENUS, KOANOPHYLLON.

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The genus Koanophyllon was described over one hundred and sixty years ago in a publication of very limited distribution. This name was overlooked by us in our listing of the Eupatorian genera (King & Robinson, 1969). As yet we have not seen a copy of the original publication but we have seen a partial translation by Koster in 1816 and a reprinted version with changed pagination dated 1895. It is the Koster translation which is cited in the Index Kewensis, although the 1810 publication seems perfectly valid.

The type species, Koanophyllon tinctoria was described as a dye plant with the common name, Anil de Pernambuco. This is apparently the same plant called Eupatorium tinctorum by Pohl in manuscript which Baker (1876) and Oliver (1892) identified as Eupatorium laeve DC.

The genus typified by Koanophyllon tinctoria is Critonioid in its general features being particularly distinctive in its usually short often somewhat reflexed anther appendage with a distinct medium groove running up the inner surface. The anther appendage in some species becomes divided almost into two separate parts and the central portion sometimes seems like a separate lobe overlapped by the two lateral portions. Even in K. simillimum of Paraguay, where the anther appendage is almost as long as wide, the medium groove is apparent and the apex is slightly but distinctly notched. We include in this treatment of the genus only those species having such grooved anther appendages.

Genera that we relate to but exclude from Koanophyllon are Eupatoriastrum which has a short grooved appendage but has a head with 150-300 flowers and with pales, Neohintonia with a short saddle-shaped appendage and usually one flower per head, Mexianthus with one flower per head and a pappus of broad scales, and Sphaereupatorium with a short unnotched appendage and heads usually paleaceous in dense spherical clusters. There are a few related species in South America that have longer ungrooved anther appendages and there is a large complex in the West Indies which have a short ungrooved appendage. These latter groups, especially the West Indian, show numerous complications which are not yet resolved. Relationships of Koanophyllon on a broader scope include Critonia which differs by its lack of glands on the leaves and corollas and the presence of lactifers in the

areoles of the leaves. Chromolaena differs most prominently by the clasping phyllaries which dehisce instead of spreading as the plant ages.

We are not establishing subgeneric concepts in Koanophyllon but certain distinctive elements are evident. One group consisting of K. pittieri and K. hylonomum has leaves that are larger and not evidently trinervate at the base, phyllaries shorter and broader and tending to dehisce and anther sacs which are usually pointed at the base. The single species K. albicaule is distinct in the broad base of the achene with a larger rounder carpopodium. Unlike others of the genus, the separation of the veins in the base of the achene in K. albicaule takes place in the area of the carpopodium instead of higher. Almost all the species of Koanophyllon have a well developed paniculate inflorescence with paniculately or spicately organized branches. The one species, K. albicaule, differs here also in the corymbose branches and it thus resembles in habit such groups as Chromolaena, Ageratina, and the West Indian complex related to Koanophyllon.

There is one striking set of variations in Koanophyllon that does not represent anything of subgeneric potential. The common species, K. solidaginoides, has a rather standard Eupatorian pappus of many slender setae. A species of extremely close relationship is notable for its complete lack of pappus, and this has been described previously as Pigueria standleyii. There is yet a third species in this complex which has been noted in collections by many workers who have sometimes called it a Trichocoronis but who have usually declined to give any name. This species with a series of many close set very short setae is named as new in this paper.

The genus Koanophyllon with its typical element in Paraguay and Brazil extends northward along the eastern slopes of the Andes and has most of its species in Central America and Mexico. Some species extend northward into the Southwestern United States and one species, K. solidaginoides, is widely distributed in both Central and South America and is known from the Galapagos.

A few observed differences in pollen should be noted. One group of species, K. solidaginoides, K. standleyii, and K. ravenii seem to have longer spines on their pollen than are seen in the rest of the genus, while K. palmeri and K. solidaginifolium have only low papillae. Also, pollen matching what we have called Type II in the genus Stevia (King & Robinson, 1968) has been observed in K. coulteri.

Koanophyllon Arruda da Camara, Discurso sobre utilidade da instituição de jardins nas principaes provincias do Brazil, p. 38? 1810.

Plants shrubs or small trees or with long arching branches,

with few to many branches. Stems terete. Leaves opposite with short distinct petioles, lamina broadly lanceolate to elliptical with base acute truncate or cordate, surface with few or no short hairs and with glands numerous to very sparse, without lactifers in the areoles. Inflorescence laxly paniculate with spreading branches paniculate to spicate. Involucral bracts 7-16 eximbricate to subimbricate, unequal to subequal, spreading with age, in two species innermost short and deciduous at maturity. Receptacle glabrous, plain to slightly convex. Flowers 6 to ca. 20 per head, corollas tubular, 5-lobed, cells of tube narrow with rather sinuous walls, lobes as wide as long or wider and appearing very thin, smooth on both inner and outer surfaces, margins of lobes with numerous short irregularly projecting cells, backs of lobes with numerous short capitate glands and sometimes with a few short hairs, without stomates. Anther collar elongate usually with numerous quadrate cells below, sometimes with annular thickenings but usually inornate, base of collar unsclerotized in K. albicaule; exothecial cells subquadrate to wider than long; anther appendages wider than long sometimes very short, apical margin slightly to strongly recurved, longitudinally grooved on the middle of the inner surface and distinctly notched apically. Style base unenlarged and glabrous; stylar appendage distinctly enlarged apically and smooth at tip, without glands. Achenes prismatic with 5 costae, costae and upper part of lateral surfaces setiferous; few or no glands; carpopodia short and distinct usually narrowed below, with small subquadrate cells in many series, walls only slightly thickened; pappus long setose, short setose or lacking, setae scabrous, apical cells acute. Chromosome number determined as $X = 10$ based on K. albicaule, reported as Eupatorium cf. ligustrinum DC. (Turner, Ellison and King, 1961).

Type species: Koanophyllon tinctoria Arruda da Camara

Our studies of the genus indicate that it contains the following 21 species.

Koanophyllon albicaulis (Schultz-Bip. ex Klatt) R.M.King & H. Robinson, comb. nov. Eupatorium albicaule Schultz-Bip. ex Klatt, Leopoldina 20: 89. 1884. Mexico.

Koanophyllon celtidifolia (Lam.) R.M.King & H.Robinson, comb. nov. Eupatorium celtidifolium Lam., Encyc. 2: 406. 1788. Colombia, Ecuador, Guatemala? Jamaica, Lesser Antilles, Peru, Venezuela.

Koanophyllon coulteri (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium coulteri B.L.Robinson, Proc. Amer. Acad. 36: 477. 1901. Guatemala.

- Koanophyllon flexilis (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium flexile B.L.Robinson, Proc. Amer. Acad. 55: 14. 1919. Peru.
- Koanophyllon hondurensis (B.L.Robinson in Standley) R.M.King & H.Robinson, comb. nov. Eupatorium hondurense B.L.Robinson in Standley, Journ. Arnold Arb. 11: 44. 1930. Honduras.
- Koanophyllon huantae (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium huantae B.L.Robinson, Contr. Gray Herb. n.s. 104: 16. 1934. Peru.
- Koanophyllon hylonoma (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium hylonomum B.L.Robinson, Proc. Bost. Soc. Nat. Hist. 31: 250. 1904. Costa Rica, Mexico, Panama?
- Koanophyllon hypomalaca (B.L.Robinson ex Donn. Smith) R.M.King & H.Robinson, comb. nov. Eupatorium hypomalacum B.L.Robinson ex Donn. Smith, Bot. Gaz. 35: 4. 1903. Guatemala.
- Koanophyllon longifolia (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium longifolium B.L.Robinson, Proc. Amer. Acad. 36: 480. 1901. Mexico.
- Koanophyllon mimica (Standl. & Steyerl.) R.M.King & H.Robinson, comb. nov. Eupatorium mimicum Standl. & Steyerl., Publ. Field Mus. Nat. Hist. Chicago, Bot. Ser. 23: 186. 1944. Guatemala.
- Koanophyllon palmeri (Gray) R.M.King & H.Robinson, comb. nov. Eupatorium palmeri Gray, Proc. Amer. Acad. 21: 383. 1886. Mexico.
- Koanophyllon pittieri (Klatt) R.M.King & H.Robinson, comb. nov. Eupatorium pittieri Klatt, Bull. Soc. Bot. Belg. 31: 192. 1892(1893). Costa Rica, Mexico, Panama.
- Koanophyllon plicata (Urban) R.M.King & H.Robinson, comb. nov. Eupatorium plicatum Urban, Symb. Antill. 5: 523. 1908. Martinique.
- Koanophyllon pseudoperfoliata (Schultz-Bip. ex Klatt) R.M. King & H.Robinson, comb. nov. Eupatorium pseudoperfoliatum Schultz-Bip ex Klatt, Leopoldina 20: 75. 1884. Mexico.
- Koanophyllon ravenii R.M.King & H.Robinson, sp. nov.

Herba vel frutex. Folia opposita, petiolata: lamina usque ad 7 cm. longa, usque 4.5 cm. lata, ovata, basi subcordata, margine crenata, apice acuminata; inflorescentia spiciformi-paniculata usque ad 7.5 cm. longa; capitula ca. 6 mm. alta;

involucri squamae bi-triseriatae ca. 14; flores ca. 12; corolla glandulosa, pauce hirsuta; pappus breviter multisetosus.

MEXICO: Chiapas: El Chorreadero 5.6 miles east of Chiapa de Corzo along Mexican Highway 190. Municipio of Chiapa de Corzo. Elevation 2500 feet. 18 October 1965. Plant 4 feet tall. D.E. Breedlove & Peter H. Raven 13472 (Holotype MICH !).

Paratypes: MEXICO: Chiapas: Gradual heavily wooded slope 17 kilometers north of Tuxtla Gutiérrez along road to El Sumidero. Municipio of Tuxtla Gutiérrez. Elevation 4000 feet. 30 October 1965. Flowers white. Plant 2 feet tall. D.E. Breedlove 14005 (MICH !). El Chorreadero 5.6 miles east of Chiapa de Corzo along Mexican Highway 190. Municipio of Chiapa de Corzo. Elevation . 24 October 1966. Flowers white, shrub 5 feet tall. Robert M. Laughlin 2603 (MICH !). Encañada Chacona Aguacata. Encañada Chacona Aguacata (northeast of Tuxtla Gutiérrez). October 1, 1950. Faustino Miranda 6688 (MEXU, US).

Koanophyllon simillima (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Eupatorium simillimum B.L.Robinson, Contr. Gray Herb. n.s. 77: 38. 1926. Argentina, Paraguay.

Koanophyllon solidaginifolia (Gray) R.M.King & H.Robinson, comb. nov. Eupatorium solidaginifolium Gray, Smiths. Contr. Knowl. 3(5): 87. 1852. Arizona, New Mexico, Texas, Northern Mexico.

Koanophyllon solidaginoides (H.B.K.) R.M.King & H.Robinson, comb. nov. Eupatorium solidaginoides H.B.K., Nov. Gen. et Sp. 4: 126. 1818. Ed. Folio. Brazil, British Honduras, Colombia, Costa Rica, Ecuador, Honduras, Mexico, Panama, Peru, Salvador, Venezuela.

Koanophyllon standleyi (B.L.Robinson) R.M.King & H.Robinson, comb. nov. Piqueria standleyi B.L.Robinson, Contr. Gray Herb. n.s. 104: 4. 1934. Salvador.

Koanophyllon stipulifera (Rusby) R.M.King & H.Robinson, comb. nov. Eupatorium stipuliferum Rusby, Mem. Torrey Bot. Club 4: 210. 1895. Argentina, Bolivia.

Koanophyllon tinctoria Arruda da Camara, Discurso sobre utilidade da instituição de jardins nas principaes provincias do Brazil, - - - p. 38 ? 1810. Brazil.

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