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# A New Circumscription of *Nissolia* (Leguminosae–Papilionoideae–Dalbergieae), with *Chaetocalyx* as a New Generic Synonym

Tânia M. de Moura,<sup>1,2\*</sup> Roy E. Gereau,<sup>1</sup> Tiina E. Särkinen,<sup>3</sup> and Ana P. Fortuna-Perez<sup>4</sup>

<sup>1</sup>Missouri Botanical Garden, P.O. Box 299, St. Louis, Missouri 63166-0299, U.S.A.

<sup>2</sup>Universidade Estadual do Centro-Oeste (UNICENTRO), Departamento de Biologia, Rua Simeão Varela de Sá, 03, Vila Carli, 85040-080, Guarapuava, Paraná, Brazil.

<sup>3</sup>Royal Botanic Garden Edinburgh, 20A Inverleith Row, EH3 5LR, Edinburgh, United Kingdom.

<sup>4</sup>Departamento de Botânica, Instituto de Biologia, Universidade Estadual Paulista “Júlio de Mesquita Filho” (UNESP), Distrito Rubião Junior s.n., 18618-970, Botucatu, São Paulo, Brazil.

\*Author for correspondence: tdmoura@unicentro.br

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**ABSTRACT.** Recent molecular phylogenetic studies have revealed *Chaetocalyx* DC. as a paraphyletic genus with *Nissolia* Jacq. nested within it, based on both nuclear ribosomal and plastid evidence. Considering the morphological similarity among the species of these two genera, which are vegetatively almost indistinguishable, we are here transferring the species of *Chaetocalyx* to *Nissolia*. Type information for all accepted species of *Nissolia* in its new circumscription is presented, including 16 new lectotype designations and the designation of one epitype. Diagnostic characters and information about the geographical distribution of each species are also noted. *Nissolia* s.l. is now represented by 30 taxa (29 species plus one variety) distributed from North to South America, with two centers of diversity found in Mexico and Brazil.

**RESUMEN.** Los estudios filogenéticos moleculares recientes han revelado *Chaetocalyx* DC. como un género parafilético con *Nissolia* Jacq. anidada dentro de él, basado en pruebas tanto nucleares ribosomales como plastidiales. Teniendo en cuenta la similitud morfológica entre las especies de estos dos géneros, que son vegetativamente casi indistinguibles, aquí estamos transfiriendo las especies de *Chaetocalyx* a *Nissolia*. Se presenta información de los tipos para todas las especies aceptadas de *Nissolia* en su circunscripción nuevo, incluyendo 16 nuevas designaciones de lectotipos y la designación de un epítipo. También se observan caracteres diagnósticos e información sobre la distribución geográfica de cada especie. *Nissolia* s.l. es actualmente representada por 30 taxones (29 especies y 1 variedad) distribuidos de América del Norte a América del Sur, con dos centros de diversidad ubicados en México y Brasil.

**Key words:** *Chaetocalyx*, Fabaceae, Neotropics, new combination, *Nissolia*, systematics, taxonomy, typification.

*Nissolia* Jacq. and *Chaetocalyx* DC. are morphologically closely allied genera placed in the *Adesmia* clade of the dalbergioid legumes (Klitgaard & Lavin, 2005). The genera are vegetatively virtually indistinguishable, both having imparipinnate leaves with five to 17 leaflets and stipels at the base of each leaflet, but species of *Nissolia* differ by having loments with sterile, winglike, flattened terminal articles, while species of *Chaetocalyx* have loments with equal articles, lacking the winglike terminal article (Rudd, 1956, 1958; Särkinen & Hughes, 2015).

The close relationship among representatives of *Chaetocalyx* and *Nissolia* has been phylogenetically confirmed in several studies, based on both nuclear ribosomal and plastid evidence (Lavin et al., 2001; Pennington et al., 2004; Fortuna-Perez et al., 2013; Iganci et al., 2013; Särkinen & Hughes, 2015). The phylogenetic studies have also revealed that *Nissolia* is nested within *Chaetocalyx*, leading to the synonymization of *Chaetocalyx* with the older genus name *Nissolia*. Of these phylogenetic studies, Särkinen and Hughes (2015) presented the broadest sampling of the two genera in terms of species, with seven species each of *Nissolia* (47% of known species) and *Chaetocalyx* (50% of known species) included (Fig. 1). These authors concluded that a taxonomic revision and recircumscription of the two genera are required.

The most recent complete taxonomic treatments of the genera include 12 species of *Nissolia* (Rudd, 1956) and 12 species of *Chaetocalyx* (Rudd, 1958). Subsequent publications of three new species of *Nissolia*

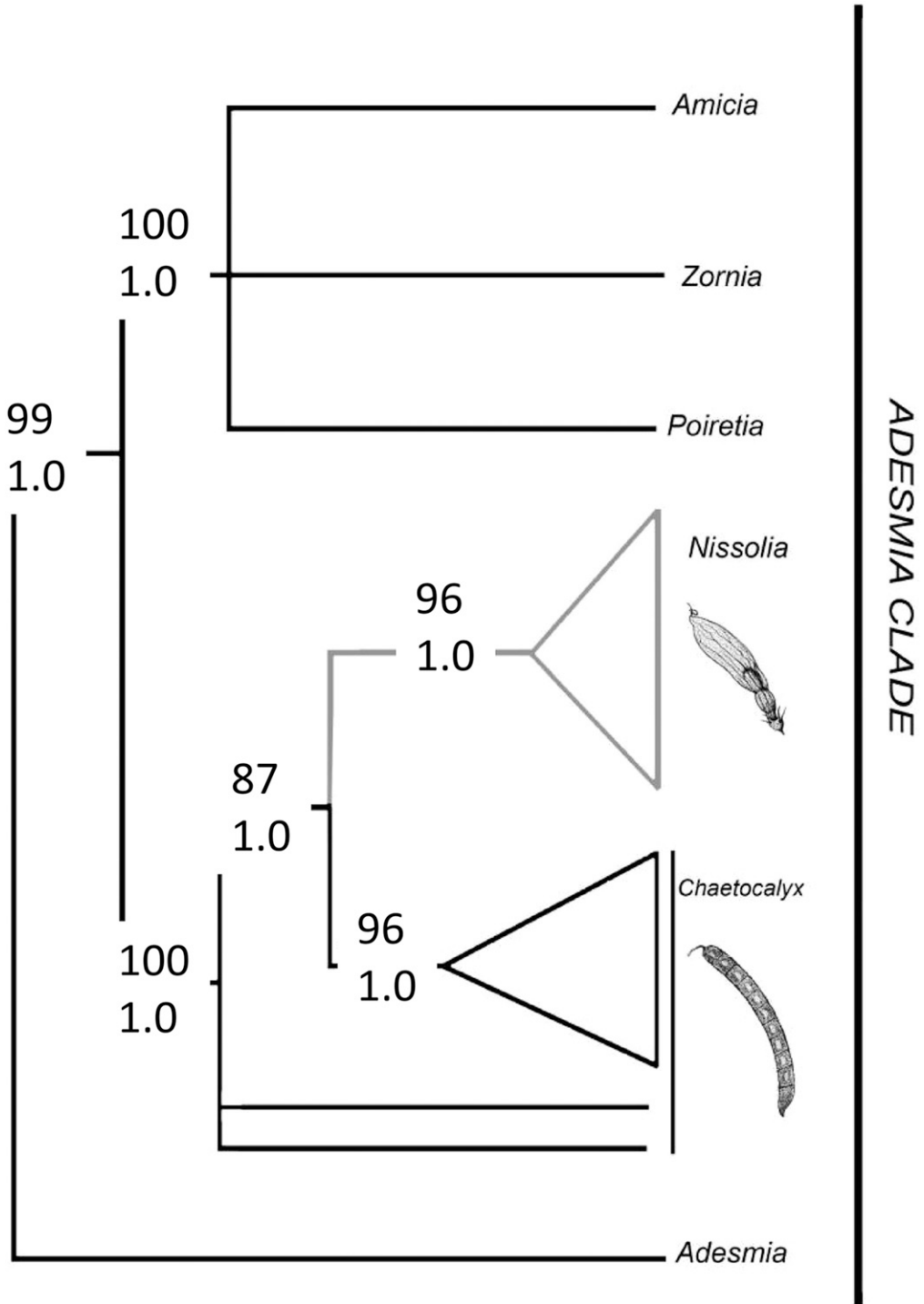


Figure 1. Phylogenetic relationships within the *Adesmia* clade, based on plastid data showing *Nissolia* Jacq. nested within *Chaetocalyx* DC. The cladogram is adapted from Särkinen and Hughes (2015); it shows bootstrap support values from maximum parsimony analysis above branches and posterior probability values from Bayesian analysis below branches. Fruit morphologies of the two genera are highlighted: (1) the samara-like fruit of *Nissolia* (illustration of *N. hintonii* Sandwith, extracted from Sandwith, 1934), and (2) the absence of the sterile, flat apex in the fruit of *Chaetocalyx* (illustration of *C. blanchetianus* (Benth.) Rudd, extracted from Rudd, 1958).

(Rudd, 1975, 1991; Cruz Durán & Sousa S., 2004) and two new species of *Chaetocalyx* (Rudd, 1972; Vanni, 1981) have increased the size of the genera slightly, to 15 species of *Nissolia* and 14 species of *Chaetocalyx*.

Corroborating the studies cited above, we analyzed the species of *Chaetocalyx* and *Nissolia* housed in the BM, BOTU, E, F, K, MEXU, MO, NY, and UEC herbaria, verifying that the phylogenetic results are consistent with the morphology of these species. Therefore, we are here proposing a new circumscription for *Nissolia*, i.e., including new combinations in *Nissolia* for all the accepted names of *Chaetocalyx* except one, for which a replacement name is published. Two new synonyms are presented. Type information for all 30 taxa (29 species plus one variety) of *Nissolia* as recognized in its new circumscription is presented, including the designation of 16 new lectotypes and one epitype.

***Nissolia*** Jacq., Enum. Syst. Pl. 7, 27. 1760. TYPE: *Nissolia fruticosa* Jacq., Enum. Syst. Pl. 27. 1760.

*Chaetocalyx* DC., Prodr. 2: 243. 1825, syn. nov. TYPE: *Glycine vincentina* Ker Gawl. [= *Chaetocalyx vincentinus* (Ker Gawl.) DC.].

Climbing, twining, or prostrate vines. Leaves imparipinnate, 5- to 17-foliolate. Inflorescences terminal or axillary, the flowers arranged in racemes, panicles, fascicles, or solitary. Flowers 5-merous; calyx campanulate with 5 lobes; corolla usually yellowish; stamens 10, monadelphous, with the filament tube commonly splitting at maturity. Fruit a loment, either samara-like, 2- to 5-articled with the terminal article sterile, flat, and winglike (in the species traditionally recognized as *Nissolia*) or 6- to 16-articled, elongate, compressed to subterete (in the species traditionally recognized as *Chaetocalyx*); seeds reniform or reniform-rod-shaped, sometimes laterally compressed, sublustrous, reddish brown; hilum small and circular.

**Distribution.** The genus *Nissolia* is endemic to the Americas, occurring from North America (United States) to South America (Argentina and Uruguay).

**1. *Nissolia acutifolia*** (Vogel) T. M. Moura & Fort.-Perez, comb. nov. Basionym: *Rhadinocarpus acutifolius* Vogel, Linnaea 12: 111. 1838. *Chaetocalyx acutifolius* (Vogel) Benth., Fl. Bras. 15(1A): 75. 1859. TYPE: Brazil. *Sellow s.n.* (holotype, B $\dagger$ ; lectotype, designated here, F-612376 image!). EPITYPE: Brazil. Rio de Janeiro, *Pohl s.n.* (epitype, designated here, K [barcode] K-222380 image!).

**Distribution.** *Nissolia acutifolia* is endemic to Brazil.

**Notes.** This species is a member of a group with narrow (subterete) fruit, which also comprises *Nissolia*

*chacoensis* (Vanni) T. M. Moura & Fort.-Perez, *N. longiflora* (Benth. ex A. Gray) T. M. Moura & Fort.-Perez, *N. brasiliensis* (Vogel) T. M. Moura & Fort.-Perez, and *N. vincentina* (Ker Gawl.) T. M. Moura & Fort.-Perez. The fruits are stipitate in *N. acutifolia* and *N. longiflora* and not stipitate in the others. Rudd (1958) commented that this species is morphologically similar to *Chaetocalyx longiflora* Benth. ex A. Gray (now *N. longiflora*), but that these two species differ in fruit morphology, pointing out that the fruit of *C. acutifolia* (now *N. acutifolia*) has articles 12–17 mm long, versus 7–10 mm long in *C. longiflora*.

The protologue of the basionym states, “In Brasil. Merid.; Sellow leg.” Consulting JSTOR (<<https://www.jstor.org/>>), the only specimen of this species collected in Brazil by Sellow was found at F, with the annotation “possible isotype.” According to Stafleu and Cowan (1986), the original collection and types of Theodor Vogel were housed in B, and others are held in other European herbaria. Regarding the specimen at F, Rudd (1958) wrote, “Sellow (fragment, presumably of type, F),” and we accept her reasonable presumption that this specimen is an extant isotype of the destroyed holotype at B. Therefore, we are designating the specimen F-612376 as the lectotype of *Rhadinocarpus acutifolius* Vogel. Because of the poor condition of the lectotype, we are designating a specimen from K as the epitype.

**Additional specimens examined.** BRAZIL. **Distrito Federal:** Gruta Impensa, 19 Feb. 1960 (fl.), *A. P. Duarte 5191* (NY). **Rio de Janeiro:** s.d. (fl.), *Schott s.n.* (F, NY, W); 1826 (fl.), *Pohl s.n.* (K-222381).

**2. *Nissolia blanchetiana*** (Benth.) T. M. Moura & Fort.-Perez, comb. nov. Basionym: *Isodesmia blanchetiana* Benth., Fl. Bras. 15(1A): 71. 1859. *Chaetocalyx blanchetianus* (Benth.) Rudd, Contr. U.S. Natl. Herb. 32(3): 219. 1958. TYPE: Brazil. Bahia: Serra do Açuruá, Rio São Francisco, 1838 (fl./fr.), *J. S. Blanchet 2892* (lectotype, designated by Rudd [1958: 220], K [barcode] K-92154 image!; isolectotypes, BM [bc] BM-931581 image!, BM [bc] BM-931582 image!, BM [bc] BM-931583 image!, BR [bc] BR-5117697 image!, F-1538476 image!, G [bc] G-388731 image!, G [bc] G-388732 image!, K [bc] K-92155 image!, MO-1880908!, P [bc] P-3206564 image!, W [bc] W-27028 image!, W [bc] W-27032 image!).

*Chaetocalyx subulatus* Mackinder, Kew Bull. 45(3): 587, fig. 1. 1990, syn. nov. TYPE: Brazil. Bahia: Município of Rio de Contas, Tamandua, 17 May 1983 (fl./fr.), *G. Hatschbach 46535* (holotype, MBM not seen; isotypes, K [barcode] K-92191 image!, MO [bc] MO-3496148!, NY [bc] NY-4024!).

**Distribution.** *Nissolia blanchetiana* is endemic to Brazil.

*Notes.* *Nissolia blanchetiana* is remarkable for its long peduncles (8–16 cm), flowers (2.5–3.5 cm), and calyces (2.1–2.4 cm). Rudd (1958) commented that this species is similar to *Chaetocalyx tomentosus* (Gardner) Rudd ( $\equiv$  *N. tomentosa* (Gardner) T. M. Moura & Fort.-Perez) and *C. platycarpus* (Harms) Rudd ( $\equiv$  *N. peruviana* T. M. Moura & Fort.-Perez) but differs from them by having longer calyx lobes. In *N. blanchetiana*, the lateral calyx teeth are ca. 5 mm long, the abaxial ca. 9 mm long, and the adaxials 12–15 mm long (the adaxial teeth are ca. twice as long as the calyx tube), whereas all calyx teeth are 0.5–1.5 mm long (shorter than the calyx tube) in *N. peruviana* and all are 1–2 mm long (with the calyx tube about three times longer than the calyx teeth) in *N. tomentosa*.

The lectotype of *Isodesmia blanchetiana*, which is the basionym of *Nissolia blanchetiana*, and the holotype of *Chaetocalyx subulatus* share calyx teeth that are longer than in any other species of *Nissolia*, and no significant difference was found between these two specimens. Therefore, we are formally considering *C. subulatus* a synonym of *N. blanchetiana*.

The protologue of *Isodesmia blanchetiana* states, “Habitat in Serra Açuruá prov. Bahiensis: Blanchet no. 2892.” Rudd (1958) presented “Serra do Açuruá, Blanchet 2892 (K lectotype of *Isodesmia blanchetiana*, F. M. neg. 2132 of isotype ex B).” Two specimens of *Blanchet 2892* were located at K, one of them identified as the lectotype by V. E. Rudd.

*Additional specimens examined.* BRAZIL. **Bahia:** encruzilhada, margem do Rio Parod, 23 May 1968 (fl./fr.), *R. P. Belem 3618* (F, MO, NY); Ibotirama, rodovia BR-242 Ibotirama-Barreira, Km. 30, 540 m, 7 July 1983 (fl./fr.), *L. Coradin et al. 6585* (NY); Abaíra, Catolés, estrada Catolés X Ribeirão, a 4 km de Catolés, 1000 m, 12 Apr. 1992 (fl.), *W. Ganev 114* (K, NY); Rio de Pires, Riacho da Forquilha, 1500 m, 27 July 1993 (fr.), *W. Ganev 1983* (NY); Pai Inácio, margem da estrada para a torre de repetição, 4 July 1994 (fl./fr.), *M. L. Guedes et al. 7* (K-908436); Palmeiras, rio Lajeado, 9 Apr. 1922 (fl.), *G. & M. Hatschbach & E. Barbosa 56922* (F, K); Macaúbas, estrada para Canatiba, próximo ao alto da Serra Poção, 800–1000 m, 20 Apr. 1996 (fl./fr.), *G. Hatschbach et al. 65142* (NY); Gentio do Ouro, Rodovia Brotas de Macaúbas a Gentio do Ouro, próximo a Ceme, 12 Mar. 1998 (fl./fr.), *G. Hatschbach et al. 67720* (K); Tanque Novo, Caldeiras, 17 June 2004 (fl./fr.), *G. Hatschbach et al. 77976* (MO). **Minas Gerais:** Francisco Sá, Rod. p/ Crão Mongol, 20 Apr. 1978 (fl.), *G. Hatschbach 41216* (NY).

**3. *Nissolia bracteosa*** (Rudd) T. M. Moura & Fort.-Perez, comb. nov. Basionym: *Chaetocalyx bracteosus* Rudd, *Phytologia* 24(4): 295, fig. 1. 1972. TYPE: Brazil. Maranhão: Codo, Carrasco, 21 June 1907, *A. Ducke 668* (holotype, MG image!).

*Distribution.* *Nissolia bracteosa* is endemic to Brazil.

*Notes.* A remarkable characteristic of *Nissolia bracteosa* is the length of the ovary stipe (3–4 mm). Fruits

were not seen. As Rudd (1972) commented, this species is also notable for its conspicuous bracts (bracts and bracteoles persistent, foliaceous, 9–10 × 5–7 mm).

*Additional specimens examined.* BRAZIL. **Bahia:** Formosa do Rio Preto, ca. de 7.5 km da cidade de Formosa do Rio Preto, 3 May 2009 (fl./fr.), *D. Cardoso et al. 2646* (K); **Maranhão:** Porto Franco, rod. Belém–Brasília, 28 Mar. 1976 (fl.), *G. Hatschbach & R. Kummrow 38440* (MO).

**4. *Nissolia brasiliensis*** (Vogel) T. M. Moura & Fort.-Perez, comb. nov. Basionym: *Rhadinocarpus brasiliensis* Vogel, *Linnaea* 12: 110. 1838. *Chaetocalyx brasiliensis* (Vogel) Benth., *Fl. Bras.* 15 (1A): 75. 1859. TYPE: Brazil. *Sellow s.n.* (specimen not located).

*Chaetocalyx latifolius* Benth., *Fl. Bras.* 15(1): 75. 1859. TYPE: Brazil. Goiás, 1841 (fl.), *G. Gardner 3671* (lectotype, designated by Rudd [1958: 231], K [barcode] K-222382 image!; isolectotypes, BM [bc] BM-931579 image!, F neg. BN002135!, K [bc] K-222383 image!, P [bc] P-2297626 image!, W [bc] W-27025 image!, W [bc] W-18890117414 image!).

*Chaetocalyx ilheoticus* Taub., *Flora* 72 (n.s. 47): 425. 1889. TYPE: Brazil. Bahia: Ilhéus, July (fl./fr.), *L. Riedel 252* (holotype, LE not seen; isotypes, K [barcode] K-92165 image!, P [bc] P-2955761 image!).

*Chaetocalyx belizensis* Standl., *Publ. Field Mus. Nat. Hist., Bot. Ser.* 12: 410. 1936. TYPE: Honduras. Tamash River, on river bank, alt. 30 m, 18 Feb. 1935 (fl.), *W. A. Schipp 1330* (holotype, F [barcode] F-59013!; isotypes, A [bc] A-53337 image!, BM [bc] BM-931589 image!, GH [bc] GH-53338 image!, K [bc] K-82060 image!, MICH [bc] MICH-1107190 image!, MO-150838!, MO-150839!, NY [bc] NY-4014!, S [bc] S-9496 image!).

*Chaetocalyx latifolius* var. *setulifer* Burkart [as “*setulifera*”], *Darwiniana* 3(2): 165, figs. 6d, 7c. 1939. TYPE: Argentina. Salta: Orán, Bobadal, 24 Mar. 1905 (fl./fr.), *C. Spegazzini* (Min. Agr. 14003) (holotype, not located; isotype, BAB [barcode] BAB-348 image!).

*Chaetocalyx matudae* Lundell [as “*matudai*”], *Contr. Univ. Michigan Herb.* 6: 26. 1941. TYPE: Mexico. Chiapas: Escuintla, 23 Nov. 1936 (fl.), *E. Matuda 834* (holotype, MICH not seen; isotypes, US [barcode] US-997164 image!, US [bc] US-1843 image!).

*Distribution.* *Nissolia brasiliensis* occurs from Mexico to Argentina (Argentina, Belize, Bolivia, Brazil, Colombia, Ecuador, Guatemala, Mexico, Paraguay, Peru, Suriname, and Trinidad).

*Notes.* *Nissolia brasiliensis* is distinguished by its large number of leaflets ([five to] nine to 11), the long, erect glandular hairs on both the pedicels and outer calyx surface, the calyx length (8–12 mm), and the fruit (a subterete loment). *Nissolia vincentina* also has subterete loment; however, the fruit is 7–8 cm × 1–2 mm and 7- to 12-articled in *N. vincentina* versus 7–16 cm × 1–2 mm and 12- to 16-articled in *N. brasiliensis*. Moreover, all the other narrow-fruited species (*N. acutifolia*, *N. chacoensis*, *N. longiflora*, and *N. vincentina*) are always 5-foliolate.

Although Rudd (1958: 229) wrote, "Type locality: 'Inter Campos et Victoria,' Espirito Santo or Rio de Janeiro, Brazil. Type collected by Sellow," she did not thereby designate a lectotype for *Rhadinocarpus brasiliensis* because she did not specify a herbarium. The protologue of *R. brasiliensis* includes the statement "In Bras. Merid.; Sellow leg. Inter Campos et Victoria." According to Stafleu and Cowan (1986), the Theodor Vogel collection might be at B, BHU, CGE, E, FI, K, or UPS. No duplicate of this collection has been located so far; however, we refrain from designating a neotype at this time because of the possibility that original material can be found.

For *Chaetocalyx latifolius* Benth., Rudd (1958: 231) stated, "K type of *C. latifolia*." Although there are two sheets of *G. Gardner 3671* at K, the specimen K-222382 has a label identifying the specimen as a lectotype (by Rudd in 1956), and for K-222383 only the word "type" is presented (also by Rudd in 1956).

The protologue of *Chaetocalyx latifolius* var. *setulifer* Burkart states "... Spegazzini, 22-24-III-1905; Min. Agr. 14003; dupl. in Herb. Speg. sub. n° 2186 (typus variety). — Orán, Spegazzini 18-III-1905; Min. Agr. 14217." The type specimens for this name are supposed to be located at both BAA and BAB. One specimen, *C. Spegazzini* (Min. Agr. 14003), was found on JSTOR's website, identified as "isotype" (BAB-348); a paratype (*C. Spegazzini* [Min. Agr. 14217]) BAB-349 was also located. We contacted both BAA and BAB, searching for other specimens, but we have not yet received an answer from BAB, and we were informed that there is no duplicate of it at BAA. Therefore, we are considering BAB-348 as an isotype of *C. latifolius* var. *setulifer*, without identifying the holotype or designating the lectotype. Further search is necessary.

*Additional specimens examined.* BELIZE. Temash River, 18 Feb. 1935 (fl./fr.), *W. A. Schipp 1330* (F); near Columbia, acahual, 12 Oct. 1946 (fl.), *P. H. Gentle 6074* (MO); Cayo, Sibun River, river bank, 3 Nov. 1954 (fl.), *P. H. Gentle 8428* (F); Stann Creek, 17 mi. section, Stann Creek Valley, in high ridge, on hill slope, 26 Nov. 1956 (fl.), *P. H. Gentle 9260* (F, MO, NY). BOLIVIA. Guanai, Tipuani, Apr.–June 1892 (fl.), *A. M. B. Lectae 1348* (F, K, NY); Guanai-Tipuani, Apr.–June 1892 (fl.), *M. Bang 1348* (BM, E). **Santa Cruz:** Nuflo de Chavez, 2 km al NW de Concepción en la zona del Balneario, 458 m, 3 June 2008, *J. R. I. Wood et al. 25047* (K). BRAZIL. **Goiás:** 24 km by rd. SW of Monte Alegre de Goiás, 600 m, 12 Mar. 1973 (fl.), *W. R. Anderson 6939* (F); Serra do Caiapó, ca. 25 km (straight line) SW of Caiapônia, 800 m, 1 May 1973 (fl.), *W. R. Anderson et al. 9595* (F). **Pará:** Itaituba, estrada Santarém–Cuiabá, BR163, Km. 1011 com a penetração de 3 km, margem direita do rio Jamanxim, 11 May 1983 (fl.), *M. N. Silva 248* (F); Serra dos Carajás, rio Parauapebas, control point at entrance to Serra Noete, ca. 39 km E of Amza camp N-5, 150 m, 23 June 1982 (fr.), *C. R. Sperling et al. 6317* (F); Sete Varas airstrip on Rio Curua, 7 Aug. 1981 (veg.), *J. J. Strudwick et al. 4291* (F). COSTA RICA. **Puntarenas:** rainforest area along Río Sonador, near Panamericana hwy., El General

Valley, 600 m, 31 Jan. 1965 (veg.), *L. O. Williams et al.* (F). ECUADOR. **Guayas:** coastal plain, in the vic. of Naranjito, ca. 120 ft., 6–7 June 1945 (fr.), *W. H. Camp E-3618* (F). **Napo-Pastaza:** betw. Tena & Archidona, 19 Dec. 1939 (fl./fr.), *E. Asplund 9457* (K). GUATEMALA. **San Marcos:** near Malacatán, Río Cabús, 300 m, 15 Mar. 1939 (buds), *P. C. Standley 68869* (F); Alta Verapaz, vic. of Cubilgüitz, 1.5–2 mi. S of Cubilgüitz, 300–350 m, 1 Mar. 1942 (fl.), *J. A. Steyermark 44359* (F). MEXICO. **Veracruz:** Catemaco, Ojoxapan, a 3 km de Coyame, orilla NE del Lago Catemaco, 345 m, 3 Dec. 1977 (fr.), *A. Delgado et al. 909* (F, NY); Hidalgotitlán, Uxpanapa, 160 m, 6 Mar. 1978 (fl.), *A. Delgado et al. 935* (F, MO); Pajapan, 5 km S of Pajapan on rd. to jet. with Chinameca to Soteapan rd., 4 Nov. 1981 (fl.), *M. Nee & J. I. Calzada 22799* (F, MO); Tlapacoyan, 150 m, 9 Nov. 1977 (fr.), *F. Ventura 14977* (MO). PERU. Alto Amazonas, Yurimaguas, lower Rio Paranapura, 180 m, 9 July 1972 (fr.), *S. McDaniel & M. Rimachi 16548* (F); Amazonas Expedition, seringal, May 1911 (fl./fr.), *E. Ule 9452* (K). **Lamas:** Alonso de Alvarado, quebrada de Lejía, al oeste de San Juan de Pacayzapa, 900 m, 18 Apr. 1973 (fl.), *J. Schunke 5951* (F); Alonso de Alvarado, quebrada de Poloponta, 4 km de San Juan de Pacayzapa, 800–900 m, 30 Apr. 1973 (fl.), *J. Schunke 6109* (F). **San Martín:** Juan Jui, alto Río Huallaga, 400–800 m, May 1936 (fl.), *G. Klug 4361* (F, K). VENEZUELA. Federal, Colinas de Bello Monte, 1100 m, 26 Jan. 1982 (fl.), *A. Castillo 1479* (K).

**5. *Nissolia chacoensis*** (Vanni) T. M. Moura & Fort-Perez, comb. nov. Basionym: *Chaetocalyx chacoensis* Vanni, Bonplandia (Corrientes) 5(20): 185, fig. 4. 1981. TYPE: Paraguay. Dpto. Nueva Asunción: Ruta Trans-Chaco, 21°26' S, 61°25' W, 7 Mar. 1979 (fl./fr.), *A. Schinini 16460* (holotype, CTES [barcode] CTES-635 image!; isotypes, G [bc] G-195351 image!, NY [bc] NY-4018!, SI [bc] SI-1951 image!, US [bc] US-1848 image!).

*Distribution.* *Nissolia chacoensis* is found in Bolivia and Paraguay.

*Notes.* *Nissolia chacoensis* has narrow fruits, similar to those of *N. brasiliensis* and *N. vincentina*, but differs from these two species by the fruits being neither segmented nor constricted between the seeds. Among all the species with narrow fruits (*N. acutifolia*, *N. brasiliensis*, *N. chacoensis*, *N. longiflora*, and *N. vincentina*), *N. chacoensis* is the only one that does not present glandular hairs on the outer calyx surface.

*Additional specimens examined.* BOLIVIA. **Santa Cruz:** Cordillera Prov., Parque Nacional Kaa-Iya del Gran Chaco, Paleodunas 25 km al NE de Palmar de las Islas, 270 m, 12 Feb. 1998 (fl./fr.), *A. Fuentes & G. Navarro 2283* (MO). PARAGUAY. **Boquerón:** Parque Nacional Teniente Enciso, 23 Feb. 2006 (fl.), *M. Peña-Chocarro et al. 2524* (BM).

**6. *Nissolia chiapensis*** Rudd, Phytologia 31: 427. 1975. TYPE: Mexico. Chiapas: 5 km E of Berriozábal along hwy. 190, 800 m, 11 Oct. 1971 (fl.), *D. E. Breedlove 20391* (holotype, CAS [barcode] CAS-3619 image!; isotypes, MEXU [bc] MEXU-254668!, SFV not seen).

*Distribution.* *Nissolia chiapensis* is found in Mexico and Guatemala.

*Notes.* *Nissolia chiapensis* is remarkable for its long leaves (4–15 cm) and flower parts that persist on the fruit. This species is similar to *N. microptera* Poir. and *N. platycarpa* Benth. but differs from them by the pedicel length: 1–2 mm long or sessile in *N. chiapensis* versus 4–5(–6) mm long in *N. microptera* and 3–12 mm long in *N. platycarpa*. The calyx is also smaller in *N. microptera* (2–2.5 mm long) than in the other two species: 5–6 mm long in *N. chiapensis* and 6–7 mm long in *N. platycarpa*.

*Additional specimens examined.* GUATEMALA. **Huehuetenango:** Nentón, Nacimiento Río Lagartero, 6 Dec. 2006 (fl.), *J. Morales & M. García 4249* (MO). MEXICO. **Chiapas:** Berriozábal, 5 km E of Berriozábal along Mexican hwy. 190, 800 m, 11 Oct. 1971 (fl.), *D. E. Breedlove 20391* (MO); La Trinitaria, along small dirt rd. to Boquerón & Ejido Mujica W of Mexican hwy. 190 at point 18 km SW of La Trinitaria, 900 m, 8 Dec. 1976 (fl.), *D. E. Breedlove 42371* (MO). **Oaxaca:** Pochutla, Santa María Huatulco, 500 m al sur de la entrada al Sabanal, 4 Oct. 2004 (fl.), *A. S. Martínez & A. Nava 52* (MO); Tehuantepec, San Pedro Huamelula, a 5 km al N de Ayuta, camino a Guadalupe Victoria, 700 m, 22 Nov. 1999 (fl./fr.), *E. Martínez et al. 33218* (MO); Yauatepec, a 1 km al NW de Río Hondo, 700 m, 18 Sep. 1978 (fl./fr.), *M. Sousa et al. 9474* (BM, MO); Tehuantepec, Santiago Laollaga, camino a Vandaquietiqui, hacia cerro Indio Dormido, al NO de Laollaga, 23 Oct. 1991 (fl.), *R. Torres & A. Campos 14048* (F).

## 7. *Nissolia fruticosa* Jacq., Enum. Syst. Pl. 27. 1760.

TYPE: hab. in America Torrida, *N. J. Jacquin s.n.* (lectotype, designated here, BM [barcode] BM-931572 image!; isolectotype, W [bc] W-26116 image!).

*Nissolia racemosa* DC., Prodr. 2: 257. 1825. TYPE: Colombia. Magdalena, Santa Marta, *C. L. G. Bertero* (lectotype, designated by Rudd [1956: 194], G not seen).

*Nissolia nelsonii* Rose, Contr. U.S. Natl. Herb. 5(4): 162, fig. 26. 1899. TYPE: Mexico. Oaxaca: valley of Oaxaca, 20 Sep. 1984 (fl./fr.), *E. W. Nelson 1266* (lectotype, designated by Rudd [1956: 193], US [barcode] US-1854 image!; isolectotype, US [bc] US-1855 image!).

*Machaerium verapazense* Donn. Sm., Bot. Gaz. 40(1): 2. 1905. TYPE: Guatemala. Alta Verapaz: Cubilquitz, alt. 350 m, Jan. 1904 (fl.), *H. von Tuerckheim 8508* (lectotype, designated by Rudd [1956: 193], US [barcode] US-2388 image!; isolectotypes, US [bc] US-997127 image!, US [bc] US-1107505 image!).

*Nissolia costaricensis* Donn. Sm., Bot. Gaz. 44(2): 108. 1907. TYPE: Costa Rica. Alajuela, 200 m, Jan. 1892 (fl.), *P. Biolley 7088* (lectotype, designated by Rudd [1956: 193], US [barcode] US-1863 image!).

*Notes.* *Nissolia fruticosa* is remarkable for the androecium that persists in fruit; the long inflorescence rachis forming a dense yellow-flowered (or yellowish) raceme (sometimes the inflorescence is paniculate and rarely fasciculate); small flowers (5–10 mm long) and

calyx (2–4 mm long); and long pods (2–4.5[–6] cm long), stipe (3–5 mm), and leaflets (2.5–8 × 2.3–4.5 cm). According to Rudd (1956), the character of the stipe exceeding the calyx distinguishes *N. fruticosa* from the other species with samara-like fruit.

Staffleu and Cowan (1979) stated that the main herbaria for types of Baron Nikolaus Joseph von Jacquin are BM, LINN, and W. Two specimens of *Nissolia fruticosa* collected by Jacquin were located: one at BM and the other at W. We are here selecting the BM specimen as the lectotype of *N. fruticosa* because it is the more informative specimen. The specimen BM-931572 contains branches and inflorescences (in bud), while W-26116 is represented by a sterile branch.

Rudd (1956: 193) stated, “US type of *Machaerium verapazense*.” Although there are three specimens of *H. von Tuerckheim 8508* at US, the word “type” is written on US-2388, and Rudd identified the other two duplicates, US-997127 and US-1107505, as iso-types. It is clear that Rudd (1956) considered US-2388 as the lectotype of *M. verapazense*.

Remaining syntypes of *Nissolia nelsonii*, some of which were located by us, include *C. G. Pringle 4640* (CM [bc] CM-1064 image!, E-841191!, M [bc] M-233700 image!, NDG [bc] NDG-27102 image!, S [bc] S-13-11983 image!, US [bc] US-1108276 image!) and *E. W. Nelson 3086* (specimen not located).

## 7a. *Nissolia fruticosa* Jacq. var. *fruticosa*.

*Distribution.* This variety occurs from Mexico to Colombia (Brazil, Colombia, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, and Venezuela).

*Additional specimens examined.* COSTA RICA. **San José:** Mora, Cuenca del Pirrís-Damas, Guayabo, 300 m S de la escuela, 18 Dec. 2001 (fl.), *J. Bustamante 251* (MO); Cantón de Aserri, Cerros Escazú-La Carpintera, bosques residuales cerca de Barrio Lourdes, 13 Nov. 1995 (fr.), *J. F. Morales & R. J. Abarca 4996* (MO); in fundo la Verbena dicto prope Alajuelita, 1140 m, Dec. 1894 (fr.), *H. Pittier 9664* (US). EL SALVADOR. **Ahuachapán:** vic. of Ahuachapán, ca. 700–1100 m, 16–25 Jan. 1947 (fr.), *P. C. Standley & E. Padilla 2572* (F). GUATEMALA. **Petén:** Lacandón, 200 m, 12 Feb. 1962 (fr.), *E. Contreras 3371* (MO). HONDURAS. **Morazán:** entre Tegucigalpa y Suyapa, 1100 m, 6 Nov. 1948 (fr.), *A. Molina 1459* (BM). MEXICO. **Chiapas:** La Trinitaria, along rd. to Lagos de Motebello, 11 mi. NE of La Trinitaria, 5300 ft., 26 Jan. 1965 (fr.), *D. E. Breedlove & P. H. Raven 8358* (F); Tuxtla Gutiérrez, 22 km N of Tuxtla Gutiérrez, steep slope at El Sumidero, 4500 ft., 2 July 1965 (fl.), *D. E. Breedlove 10666* (F); Tuxtla Gutiérrez, en el mirador La Coyota, 17 km al N de Tuxtla Gutiérrez, en el Cañón del Sumidero, 1240 m, 3 July 1990 (fl.), *A. R. García et al. 1729* (F). **Guerrero:** Parque Nacional El Veladero, parte posterior de la col. Fco. Villa, 2 Sep. 1984 (fr.), *N. N. Acosta 126* (MEXU); Pilacaya, Grutas de Cacahuamilpa, Jardín Botánico, 1116 m, 28 July 2011 (fl.), *K. A. Andrade 169* (MEXU); Apaxtla, aprox. 10 km al S de

Apaxtla, carr. Teloloapan–Apaxtla–El Caracol, 1427 m, 26 Aug. 2011 (fl.), *J. C. Soto 19364* (MEXU). **Jalisco:** Mpio. La Huerta, Estación de Biología Chamela, UNAM, 20 m, *A. Domínguez-Mariani 448* (E). **Oaxaca:** Monte Albán, S of Oaxaca city, around mountaintop below ruins of Monte Albán, 1880 m, 14 Oct. 1983 (fl.), *W. R. Anderson 13136* (MO); Tehuantepec, Mpio. Santiago Astata, 500 m E of Santa María Hamelula, 50 m, *C. A. Pendry et al. 824* (E); Juquila, Limones, a 11 km al NW de Puerto Escondido, 100 m, 24 Sep. 1982 (fl.), *M. Sousa et al. 12558* (BM, MEXU); Juchitán, a 14 km al N-NW de La Ventosa, 90 m, 21 Sep. 1978 (fl.), *M. Sousa & S. Purata 9621* (BM, MEXU); Juchitán, Torre de Microondas, Los Tules Nilttepec, 11 Dec. 1985 (fr.), *R. Torres et al. 7857* (MEXU). **Puebla:** Yaultepec, San Miguel Ecatepec, 7 May 1970 (fl.), *T. MacDougall s.n.* (F); Puerto del Gato a 32 km al SE de Izucar de Matamoros, 1100 m, 17 Aug. 1976 (fr.), *M. Sousa et al. 5756* (MO); Huehuetlán, 10 km al E de Huehuetlán, 1680 m, 4 July 1986 (fl.), *P. L. Tenorio & A. T. Salinas 11545* (F, MO); Izucar de Matamoros, 21 km al S de Izucar de Matamoros, carr. a Oaxaca, 1300 m, 26 July 1987 (fl.), *P. L. Tenorio & C. T. Romero 14190* (MO); Juchitán, Los Tules Nilttepec, Torre de Microondas, 11 Dec. 1985 (fr.), *R. Torres et al. 7857* (F). **Querétaro:** Jalpán, arredores del pueblo, 800 m, *E. Arguelles 1484* (MEXU). **Veracruz:** Ozuluama, along hwy. Mex. 180, 4 km SE of Ozuluama, 100 m, 18 Jan. 1981 (fr.), *M. Nee 20054* (F, MEXU); Las Choapas, 5 km NW of El Doce, along main gravel rd. of the Uxpanapa region, 100 m, 4 Mar. 1984 (fl.), *M. Nee & K. Taylor 29882* (F). **NICARAGUA. Estelí:** Reserva Natural de Miraflores, 9 Sep. 2011 (fr.), *I. Coronado & J. Reyes 6377* (MO); ca. 7 km from Hwy. 1 on rd. to Pueblo Nuevo, from Quebrada Jamaili to near summit of Cerro El Pedrero, 600–700 m, 3 July 1977 (fl.), *W. D. Stevens 2608* (BM). **Madriz:** 2.8 km E of Panamerican hwy. (at 2.8 km S of Río Coco bridge, just S of Ocotal) along rd. to Verapaz, 19 Dec. 2012 (fr.), *W. D. Stevens & O. M. Montiel 33623* (MO). **Managua:** ca. 2.3 km from Hwy. 12 on rd. along ridge of Sierra de Managua from Hwy. 12 at Km. 17 to Hwy. 2, 450–550 m, 20 Aug. 1977 (fr.), *W. D. Stevens 3420* (BM). **Matagalpa:** El Nancital, carretera a la Planta Hidroeléctrica Santa Bárbara, a 10 km de la carretera León–San Isidro, 500–600 m, 16 Dec. 1980 (fr.), *P. Moreno 5357* (MO).

**7b. *Nissolia fruticosa* var. *guatemalensis*** (Rose) Rudd, Contr. U.S. Natl. Herb. 32(2): 195. 1956. Basionym: *Nissolia guatemalensis* Rose, Contr. U.S. Natl. Herb. 5(4): 162. 1899. TYPE: Guatemala. Near Esquintla, Nov. 1860 (fr.), *E. Hayes s.n.* (lectotype, designated by Rudd [1956: 195], GH [barcode] GH-64514 image!; isolectotype, US [bc] US-1680 image!).

*Pseudomachaerium rojasianum* Hassl., Bull. Herb. Boissier, Sér. 2, 7: 2. 1907. TYPE: Paraguay. Vila Rica, Jan. 1905 (fl./fr.), *E. Hassler 8619a* (lectotype, designated here, G [barcode] G-229831 image!; isolectotypes, BM [bc] BM-538112 image!, G [bc] G-229832 image!, G [bc] G-229833 image!, G [bc] G-229834 image!, G [bc] G-229835 image!, MO [bc] MO-150991!, S [bc] S-9495 image!).

**Distribution.** *Nissolia fruticosa* var. *guatemalensis* occurs from Guatemala to Argentina (Argentina, Bolivia, Ecuador, El Salvador, Guatemala, Paraguay, and Peru).

**Notes.** We consider the two varieties of *Nissolia fruticosa* very similar, and we question if they should continue to be considered different taxa. Because we have analyzed few specimens of *N. fruticosa* var. *guatemalensis*, we have opted to follow Rudd (1956), who also considered these two varieties similar, with flowers slightly shorter but the calyx longer in the typical variety. According to our research, *N. fruticosa* var. *guatemalensis* has flowers 7–10 mm long and calyces ca. 2 mm long, versus flowers 5–10 mm long and calyces 2–4 mm long in *N. fruticosa* var. *fruticosa*.

In the protologue of the basionym two syntypes were listed: “collected in Guatemala by Sutton Hayes, near Esquintla, November, 1860 (specimen in Herb. Gray), and by Heyde & Lux near Cuajiniquilapa, in 1893, and distributed by John Donnell Smith as no. 6112.” Rudd (1956) chose “Near Escuintla, Hayes, Nov. 1860 (GH type, US fragment)” to be the lectotype.

According to Stafleu and Cowan (1979), the Émile Hassler collection from Paraguay is housed at G, where 11 syntype collections are located: six of *Hassler 8619* and five of *Hassler 8619a*. Because the protologue includes descriptions and illustrations of flower, fruit, and seed, we selected the most informative sheet with both flower and fruit (*Hassler 8619a* [G 229831]) as the lectotype of *Pseudomachaerium rojasianum* Hassl.

**Additional specimens examined.** ARGENTINA. **Tucumán:** La Cruz, 22–28 Dec. 1872 (fl.), *P. G. Lorendy & G. Hieronymus 81* (F). ECUADOR. 9 Apr. 1849 (fl./fr.), *Eggers 15767* (F). GUATEMALA. **Santa Rosa:** Jutiapa, vic. of Jutiapa, ca. 850 m, 24 Oct.–5 Nov. 1940 (fl./fr.), *P. C. Standley 75011* (F); region de La Sepultura, W of Chiquimulilla, 220 m, 5 Dec. 1940 (fr.), *P. C. Standley 79301* (F). PARAGUAY. In regione collium: Cordillera de Villa-Rica, Jan. 1905 (fl./fr.), *E. Hassler 8619* (K). PERU. **Cuzco:** Convención, Echarate, 900 m, 2 Feb. 1939 (fr.), *H. E. Stork et al. 10480* (F). **Junín:** Huancayo, Valle de Río Mantaro, cerca de Huachicna, Río Montara, 2300 m, 1909–1914 (fl.), *A. Weberbauer 6555* (F). **San Martín:** Juan Jui, alto Río Huallaga, 400–800 m, Apr. 1936 (fl.), *G. Klug 4320* (F).

**8. *Nissolia gentryi*** Rudd, Acta Bot. Mex. 15: 26. 1991. TYPE: Mexico. Sinaloa: Capadero, Sierra Tacuichamona, 14 Feb. 1940 (fr./fr.), *H. S. Gentry 5627* (holotype, CAS [barcode] CAS-3620 image!; isotypes, ARIZ [bc] ARIZ-4090 image!, GH not seen, M not seen, MEXU [bc] MEXU-137989!, NA not seen, NY [bc] NY-991164!, POM not seen).

**Distribution.** *Nissolia gentryi* is endemic to Mexico.

**Notes.** This species is characterized by 5-foliolate leaves; small leaflets (7–19 × 5–10 mm); calyx teeth either acicular or narrowly triangular and all the same length; dense indumentum on the abaxial surface of the leaflets; and fruit samara-like, ca. 2 cm long, with a reduced stipe (ca. 1 mm long). Rudd (1991) commented

that *Nissolia gentryi* is very similar to *N. platycarpa* and *N. chiapensis*. These three species differ by the number of flowers in the inflorescence and the calyx length: (one to) two to five (to eight) flowers and calyx 3–5 mm long in *N. platycarpa*; two to four flowers and calyx 6–8 mm long in *N. gentryi*; and 10 to 20 flowers and calyx 5–6 mm long in *N. chiapensis* (Rudd, 1975). They also differ in the absolute and relative dimensions of the leaflets:  $0.5\text{--}4.5 \times 0.4\text{--}4$  cm (as wide as long) in *N. platycarpa* and  $2\text{--}6 \times 1\text{--}2.5$  cm (length about twice the width) in *N. chiapensis* (Rudd, 1975).

*Additional specimens examined.* MEXICO. **Sinaloa:** Culiacán, Tierras Blancas 2 km al N de El Rincón, Brecha a Tamazula, 155 m, 14 Mar. 1985 (fr.), *P. Tenorio 8301* (MEXU). **Sonora:** Arroyo Gochico, below Gochico Viejo, ca. 9.5 km E of San Bernardo, 450 m, 13 Mar. 1995 (fl./fr.), *M. Fishbein et al. 2152* (MEXU); Canyon Guadalupe, S Chiribo, Río Mayo, 6 Mar. 1935 (fr.), *H. S. Gentry 1382* (MEXU); Rancho La Mula, 28.2 km SE of Río Yaquí on Mex. 16 (Km. 195 E of Hermosillo), 900 m, 17 Mar. 1998 (fl.), *A. L. Reina et al. 98-270* (MEXU); 4 km NW of Curea, 569 m, 19 Mar. 2004 (fl./fr.), *T. R. Van Devender & A. L. Reina 151* (MO); Rancho La Asoguera, 2.6 km SW of Santa Ana on rd. to Guadalupe Tayopa, 780 m, 12 Jan. 2001, *T. R. Van Devender et al. 2001-116* (MEXU); San Javier, cañada El Frío, Cerro San Juan ladera NE a 1 km NW del poblado, camino a la estación de microondas, 900 m, 8 Apr. 1997 (fl./fr.), *L. Varela & E. Cuamea 97-33* (MEXU).

**9. *Nissolia hintonii*** Sandwith, Hooker's Icon. Pl. 33 (ser. 5; 3): t. 3248. 1934 [as "*hintonii*"]. TYPE: Mexico. Distr. of Temascaltepec, state of Mexico: Carboneras, 2030 m, 1 Nov. 1932 (fl.), *G. B. Hinton 2334* (lectotype, designated here, K [barcode] K-82066 image!; isolectotypes, LL [bc] LL-371363 image!, GBH [bc] GBH-2334 image!, K [bc] K-222386 image!, MEXU [bc] MEXU-30032!, NY [bc] NY-26454!).

*Distribution.* *Nissolia hintonii* is endemic to Mexico.

*Notes.* This species is characterized by the presence of glandular trichomes on the stem, inflorescence rachis, bracts, peduncle, and calyx. The many persistent bracts ( $3\text{--}4 \times$  ca. 1 mm) along the peduncle allow the ready recognition of *Nissolia hintonii*. The calyx with all five teeth filiform and of the same length (1–2 mm long with the calyx tube about twice as long as the teeth) also characterizes the species. *Nissolia laxior* (B. L. Rob.) Rose also has filiform calyx teeth (3–4 mm long with the calyx tube about equaling the teeth length); however, the inflorescences are fasciculate in *N. laxior* versus racemose (sometimes paniculate) in *N. hintonii*.

The protologue states "MEXICO. District of Temascaltepec, State of Mexico: Carboneras, 2030 m., fl. Nov. 1932, Hinton 2334 (type)." Stafleu and Cowan (1985) state that Noel Yvri Sandwith's types and South

American collections are located at BRIST and K, and they make no mention of the Central and North American collections. Two sheets of *Hinton 2334* were found at K. Although K-82066 is a complete specimen in flower with "sp. nov. Typus!" handwritten on the field label, K-222386, also with "sp. nov. Typus!" handwritten on the label, consists of some whole flowers and some dissected flowers and a drawing that corresponds to the illustration published in the protologue. We assume (without clearer evidence) that K-222386 is the part that was removed from K-82066 and used for the illustration. We are here designating K-82066 as the lectotype of *Nissolia hintonii*.

*Additional specimens examined.* MEXICO. **Guerrero:** on conglomerate on W side of ravine on W side of gorge of Tenancingo River, ca. 4 km S-SE of Villa, 1930 m, 10 Oct. 1955 (fl.), *R. T. Clausen s.n.* (MEXU); Adama, Sierra Madre del Sur, N of Río Balsas, 520 m, 18 Nov. 1937 (fl./fr.), *Y. Mexia 8848* (F, MO); a 2 km al SW de Xochipila, Zumpango del Río, 1070 m, 1 July 1989 (fl.), *M. Sousa et al. 13225* (MO), Tetipac, 6 km al E de San Andrés, 1340 m, 23 Jan. 1998 (fr.), *L. L. Toledo 27* (MEXU). **México:** Temascaltepec, Ixtapan, 1000 m, 12 Dec. 1932 (fl./fr.), *G. B. Hinton 2922* (BM); Carboneras, 25 Feb. 1934 (fr.), *G. B. Hinton 5603* (BM); Rincón, 11 July 1933 (fl./fr.), *G. B. Hinton 5075* (BM); Lucas del Maiz, 2 March 1933 (fr.), *G. B. Hinton 3336* (MEXU); Tejuipilco-San José, 3 Dec. 1934 (fl.), *G. B. Hinton 7086* (F); 30 Dec. 1934 (fl./fr.), *G. B. Hinton 7189* (MEXU, MO). **Michoacán:** Charo, 5 km al S de Temascal, brecha a Tzitzio, 2000 m, 11 Mar. 1985 (fr.), *J. S. Nuñez 7518* (MEXU).

**10. *Nissolia klugii*** (Rudd) T. M. Moura & Fort.-Perez, comb. nov. Basionym: *Chaetocalyx klugii* Rudd, Contr. U.S. Natl. Herb. 32(3): 232, fig. 11. 1958. TYPE: Peru. Loreto: Balsapuerto, June 1933 (fl.), *G. Klug 3114* (holotype, US [barcode] US-1846 image!; isotypes, A [bc] A-53340 image!, BM [bc] BM-931587 image!, F [bc] 43446!, G [bc] G-364838 image!, GH-61963 image!, K [bc] K-222384 image!, MO [bc] MO-150989!, NY [bc] NY-4020!).

*Distribution.* *Nissolia klugii* is found in Brazil, Ecuador, and Peru.

*Notes.* *Nissolia klugii* is unique by its fruit, a loment 8.3–11 cm long, stipitate, with stipe ca. 3 mm long, and with two longitudinal wings along both sides of the fruit (ca. 7 mm wide on each side).

*Additional specimens examined.* BRAZIL. **Acre:** Brasília, Seringal Porongaba, Colocação São José, 29 May 1991 (fl.), *D. C. Daly et al. 6778* (MO, NY). **Rondônia:** Guarajá-Mirim, sub-base projeto RADAM, fronteira Brasil-Bolivia, ponto 19, 1976 (fl.), *M. R. Cordeiro 920* (NY). ECUADOR. **Napo:** Cantón Tena, Estación Biológica Jatun Sacha, Río Napo, 8 km al E de Misahualli, 400 m, 11–14 Apr. 1989 (fl./fr.), *C. Cerón 6382* (MO). PERU. **Amazonas:** Bagua, Imaza, Región Nororiental del Marañón, comunidad Yamayakat, Río Marañón, 320 m, 2 Aug. 1994 (fl./fr.), *N. Jaramillo*



et al. 251 (MO, NY). **Huánuco:** vic. of Tingo María, 21 July 1962 (fr.), *M. E. Mathias* & *D. Taylor 5971* (F, MO); Pachitea, Honoria, 8 May 1967 (fl.), *J. Schunke 1937* (F, MO, NY); Honoria, Panchitea, en bosque alto en la quebrada de Ayamiría a 4 km, 26 June 1967 (fr.), *J. Schunke 2080* (F, NY).

**11. *Nissolia latisiliqua*** (Poir.) T. M. Moura & Fort.-Perez, comb. nov. Basionym: *Hedysarum latisiliquium* Poir., *Encycl.* 6(2): 432. 1805. *Chaetocalyx latisiliquus* (Poir.) Benth. ex Hemsl., *Biol. Centr.-Amer., Bot.* 1: 268. 1879. *Poiretia latisiliqua* (Poir.) Desv., *J. Bot. Agric.* 1: 122. 1813. *Planarium latisiliquum* (Poir.) Desv., *Ann. Sci. Nat. (Paris)* 9: 417. 1826. TYPE: Ecuador. s. loc., *J. Jussieu s.n.* (holotype, P [barcode] P-15601!).

*Distribution.* *Nissolia latisiliqua* is found in Colombia, Costa Rica, Ecuador, and Panama.

*Notes.* *Nissolia latisiliqua* is characterized by the combination of large leaflets (1.7–4.5 × 1.2–2.5 cm), a short calyx tube (ca. 2 mm long), a stipitate loment, all flower parts persistent in the young fruit, and the stipe (3–7 mm long) exceeding the remaining flower parts. *Nissolia fruticosa* also has large leaflets (2.5–8 × 2.3–4.5 cm), a calyx tube ca. 2 mm long, and the stipe exceeding the remaining flower parts; however, its fruit is samara-like versus a loment in *N. latisiliqua*.

The protologue of the basionym stated, “Cette plante a été rapportée du Pérou par Joseph Jussieu (v.s. in herb. Jussieu).” According to Stafleu and Cowan (1979), the main collection of J. Jussieu is in P-JU, with other material at C. The types and collection of Jean L. M. Poiret are mainly in P and PC with other material at BR, FI, H, P-LA, and UPS (Stafleu & Cowan, 1983). One specimen (P-15601) was located; we therefore consider it the holotype of *Hedysarum latisiliquum* Poir., probably transferred from P-JU to the general herbarium at P at some time after the publication of the basionym.

*Additional specimens examined.* COSTA RICA. **Puntarenas:** Parque Nacional Corcovado, Sirena, Río Claro Trail–Río Claro, 11 Feb. 1988 (fr.), *C. Kerner 122* (F, MO); Cantón de Golfito, Valle de Coto Colorado, Ribera de Río Esquinas, Boca Río Esquinas, 17 Dec. 1993 (fl./fr.), *M. Segura et al. 249* (F, MO). **San José:** vic. of El General, 88 m, Jan. 1936 (fl./fr.), *A. F. Skutch 2424* (MO); San José, cut-over hills about 8 km SW of San Isidro El General, 1000 m, 27 Jan. 1965 (fl./fr.), *L. O. Williams et al. 28347* (F). ECUADOR. **El Oro:** bosque petrificado Puyango, quebrada Los Zabalos, 330 m, 6 June 1995 (fl./fr.), *X. Conejo et al. 4063* (K). **Esmeraldas:** Atacamas, near Esmeraldas, 4–7 Dec. 1836 (fr.), *G. W. Barclay 746* (BM); Parroquia de Concepción, island in Río Santiago, near Playa Rica, 108 m, 19 Dec. 1936 (fl./fr.), *Y. Mexia 8463* (BM, F, K). **Guayas:** Chongón, 14 July 1939 (fl./fr.), *E. Asplund 7682* (K, NY); Teresita, 3 km W of Bucay, 270 m, 5–7 July 1923 (fl./fr.), *A. S. Hitchcock 20509* (NY). **Loja:** rd. Macará–Sozoranga, Km. 21, 700 m, 30 May 1996 (fl./fr.), *G. P. Lewis 2354* (K, NY). **Manabi:** roadsides near Jipijapa, 300–700 m, 14 July 1942 (fl./fr.), *O. Haught 3398* (K). **Pichincha:** 20 km

W of Santo Domingo de los Colorados, 2 Nov. 1961 (fl./fr.), *P. C. D. Cazalet & T. D. Pennington 5252* (K, NY). PANAMA. Changuinola Valley, on railroad ballast, 29 Jan. 1924 (fl./fr.), *V. C. Dunlap 400* (F). **Bocas del Toro:** Bocas del Toro, region of Almirante, Jan.–Mar. 1928 (fl.), *G. P. Cooper* (F); Río Teribe, mostly 2nd growth near Quebrada Lúkulon, 90 m, 12 Apr. 1968, (fl.), *J. H. Kirkbride Jr. & J. A. Duke 510* (NY).

**12. *Nissolia laxior*** (B. L. Rob.) Rose, *Contr. U.S. Natl. Herb.* 5(4): 162. 1899. Basionym: *Nissolia confertiflora* S. Watson var. *laxior* B. L. Rob., *Proc. Amer. Acad. Arts* 29: 315. 1894. TYPE: Mexico. Barranca of Beltrán, 5 June 1893 (fl.), *C. G. Pringle 4379* (lectotype, designated by Rudd [1956: 186], GH [barcode] GH-64512 image!; isolectotypes, BM [bc] BM-931577 image!, BR [bc] BR-5198825 image!, COLO [bc] COLO-385674 image!, E [bc] E-841192!, F [bc] F-59562!, HBG [bc] HBG-519362 image!, JE [bc] JE-4909 image!, M [bc] M-233698 image!, MEL [bc] MEL-2108209 image!, MEXU [bc] MEXU-1169261!, MIN [bc] MIN-1001893 image!, MIN [bc] MIN-1169259 image!, MIN [bc] MIN-1169260 image!, MO [bc] MO-150954!, MSC [bc] MSC-92466 image!, MU [bc] MU-167 image!, NDG [bc] NDG-27103 image!, NY [bc] NY-26452!, P [bc] P-2955939 image!, P [bc] P-2955940 image!, PH not seen, PUL [bc] PUL-257 image!, S [bc] S-8849 image!, UC [bc] UC-82343 image!, US [bc] US-1840 image!, US [bc] US-997133 image!).

*Distribution.* *Nissolia laxior* is endemic to Mexico.

*Notes.* *Nissolia laxior* is remarkable for its filiform calyx teeth (3–4 mm long, with the calyx tube equal in length to the calyx teeth) and long stipe (3–5 mm long) on its samara-like fruit. Rudd (1956) commented that the stipules, which are 4(–10) × 2–3 mm (at the base) and usually tomentulose beneath, serve as a ready identification character for this species.

*Additional specimens examined.* MEXICO. **Colima:** Comala, Rancho El Jabaili, 22 km (airline) NNW of Colima in the SW of foothills of the Volcán de Colima, 1325 m, 19 July 1991 (fl.), *L. Vázquez & B. L. Phillips 907* (MEXU). **Jalisco:** Talpa, 7 km al S de Talpa, camino a La Cuesta, 8 Sep. 1979 (fr.), *J. A. S. Magallanes & P. Basurto 1947* (MEXU); Talpa, 26 km S de Talpa, cerca de la Cuesta, 8 Sep. 1979 (fr.), *J. A. S. Magallanes & P. Basurto 1968* (MEXU); Autlán, 15 km al SO de Autlán, carretera a Barra de Navidad, 25 July 1982 (fl.), *J. A. S. Magallanes 3649* (MEXU); Zapotitlán, Rancho El Jabaili, 22 km (airline) N of Colima in the SW foothills of the Volcán de Colima, 1100 m, 11 Sep. 1991 (fr.), *A. C. Sanders et al. 11382* (MEXU, MO); dry roadside thicket about Corcovado Canyon, 11 mi. NE of Autlán toward Guadalajara, 3700 ft., 16 Aug. 1949 (fr.), *R. L. Wilbur & C. R. Wilbur 2379* (MEXU). **Michoacán:** Aguililla, a 10 km al O de Aguililla, 11 July 1985 (fl./fr.), *J. C. S. Núñez et al. 9247* (F, MO); Coalcomán, a 10 km al NE de Coalcomán, en la carr. a dos Aguas, 1170 m, 22 July 1979 (fr.), *M. Sousa et al. 10766* (BM, MO). **Oaxaca:**

Tehuantepec, El Cerro Calderona, a 6 km al S de Jalapa del Marqués, en el camino a Estación de Microondas, 540 m, 14 Dec. 1978 (fr.), *M. Sousa et al. 10105* (MEXU); La Cascada, San Isidro, al E de San Vicente, 15 km al N de Putla, 10 June 1985 (fl.), *R. Torres & A. García 6747* (BM, MEXU, MO).

**13. *Nissolia leiogyne*** Sandwith, Bull. Misc. Inform. Kew 1937(5): 302. 1937. TYPE: Mexico. Guerrero: distr. of Coyuca, Santa Barbara, in Barranca, 14 July 1934 (fl./fr.), *G. B. Hinton 6291* (lectotype, designated here, K [barcode] K-222387 image!; isolectotypes, A [bc] A-64515 image!, BM [bc] BM-931574 image!, ENCB [bc] ENCB-3380 image!, F [bc] F-59578!, GBH [bc] GBH-6291 image!, GH [bc] GH-64516 image!, LL [bc] LL-371364 image!, K [bc] K-82071 image!, MEXU [bc] MEXU-1169258!, MO [bc] MO-150986!, NY [bc] NY-26455!, NY [bc] NY-26456!, PH [bc] PH-19317 image!, RSA [bc] RSA-4070 image!, RSA [bc] RSA-4071 image!, S [bc] S-13-11989 image!, US [bc] US-1858 image!, US [bc] US-997150 image!).

*Distribution.* *Nissolia leiogyne* is endemic to Mexico.

*Notes.* Rudd (1956) stated that *Nissolia leiogyne* “is characterized by fruits that are glabrous or nearly so,” and also that *N. schottii* (Torr.) A. Gray is probably its nearest relative, but these species differ by the flowers, which are slightly smaller in *N. leiogyne* (ca. 8 mm long vs. ca. 1 cm long in *N. schottii*). They also differ in the pedicel length, which is 4–6 mm long in both flower and fruit in *N. leiogyne* versus ca. 6 mm long in flower and 8–10 mm long in fruit in *N. schottii*.

The protologue states, “State of Guerrero, district of Coyuca: Santa Barbara, in Barranca, fl. and fr. July 14<sup>th</sup>, 1934, Hinton 6291 (typus).” Two specimens of *Hinton 6291* were located at K (K-222387 and K-82071). Both specimens fit the protologue and bear flowers and fruit. We are designating K-222387 as the lectotype of *Nissolia leiogyne* because it is the most informative specimen.

*Additional specimens examined.* MEXICO. **Guerrero:** Chichihualco, 15 km sobre la desviación a Chichihualco, tramo Jalapa–El Palmar, 19 km al NE de Chilpancingo, 14 July 1979 (fl.), *A. Delgado & J. García 1063* (MO); Chilpancingo, 8 km al N, carretera a Iguala, 1295 m, 8 July 2000 (fl./fr.), *R. C. Durán et al. 4776* (MEXU); 1 km al NO de la desviación a Chichihualco, 23 June 1990 (fr.), *J. C. S. Núñez 13680* (MEXU). **Jalisco:** La Huerta, Arroyo Colorado a 10 m del final de camino Eje Central, dentro de la Estación de Biología Chamela, 20 m, 23 Sep. 1997 (fr.), *A. Domínguez-Mariani 462* (MEXU); Jilotlán de Los Dolores, en los Tuneles de Chilacatan, sobre el Río Tepalcatepec, 21 Sep. 1948 (fr.), *E. Martínez et al. 4365* (MEXU); El Limón, 3 km al SE de El Limón por la carretera El Grullo–Cd. Guzmán, 950 m, 17 Oct. 1994 (fr.), *F. J. Santana & E. Muñoz 6979* (MEXU); dry roadside thicket about Corcovado Canyon, 11 mi. NE of Autlán toward Guadaluajara, 3700 ft., 16 Aug. 1949 (fl.), *R. L. Wilbur & C. R. Wilbur 2383* (MEXU).

**Michoacán:** carr. La Huacana–Cuatro Caminos, cerca de la presa de Zicuirán, 350 m, 13 Sep. 1979 (fr.), *J. C. S. Núñez & G. Ramírez 1595* (MO); Aquila, a 8 km al W de Tecoman Col.—Playa Azul, 26 Sep. 1983 (fr.), *E. Martínez 4573* (MEXU); a 5 km al S de Arteaga, Sierra Madre del Sur, 700 m, 21 Aug. 1977 (fl.), *M. Sousa et al. 8032* (BM, MO); a 2 km al E de El Puerto de San Salvador, al NE de Arteaga, 850 m, 20 July 1979 (fl.), *M. Sousa et al. 10725* (BM); a 18 km al NE de Arteaga y a 4 al NE de Las Juntas, Sierra Madre del Sur, 700 m, 21 Aug. 1977 (fr.), *M. Sousa et al. 8041* (BM). **Oaxaca:** Jamiltepec, a 11 km al SW de Mancuernas, 20 Aug. 1976 (fr.), *M. Sousa et al. 5848* (MEXU, MO).

**14. *Nissolia longiflora*** (Benth. ex A. Gray) T. M. Moura & Fort.-Perez, comb. nov. Basionym: *Chaetocalyx longiflorus* Benth. ex A. Gray, U.S. Expl. Exped., Phan. 1: 423. 1854. TYPE: Brazil. Rio de Janeiro, *Schott s.n.* (lectotype, designated here, W [barcode] W-27026 image!; isolectotype, W [bc] W-27027 image!).

*Chaetocalyx hebecarpus* Benth., Fl. Bras. 15(1A): 76. 1859. TYPE: Minas Gerais: Cachoeira do Campo, *P. Claussen s.n.* (lectotype, designated here, K [barcode] K-222379 image!).

*Chaetocalyx hebecarpus* Benth. var. *mollis* Benth., Fl. Bras. 15(1A): 76. 1859. TYPE: Brazil. Minas Gerais: in agris calidis deserti Serro Frio versus S. S. Fran. Provinciae, *C. F. P. von Martius s.n.* (holotype, M [barcode] M-233705 image!).

*Chaetocalyx hebecarpus* Benth. var. *oblongifolius* Benth., Fl. Bras. 15(1A): 76. 1859. TYPE: Brazil. Minas Gerais: in campis territ. Adamantum ad Tejuco, *C. F. P. von Martius 1297* (holotype, M [barcode] M-233704 image!).

*Chaetocalyx glaziovii* Taub., Flora 72(n.s. 47): 425. 1889. TYPE: Brazil. s. loc., *A. F. M. Glaziou 13703* (Berol. et hort. Petrop.) (lectotype, designated here, C [barcode] C-10012012 image!; isolectotypes, BR [bc] BR-5118021 image!, K [bc] K-222377 image!, SI [bc] SI-1952 image!, SI [bc] SI-1953 image!).

*Distribution.* *Nissolia longiflora* is found in Brazil and Bolivia.

*Notes.* As previously noted, *Nissolia longiflora* is a member of a group with narrow (subterete) fruits. This species is distinguished, however, by its flower length (2–3 cm long) and stipitate fruit (stipes 2–3 mm long). Among the species with subterete fruit, only *N. acutifolia* also has flowers over 2 cm long (ca. 2.4 cm long) and stipitate fruit (stipes ca. 10 mm long). These two species differ by the relative proportions of the calyx parts: the calyx tube is about twice as long as the adaxial calyx teeth in *N. acutifolia*, while in *N. longiflora* the calyx tube is about equal to the adaxial teeth.

The protologue of the basionym stated, “Chaetocalyx longiflorus, Benth... ined. in Herb. Imp. Vindob. ... Hab. Brazil, in vicinity of Rio Janeiro.” The W herbarium (formerly Herbarium Imperiale Vindobonense) has two collections of the type *Schott s.n.* (W-27026 and W-27027). Although Rudd (1958: 226) stated “Rio de

Janeiro: Wilkes Exped. (US type),” we believe that this is a mistake, because the protologue makes clear that the specimen seen by the author is hosted at W. There are two equally informative flowering duplicates in W; we are here designating W-27026 as the lectotype of *Chaetocalyx longiflorus*.

The protologue of *Chaetocalyx glaziovii* states, “A. F. M. Glaziou 13703 (Berol. et hort. Petrop.)” We sent e-mail correspondence to both B and LE, and this collection was not found at either herbarium. Nevertheless, five isotypes were located at BR, C, K, and SI (two sheets). We assume that the holotype was lost in the fire of the Berlin Botanical Museum in 1943; therefore, we are here designating a lectotype for this taxon. Among the isotypes located, the two housed in SI represent only leaves and flowers in a packet, while those at BR, C, and K have branches in flower and fit the description in the protologue. We are, therefore, selecting the most informative specimen (C-10012012) as the lectotype of *C. glaziovii*.

In the protologue of *Chaetocalyx hebecarpus* the author stated, “Habitat in Brasilia meridionali: A. de Saint Hilaire; inter cabo d’Agosto et Cocaes et ad Rio de Onça prov. Minarum: M.; ad Caxoeira do Campo: Claussen, Mart. Herb. Fl. Bras. n.1175.” Because Bentham cited multiple syntypes and his own collection is hosted at K, we are here designating the specimen K-222379 as the lectotype of *C. hebecarpus*.

Remaining syntypes of *Chaetocalyx hebecarpus*, some of which were located by us, include *A. de St. Hilaire s.n.* (probably at P not seen) and *C. F. P. von Martius 1175* (M [bc] M-233702 images!, M [bc] M-233703 image!).

**Additional specimens examined.** BOLIVIA. **Santa Cruz:** Florida, hwy. from Samaipata to Santa Cruz, 3 km (by air) NE of Estancia Cuevas, 1400 m, 3 June 1991 (fl.), *M. Nee 40767* (MO); Guarayos, 6.5 km W of Yotaí, 250 m, 12 July 1991 (fl./fr.), *M. Nee & G. Coimbra 41682* (MO); Ñuflo de Chávez, edge of dirt rd., pastures & edge of woods, 0.5–1 km N of center of San Javier, low hills, 480–510 m, 17 May 2005 (fl./fr.), *M. Nee 53044* (NY). BRAZIL. **Bahia:** Espigão Mestre, ca. 13 km S of Cocos & 3 km S of the Rio Itaguari, 560 m, 15 Mar. 1972 (fl.), *W. R. Anderson et al. 36992* (F, NY); próximo Vargem da Pedra a 33 km de Sussuarana, 27 Jan. 1965 (fl.), *E. Pereira 9776 & G. Pabst 8665* (F). **Distrito Federal:** Brasília, 15 Apr. 1979 (fl./fr.), *F. C. Silva 177* (MO). **Minas Gerais:** Caeté, Base da Serra da Piedade, 6 May 1934 (fr.), *M. Barreto 5703* (F); Sabará, Gaya, 6 May 1934 (fl.), *M. Barreto 5704* (F); Pará de Minas, 28 May 1936 (fl./fr.), *J. M. S. Gouvea s.n.* (F); Diamantina, near Km. 988 of railroad, tangle on embankment, 1260 m, 14 May 1931 (fl.), *Y. Mexia 5835* (BM, F, NY). **Paraná:** Capão Grande, 28 Mar. 1915 (fl.), *P. Dusén 16881* (F). **Rondônia:** Ariquemes, Mineração Mibrasa, Setor Alto Candeiás, Km. 128, SE de Ariquemes, 11 May 1982 (fl.), *L. O. A. Teixeira et al. 342* (MO, NY).

**15. *Nissolia longiloba*** (Rudd) T. M. Moura & Fort.-Perez, comb. nov. Basionym: *Chaetocalyx longilobus* Rudd, *Novon* 6: 119. 1996. TYPE: Peru.

Amazonas: Luya, Camporredondo, Fundo Cedro, 2450–2550 m, 25 May 1989 (fr.), *C. Díaz, J. Campos & L. Campos 3530* (holotype, MO [barcode] MO-176749!; isotypes, SFV not seen, USM [bc] USM-362 image!).

**Distribution.** *Nissolia longiloba* is found in Ecuador and Peru.

**Notes.** Rudd (1996) commented that *Chaetocalyx longilobus* was similar to *C. weberbaueri* Harms (= *Nissolia weberbaueri* (Harms) T. M. Moura & Fort.-Perez) and *C. latisiliquus* (= *N. latisiliqua*), but these three species differ in flower characteristics: the standard petal is pubescent on the outer surface in *N. longiloba* versus glabrous in the other two species. The calyx teeth are also longer in *N. longiloba* (6–8 mm) than in the other two species (1–2 mm in *N. latisiliqua* and 2–3 mm in *N. weberbaueri*).

**Additional specimens examined.** ECUADOR. **Loja:** Catacocha to Loma Quemada, Km. 8.5, 1600 m, 16 Apr. 1996 (fl./fr.), *G. P. Lewis et al. 2245* (E, MO). PERU. **Amazonas:** Luya, Camporredondo, Fundo Cedro, 2450–2550 m, 24 May 1989 (fr.), *C. Díaz et al. 3518* (MO).

**16. *Nissolia microptera*** Poir., *Encycl., Suppl.* 4(1): 98. 1816. *Machaerium micropteron* (Poir.) Benth., *Comm. Legum. Gen.* 37. 1837. TYPE: cultivated in Ténériffe (Spain), *A. P. Ledru s.n.* (lectotype, designated by Rudd [1970: 324], P [barcode] P-2297630 image!, ex herb. Poirét; isolectotype, FI [bc] FI-9734 image!).

*Nissolia hirsuta* DC., *Prodr.* 2: 257. 1825. TYPE: México. Guanajuato, *Née s.n.* (holotype, G [barcode] G-478063 image!).

*Nissolia confertiflora* S. Watson, *Proc. Amer. Acad. Arts* 21: 424. 1886. TYPE: Mexico. Hacienda San José, 25 mi. S of Batopilas, Aug. 1885 (fl.), *E. Palmer 42* (lectotype, designated by Rudd [1956: 191], GH [barcode] GH-64511 image!).

*Nissolia multiflora* Rose, *Contr. U.S. Natl. Herb.* 5(4): 161, fig. 24. 1899. TYPE: Mexico. Oaxaca: Monte Albán, alt. 5800 ft., 23 Nov. 1894 (fr.), *C. G. Pringle 6064* (lectotype, designated by Rudd [1956: 191], US [barcode] US-1856 image! [excluding upper right part of specimen, annotated by Rudd as *N. pringlei* Rose]; isolectotypes, AC [bc] AC-319922 image!, BKL [bc] BKL-2373 image!, BR [bc] BR-5174836 image!, CM [bc] CM-1063 image!, F [bc] 59579!, GH [bc] GH-64518 image!, GOET [bc] GOET-5182 image!, HBG [bc] HBG-519359 image!, JE [bc] JE-1101 image!, KFTA [bc] KFTA-494 image!, M [bc] M-233699 image!, MEL [bc] MEL-2108205 image!, MEXU [bc] MEXU-1169255!, MEXU [bc] MEXU-1169256!, MEXU [bc] MEXU-1169257!, MIN [bc] MIN-1001891 image!, MO [bc] MO-150845!, NDC [bc] NDC-27101 image!, NY [bc] NY-26457!, P [bc] P-2955836 image!, P [bc] P-2955838 image!, PH [bc] PH-19318 image!, S [bc] S-13-11987 image!, US [bc] US-997126 image!, US [bc] US-1107507 image!).

**Distribution.** *Nissolia microptera* is endemic to Mexico.

*Notes.* *Nissolia microptera* was published in 1816 (Poiret, 1816) and transferred to *Machaerium* by Bentham (1837). Rudd (1970) recognized the species as *N. microptera* and synonymized *N. hirsuta* DC. with it. This species is easily recognized by the dense tomentose indumentum on the abaxial surface of the leaflets.

*Additional specimens examined.* MEXICO. **Durango:** 15 Aug. 1987 (fl.), *J. N. Rose 2301* (F). **Guerrero:** Iguala y Buenavista, Cañón de La Mano, entre Los Amates y El Naranjo, 10 km al N de Iguala por el ferrocarril, 900–1000 m, 13 Sep. 1986 (fl./fr.), *C. Catalán & S. Vázquez 105* (MEXU); Chilpancingo de los Bravos, sobre la desv. a Chichihualco en Azizintla, a 8 km al NW de Chilpancingo, 19 Oct. 1977 (fr.), *M. Ladd et al. 149* (MO); Atenguillo, camino a Talpa, 12 km NE de los Volcanes, 7 Sep. 1979 (fl.), *J. A. S. Magallanes & P. Basurto 1931* (MEXU); Apaxtla, aprox. 19.5 km al S de Apaxtla y a 55.5 km al S de Teloloapan, carretera Teloloapan–Apaxtla–El Caracol, 1147 m, 30 Aug. 2011 (fl.), *J. C. Soto 19438* (MEXU); Chilpancingo, aprox. 5 km al N del centro de Chilpancingo en la parte baja de cerro calizo, al N de la Col. El Polvorín, 1464 m, 24 Aug. 2013 (fl.), *J. C. Soto 20662* (MEXU). **Michoacán:** lower N-facing slopes of Cerro Santa María, 8–10 km SW of Jiquilpan & 5 km NE of Quitupan, 2000 m, 5–7 Aug. 1959 (fl.), *C. Feddema 40* (MO); Tiquicheo, La Crucita, 18 km SO Tiquicheo, 640 m, 15 July 2003 (fl.), *J. C. Soto & A. S. Navarro 15114* (MEXU); Morelia, lado NE del Cerro El Águila, 2160 m, 11 Oct. 2008 (fl.), *G. C. Tenorio & G. I. Manríquez 3130* (MEXU). **Morelos:** Tepoztlán, poblado próximo Amatlán, 1 km al SW de Amatlán, 1580 m, *M. D. Garduño et al. 337* (MEXU); near Cuernavaca, 5000 ft., 24 July–15 Sep. 1896 (fl./fr.), *C. G. Pringle 6395* (BM, E, F, MO). **Oaxaca:** Dpto. Del Centro, Cerro San Antonio, 27 Oct. 1907 (fl./fr.), *C. Conzatti 2038* (MEXU); Monte Albán, near Oaxaca, 5800 ft., 28 Nov. 1894 (fr.), *C. G. Pringle 6064* (F, MO); Monte Albán, en las Ruinas, 1850 m, 24 Aug. 1976 (fl./fr.), *M. Sousa et al. 6072* (MEXU); a 1 km del Río de regreso de Tomellín, 26 Sep. 1976 (fl./fr.), *O. Tellez & A. S. Magallanes 289* (MO). **Zacatecas:** García de la Cadena, alrededores del río Patitos, 0.5 km en línea recta al NNO de las Higueras, 1230 m, 15 May 2015 (fl.), *C. J. Ramírez-Díaz & P. Carrillo-Reyes 390* (MEXU).

**17. *Nissolia montana*** Rose, Contr. U.S. Natl. Herb. 8 (1): 48. 1903. TYPE: Mexico. Guerrero: on mtns. near Iguala, 24 Oct. 1900 (fl./fr.), *C. G. Pringle 9259* (holotype, US [barcode] US-1857 image!; isolectotypes, GH [bc] GH-64517 image!, MEXU [bc] MEXU-1169253!, MEXU [bc] MEXU-1169254!, VT [bc] VT-26276 image!).

*Distribution.* *Nissolia montana* is endemic to Mexico.

*Notes.* This is the only species of the genus with the corolla reported to be cherry colored with white (*M. M. Osorio et al. 444*, MEXU). Rudd (1956) commented that *Nissolia montana* most resembles *N. laxior* and *N. schottii*. These species differ in the relative proportions of the calyx parts: the calyx tube is ca. four times as long as the calyx teeth in *N. montana*, and about equal in *N. laxior* and *N. schottii*.

*Additional specimens examined.* MEXICO. **Guerrero:** Iguala Canyon, 3000 ft., 13 Oct. 1906 (fl.), *C. G. Pringle 10329* (BM, E, F). **Oaxaca:** Tlaxiaco, Santiago Yosondúa,

Imperio Santiago Yosondúa, 2380 m, 12 Sep. 2006 (fl.), *M. M. Osorio et al. 444* (MEXU).

**18. *Nissolia nigricans*** (Burkart) T. M. Moura & Fort.-Perez, comb. nov. Basionym: *Chaetocalyx nigricans* Burkart, Darwiniana 3: 160, figs. 6a, 7a, pl. 6. 1939. TYPE: Argentina. Corrientes, La Cruz, Río Uruguay, 10 Nov. 1936 (fl./fr.), *A. Burkart 8197* (lectotype, designated here, SI [barcode] SI-1954 image!; isolectotypes, GH [bc] GH-53342 image!, K [bc] K-222385 image!, P [bc] P-2297627 image!, SI [bc] SI-1955 image!, SI [bc] SI-1956 image!, US [bc] US-1841 image!).

*Distribution.* *Nissolia nigricans* is known from Argentina, Brazil, and Uruguay.

*Notes.* *Nissolia nigricans* has a long stipe (1–1.2 cm) that exceeds the calyx length, as in *N. fruticosa*. However, *N. fruticosa* has a samara-like fruit, while *N. nigricans* has a compressed linear loment. Rudd (1958) commented that this seems to be the only species of *Chaetocalyx* that turns blackish on drying; we have noticed that this remains true when all 30 taxa now recognized as *Nissolia* are considered.

The protologue of the basionym states, “Argentina: Corrientes, La Cruz, en la costa del Río Uruguay, Burkart 8197, 10-XI-1936; SI (typus).” There are three specimens of *Burkart 8197* housed in SI: SI-1954, with a label, probably inserted by the herbarium staff, upon which is written “holotype”; SI-1956, with the field label bearing the same label information cited above, and the word “duplum” written on it; and SI-1955, without a field label, but only with “*Chaetocalyx nigricans* – typus – Burkart n 8197” written on it. As the three specimens are equally informative, we consider it appropriate to follow the label indication and designate SI-1954 as the lectotype of *C. nigricans*.

*Additional specimens examined.* ARGENTINA. **Misiones:** Parque Nacional del Iguazú, 1 July 1986 (fr.), *S. Ferrucci et al. 486* (K); Candelaria, Puerto de Sta. Ana, sobre el Río Paraná, 5 km de Sta. Ana, 300 ft., 10 Oct. 1996 (fr.), *O. Morrone et al. 1162* (MO, NY); Iguazú, Parque Nacional Iguazú, borde selva marginal del Río Iguazú, camino a Pto. de las Canoas, 17 Dec. 1991 (fl.), *R. Vanni et al. 2955* (F, NY). **Corrientes:** La Cruz, 10 Nov. 1936 (fl./fr.), *A. Burkart 8197* (K); Santo Tomé, Ea. Timbó, Potrero Luna, 8 Dec. 1981 (fr.), *S. G. Tressens et al. 1604* (MO). BRAZIL. **Paraná:** Curitiba, Vila Nova, 13 Dec. 1971 (fl.), *G. Hatschbach 28470* (MO); Palmital, Río do Cobre, 850 m, 15 Oct. 1991 (fl.), *G. Hatschbach & D. Guimarães 55762* (MO).

**19. *Nissolia peruviana*** T. M. Moura & Fort.-Perez, nom. nov. Replaced name: *Raimondianthus platycarpus* Harms, Notizbl. Bot. Gart. Berlin-Dahlem 10: 387. 1928. *Chaetocalyx platycarpus* (Harms) Rudd, Contr. U.S. Natl. Herb. 32(3): 216. 1958. TYPE: Peru. Cajamarca, *A. Raimondi 6714*

(lectotype, designated by Rudd [1958: 217], F-1082827 image!).

*Distribution.* *Nissolia peruviana* is endemic to Peru.

*Notes.* *Nissolia peruviana* seems to be uncommon or not well collected; we have seen this species only by image, and Rudd (1958) stated that this species is known exclusively from the type locality and cited only two examined specimens (one being the type). Rudd also commented that *Chaetocalyx platycarpus* ( $\equiv$  *N. peruviana*) is similar to *N. tomentosa*; however, *N. peruviana* is 5- to 7-foliolate, while *N. tomentosa* is 11- to 17-foliolate.

A nomen novum is here designated due to the prior existence of *Nissolia platycarpa*. Because *Chaetocalyx platycarpus* is endemic to Peru, we selected “*peruviana*” as the new specific epithet.

**20. *Nissolia platycalyx*** S. Watson, Proc. Amer. Acad. Arts 17: 344. 1882. TYPE: Mexico. Mtns. E of Saltillo, July 1880 (fl./fr.), *E. Palmer 248* (lectotype, designated by Rudd [1956: 186], GH [barcode] GH-64519 image!; isolectotypes, F [bc] F-59580!, F [bc] F-59581!, K [bc] K-82067 image!, P [bc] P-2297631 image!, P [bc] P-2297632 image!, P [bc] P-2297633 image!, P [bc] P-2955835 image!, P [bc] P-930894 image!, PH [bc] PH-19319 image!, US [bc] US-1852 image!, YU [bc] YU-1503 image!).

*Distribution.* *Nissolia platycalyx* is found in the United States and Mexico.

*Notes.* In flower this species is characterized by the 1- to 4-flowered inflorescence, flowers 1.5–2 cm long, and calyx 7–10 mm long with teeth 2–4 mm long (the calyx tube is ca. twice as long as the calyx teeth). Rudd (1956) commented that among the species with samara-like fruit, *Nissolia platycalyx* has the largest flowers; when the species is in fruit, the persistent large calyx is very distinctive. She also commented that apparently this is the only member of the group with samara-like fruit that also has 7-foliolate leaves; however, 5-foliolate leaves are sometimes found.

In the protologue the type locality and collection number are cited as “in the mountains east of Saltillo (248, in part).” The herbarium and types of Sereno Watson are housed mainly in US and GH (Staffleu & Cowan, 1988). Three duplicates of *E. Palmer 248* were located in US and another in GH. Rudd (1956: 186) stated, “Coahuila: Saltillo, Palmer 248 in 1880 in part (GH type, PH, US).” As only one specimen was located in GH, this is the lectotype designated by Rudd (1956). Duplicates of *E. Palmer 248* were also located at F, K, P, PH, US, and YU; however, because the author stated “in part” in the protologue we assume that all these

duplicates must be better analyzed before being considered isolectotypes. Therefore, we are here following Rudd (1956) and presenting PH and US as the isolectotypes until further investigation can be undertaken.

*Additional specimens examined.* MEXICO. **Coahuila:** 22 km ESE of La Cuesta del Plomo on the Múzquiz–Boquillas hwy., near the intersection of the hwy. from V. Acuña, 7 June 1972 (fl.), *F. Chiang et al. 7543* (MO); ca 30 (air) mi. WNW of Cuatro Ciénegas, in the limestone Cañón los Pozos, about 3–4 mi. W of Rancho Cerro de la Madero along trail to Cañón Desiderio, 1400 m, 1 May 1977 (fl.), *J. Henriksen & E. Lee 15965* (MEXU); Puente Chorro 4, from Saltillo to San Roberto Jet., ca. 24 km by winding hwy. S of Saltillo, 1900 m, 16 May 1973 (fl.), *M. C. Johnston et al. 11028* (MO); Las Vigas, Cañón de la Carbonera, Sierra de Artega, 2100–2600 m, 5 June 1987 (fl.), *J. A. Villarreal & M. A. Carranza 3770* (MEXU); Sierra de la Madera, Cañón Charreteras, Rancho Carreteras, 1750–1900 m, 15 Nov. 1993 (fr.), *J. A. Villarreal et al. 7387* (MEXU). **Nuevo León:** Iturbide, Bosque-Escuela, 15 Apr. 1988 (fr.), *A. E. Estrada 1439* (MO); Linares–Galeana rd., halfway to two thirds up the canyon, about 4200 ft., 13 July 1953 (fl.), *W. E. Manning & M. S. Manning 53305* (MEXU); Galeana, Rayones, canyon, 1485 m, 27 June 1994 (fl.), *Hinton et al. 24458* (MEXU). **Tamaulipas:** Bustamante, rd. to Bustamante, N of La Presita & 2.7 mi. N of hwy. 70, 21 May 1982 (fl.), *L. J. Dorr & T. L. Atkins 2357* (MEXU); Bustamante, 3 km al N de la Joya de Herrera, 2000 m, 24 May 1976 (fl./fr.), *F. González-Medrano et al. 9112* (MEXU); Bustamante, 3 km al N de la Joya de Herrera, 2000 m, 24 May 1976 (fl.), *F. González-Medrano 9133* (MEXU, MO); Tula, ejido Corf. Ricardo García, 26 km al N de Tula, y de ahí 5 km al E del ejido, 1800–1900 m, 9 Aug. 1976 (fr.), *F. González-Medrano & F. Guevara 10163* (MEXU); Tula, Ejido Ricardo García, Km. 66, carr. Tula–Victoria, 1750 m, 20 June 1986 (fl./fr.), *M. Martínez 1165* (MEXU, MO); Bustamante, 1 km sobre la brecha a Bustamante saliendo del Km. 79, carr. Tula–Victoria, 1800 m, 10 Sep. 1986 (fr.), *M. Martínez 1297* (MEXU, MO). U.S.A. **Arizona:** Santa Catalina Mtns., 3 Aug. 1881 (fl.), *C. G. Pringle s.n.* (F). **Texas:** Juniper Canyon, 6 Aug. 1937 (fr.), *E. M. Marsh 175* (F).

**21. *Nissolia platycarpa*** Benth., Fl. Bras. 15(1A): 77, in nota. 1859. TYPE: Mexico. Zimapan, *Coulter s.n.* (lectotype, designated by Rudd [1956: 184], K [barcode] K-82064 image!).

*Nissolia dodgei* Rose, Contr. U.S. Nat. Herb. 5(4): 161, fig. 23. 1899. TYPE: Mexico. Nuevo León: Monterrey, May 1891 (fl./fr.), *C. K. Dodge 131* (lectotype, designated by Rudd [1956: 184], US [barcode] US-1861 image!; isolectotype, MICH [bc] MICH-1104215 image!).

*Distribution.* *Nissolia platycarpa* is endemic to Mexico.

*Notes.* *Nissolia platycarpa* is characterized by flowers 7–11 mm long, calyces 6–7 mm long, a samara-like fruit 2.5–3.6 cm long, and stipes 1 mm. It is somewhat similar to *N. platycalyx*; however, these two species differ by the larger flowers and fruit in *N. platycalyx*: flowers 15–20 mm long, calyces 7–10 mm long, the samara-like fruit 4.5–6 cm long, and stipes ca. 3 mm.

In the protologue two syntypes are cited: "Habitat in Mexici prov. Zimapan (Coulter) et verisimiliter ad eandem pertinent specimina Galleottiana n. 3347." Rudd (1956: 184) cited "Hidalgo: Zimapán, Coulter (sketch from type ex K)," but did not publish the cited sketch. There are two specimens of *Nissolia platycarpa* at K collected by Coulter: K-82064 (Herbarium Benthamianum) is Coulter *s.n.*, and K-82063 (Herbarium Hookerianum) is Coulter 584, mounted on the same sheet as *H. Galeotti 3347* but with a different label, identical to that of K-82064 except for the added number 584. Lacking the cited sketch for comparison, we consider that Rudd designated K-82064 as the lectotype for *N. platycarpa*, because she cited no number for the Coulter collection, and she otherwise consistently cited collection numbers when available.

*Additional specimens examined.* MEXICO. **Nuevo León:** hills near Monterey, 31 Aug. 1903 (fl./fr.), *C. G. Pringle 11813* (MO). **Oaxaca:** San Juan Mixtepec, Lomas de Río Azucena a 12 km NO de San Juan Mixtepec, 1900 m, 5 Oct. 1988 (fl.), *J. R. Santiago 802* (MEXU). **Sinaloa:** Cuesta de Ratamoza, 2000 ft., 27 Jan. 1940 (fl.), *H. S. Gentry 5383* (MO); Capadero, Sierra Tacuichamona, 2500 ft., 14 Feb. 1940 (fl.), *H. S. Gentry 5627* (MO); cerros de Navachiste about Bahía Topolobampo, 26–30 Sep. 1954 (fr.), *H. S. Gentry 14313* (MEXU). **Tamaulipas:** shale hill 5 mi. E of Casas on the new Victoria–Soto la Marina hwy., 28 Sep. 1960 (fl.), *J. Crutchfield & M. C. Johnston 5792* (MEXU); near town of Miquihuana, 2460 m, 8 Aug. 1941 (fl./fr.), *L. R. Standord et al. 785* (MO).

**22. *Nissolia pringlei*** Rose, Contr. U.S. Natl. Herb. 5 (4): 159, fig. 20. 1899. TYPE: Mexico. Chihuahua: Santa Eulalia Mtns., 15 Sep. 1885 (fl./fr.), *C. G. Pringle 324* (lectotype, designated here, US [barcode] US-1851 image!; isolectotypes, BM [bc] BM-931576 image!, BR [bc] BR-5174775 image!, CAS [bc] CAS-3621 image!, CM [bc] CM-1065 image!, E [bc] E-841190!, F [bc] F-59582!, F [bc] F-59583!, GH [bc] GH-64520 image!, GOET [bc] GOET-5181 image!, JE [bc] JE-4910 image!, K [bc] K-82069 image!, MO-1880864!, NY [bc] NY-26458!, NY [bc] NY-26459!, PH [bc] PH-19320 image!, US [bc] US-930892 image!, US [bc] US-930893 image!, VT [bc] VT-26278 image!).

*Distribution.* *Nissolia pringlei* is endemic to Mexico.

*Notes.* *Nissolia pringlei* is a member of a species complex in Mexico, with characters sometimes overlapping with *N. schottii* and *N. microptera*. This complex has previously been discussed by Rudd (1956). Detailed investigations must be taken to resolve this enigmatic complex.

The protologue stated, "Collected by Mr. C. G. Pringle in the Santa Eulalia Mountains, State of Chihuahua, September 15, 1885 (No. 324)... The type is in the National herbarium." There are three duplicates of

*C. G. Pringle 324* in US. US49908 (barcode US-1851) has the word "type" handwritten above an original printed label. The specimen US132393 (barcode US-930892) has the word "isotype" handwritten on it, and US1337182 (barcode US-930893) does not present any indication that it is a type specimen. Although the specimen US49908 (barcode US-1851) is filed in the herbarium as a holotype, there is no evidence that the word "type" was written by Rose. We are, therefore, designating US49908 (barcode US-1851) as the lectotype of *N. pringlei*.

*Additional specimens examined.* MEXICO. **Durango:** Rodeo, 6 km al NW de Las Higueras, 4 Nov. 1983 (fl.), *E. Torrecillas 163* (MEXU). **Guerrero:** Chilpancingo, 8 km al N, carretera a Iguala, 1295 m, 8 July 2000, *R. C. Durán et al. 4776* (MEXU). **Morelos:** limestone hills near Jojutla, 3000 ft., 30 Aug. 1902 (fr.), *C. G. Pringle 8662* (BM, E, MEXU). **Oaxaca:** 2 km al S del límite Oaxaca–Puebla, sobre la carr. Huajuapán–Tehuacán, 27 July 1979 (fl./fr.), *F. Chiang et al. 183* (MO). **Puebla:** vic. of Puebla, 2330 m, 16 Sep. 1907 (fr.), *B. A. Arsène 1883* (BM, MO), *B. A. Arsène 2054* (BM, MO); Teontepec, Barranca Ahuaxotitla al W de Nopala, 2140 m, 27 Sep. 1984 (fr.), *P. Tenorio et al. 7420* (MO). **Querétaro:** Cerro de la Mesa, ca. 20 mi. N of Tequisquiapan, 30 Aug. 1965 (fl.), *D. Flyr 647* (MO).

**23. *Nissolia ruddiae*** Cruz Durán & M. Sousa, Acta Bot. Mex. 68: 66, fig. 1. 2004. TYPE: Mexico. En Mexicaltepec, 8 km al NE de Iguala, 800 m, 6 July 1982 (fl./fr.), *J. C. S. Núñez & E. M. Martínez 3970* (holotype, MEXU [barcode] MEXU-599272!; isotype, MEXU [bc] MEXU-599613!).

*Distribution.* *Nissolia ruddiae* is endemic to Mexico.

*Notes.* Cruz Durán and Sousa S. (2004) comment that *Nissolia ruddiae* is morphologically similar to the sympatric species *N. hintonii*. The inflorescences of *N. hintonii* are racemose or paniculate and the samara-like fruit is 2–2.5 cm long, whereas *N. ruddiae* has fasciculate inflorescences and the fruit is 3.5–4.5 cm long. Both species share the feature of glandular hairs.

*Additional specimens examined.* MEXICO. **Guerrero:** Alpoyeca, a 8 km al de Tlapa, camino Tlapa–Huamuxtitlán, puente el Salado, 990 m, 16 Sep. 1982 (fr.), *E. Martínez et al. 2636* (MEXU); 6 km 15° SE de Huamuxtitlán hacia Tlaquiltepec, 900 m, 24 June 1981 (fl.), *V. Aguilar 54* (MEXU); Huamuxtitlán, 4.5 km al N de Huamuxtitlán, 23 June 1983 (fl.), *J. Hernández s.n.* (MEXU); Huamuxtitlán, a 3 km al S de Huamuxtitlán, camino Tlapa, 960 m, 20 June 1982 (fl.), *E. Martínez 1027* (MEXU); Zumpango del Río, a 2 km al SW de Xochipila, 1070 m, 1 July 1989 (fl./fr.), *M. Sousa et al. 13225* (MEXU); Zumpango del Río, cañada aprox. 200 m al E de Venta Vieja, Km. 64, carretera Iguala Chilpancingo, 12 Sep. 1908 (fr.), *J. L. Contreras 607* (MEXU); Zumpango del Río, Cañón del Zopilote, desviación phyllo de caballo, carretera Mex–Acapulco (casas verdes), 10 July 1981 (fl.), *M. Ramírez 9* (MEXU). **Puebla:** 18.5 km al SE de Acatlán, 1450 m, *R. M. Ballester s.n.* (MEXU).

**24. *Nissolia schottii*** (Torr.) A. Gray, J. Proc. Linn. Soc., Bot. 5: 26. 1861. Basionym: *Chaetocalyx schottii* Torr., Rep. U.S. Mex. Bound., Bot. [Emory] 2(1): 56, pl. 18. 1859. TYPE: Mexico. Sonora: Sierra Verde, Arroyo de los Samotas, 20 July 1855 (fl.), A. C. V. Schott 253a (lectotype, designated here, NY [barcode] NY-4015!; isolectotypes, NY [bc] NY-4016!, F not seen, GH [bc] GH-53335 image!).

*Nissolia diversifolia* Rose, Contr. U.S. Nat. Herb. 5(4): 160, fig. 21. 1899. TYPE: Mexico. Puebla: about Tehuacan, 29 Aug. 1897 (fl./fr.), C. G. Pringle 6693 (lectotype, designated here, US [barcode] US-1862 image!; isolectotypes, AC [bc] AC-319921 image!, BKL [bc] BKL-4950 image!, BM [bc] BM-931575 image!, BR [bc] BR-5174850 image!, CM [bc] CM-1062 image!, E [bc] E-841194!, ENCB [bc] ENCB-3379 image!, F [bc] F-59577!, GH [bc] GH-64513 image!, HBG [bc] HBG-519358 image!, JE [bc] JE-1100 image!, KFTA [bc] KFTA-495 image!, M [bc] M-233695 image!, MEXU [bc] MEXU-52779!, MEXU [bc] MEXU-1169221!, MEXU [bc] MEXU-1169222!, NY [bc] NY-26453!, PH [bc] PH-19315 image!, RM [bc] RM-2653 image!, S [bc] S-13-11996 image!, UC [bc] UC-82346 image!, US [bc] US-997143, VT [bc] VT-26270 image!).

*Distribution.* *Nissolia schottii* is found in the United States and Mexico.

*Notes.* The most remarkable character in *Nissolia schottii* is the calyx teeth, which are acicular, ca. 3 mm long, and equal in length to the calyx tube. Rudd (1956) commented that some specimens of *N. schottii* have glandular trichomes on the calyx and some have pubescence approaching that of *N. pringlei*, and also that the well-developed, sterile, flat apex of the fruit (6–18 × 6–7 mm) in *N. schottii* serves to distinguish it from the sympatric *N. wislizeni* (A. Gray) A. Gray (fruit apex 3–6 × 1–2 mm). *Nissolia schottii* differs from the very similar *N. pringlei* mainly by the calyx length: ca. 4 mm long in *N. pringlei* versus ca. 6 mm long in *N. schottii*. The number of flowers per inflorescence can sometimes be useful to help differentiate them: 1- to 8-flowered in *N. schottii* versus 4- to many-flowered in *N. pringlei*.

The protologue of the basionym states, “Sierra Verde, Arroyo de los Samotas, Sonora, August; Schott.” The collection and types of John Torrey are mainly at NY (Staffleu & Cowan, 1986). Two duplicates of *Schott 253a* were located in NY. The duplicate NY-4015 includes all of the locality information contained in the protologue, and it also fits the illustration “XVIII” cited in the original description. The other duplicate, NY-4016, only gives “Sonora” as the location. Although M. Lavin in 2001 and T. Zanoni in 2008 have annotated NY-4015 as the holotype of *Chaetocalyx schottii*, we believe that the two are syntypes, because in the protologue the author did not exclude NY-4016. Because NY-4015 fits the illustration cited above, we are designating this

duplicate as the lectotype of *C. schottii* ( $\equiv$  *Nissolia schottii*).

Although Rudd labeled the specimen US-1862 as a type of *Nissolia diversifolia* and US-997143 as an isotype, she never formalized the designation of the type specimen. We are, therefore, following the annotation made by Rudd in 1955 and designating US-1862 as the lectotype of *N. diversifolia*.

*Additional specimens examined.* MEXICO. **Chihuahua:** 1.5 km E of Rancho San Francisco & 2 km W of Rancho Victoria on the rd. betw. them, 1450 m, 30 Sep. 1972 (fl./fr.), T. L. Wendt et al. 9601 (MEXU); 12 km al SW de Jiménez, 1350 m, 16 Sep. 1978 (fl./fr.), R. Grether et al. 1072 (MEXU); 1 km al W de Aquiles Serdán (antes Sta. Eulalia), 7 km al E-SE de Ciudad Chihuahua, 1500 m, 13 Sep. 1978 (fl.), R. Grether et al. 1052 (MEXU). **San Luis Potosí:** Guadalcázar, ca. 6 km al NE de El Quelital sobre el camino a Buenavista a vereda hacia Cerro Grande, El Quelital está a 27 km al E de Guadalcázar, 22 Sep. 1996 (fl.), C. G. Hinostroza 1031 (MEXU). **Sonora:** 5 mi. W of Los Arrieros, betw. Los Arrieros & Tastiota, 2 Sep. 1941 (fl.), I. L. Wiggins & R. C. Rollins 242 (MO); 1 mi. W of Colorado on the rd. to Hermosillo, 5 Sep. 1941 (fr.), I. L. Wiggins & R. C. Rollins 307 (MO); Navojoa, 18 km al E de Navojoa, carretera Navojoa–Alamos, 9 Aug. 1989 (fr.), R. Grether et al. 2475 (MEXU). U.S.A. **Arizona:** Baboquivari Canyon, Baboquivari Mtns., 10 July 1931 (fl./fr.), R. H. Peebles & W. T. Swingle 7933 (MO); Babiroquivra Mtns., 20 Sep. 1929 (fr.), M. E. Jones 24931 (MO).

**25. *Nissolia setosa*** Brandegees, Proc. Calif. Acad. Sci., Ser. 2, 3: 127. 1891. TYPE: Mexico. Baja California: San Pedro, 30 Oct. 1890 (fl./fr.), T. S. Brandegees 140 (lectotype, designated by Rudd [1956: 182], UC [barcode] UC-83944 image!; isolectotypes, GH [bc] GH-64521 image!, PH [bc] PH-19321 image!, US [bc] US-1849 image!).

*Distribution.* *Nissolia setosa* is endemic to Mexico.

*Notes.* *Nissolia setosa* is unique within the genus by having its calyx teeth tipped with attenuate, glandular setae 1–2 mm long. *Nissolia setosa* has been considered a synonym of *N. schottii* (Rose, 1899), but was once again recognized as a separate species by Rudd (1956), who commented that it seems to be more similar to *N. wislizeni* and *N. platycarpa*. In addition to the glandular setae at the apices of the calyx teeth, *N. setosa* differs from *N. platycarpa* in the calyx tube (which is without glandular setae in *N. setosa*, and with glandular setae in *N. platycarpa*) and the fruit (fertile articles are ca. 3 mm wide in *N. setosa*, vs. 5–6 mm wide in *N. platycarpa*). It differs from *N. wislizeni* in the calyx, which is ca. 6 mm long with teeth ca. 3 mm in *N. setosa*, versus ca. 4 mm long with teeth ca. 1 mm in *N. wislizeni*.

Brandegee (1891: 127) cited only *Brandegee 140* in the protologue of *Nissolia setosa* without specifying the herbarium of deposit. Rudd (1956: 182) cited the

duplicates of *Brandegea 140* at GH, PH, UC, and US, with the UC duplicate indicated as “type,” which constitutes an effective lectotypification, even though the word “lectotype” was not used.

*Additional specimens examined.* MEXICO. “La Burrera,” 20 km al este de T. Santos B.C.S., 250 m, 5 Oct. 1987 (fl.), *J. Agundez 451* (MEXU). **Baja California:** Sur, steep W facing slope of the Sierra La Laguna, above Rancho La Burrera on trail to La Laguna, 4300–5210 ft., 22 Oct. 1977 (fl.), *D. E. Breedlove & D. I. Axelrod 43412* (MEXU); La Paz, carretera La Paz–Todos Santos, Km. 3, 100–200 m, *J. Agundez 207* (MEXU); La Paz, San Pedro, 22.5 km al S de La Paz, 180 m, 13 Oct. 1985 (fl./fr.), *P. Tenorio et al. 10379* (MEXU); La Paz, Los Limpios, Sierra La Laguna, al E de Todos Santos, 18 Oct. 1985 (fr.), *P. Tenorio et al. 10619* (MEXU).

**26. *Nissolia tomentosa*** (Gardner) T. M. Moura & Fort.-Perez, comb. nov. Basionym: *Isodesmia tomentosa* Gardner, London J. Bot. 2: 340. 1843. *Chaetocalyx tomentosus* (Gardner) Rudd, Contr. U.S. Natl. Herb. 32(3): 217. 1958. TYPE: Brazil. Imbuhy, Mar. 1837 (fl./fr.), *G. Gardner 350* (lectotype, designated here, BM [barcode] BM-931585 image!; isolectotype, K [bc] K-222376 image!).

*Coronilla hirsuta* Vell., Fl. Flumin. 311. 1825 [1829], Fl. Flumin. Icon. 7: tab. 122. 1827 [1831], non DC., Prodr. 2: 310. 1825. TYPE: [icon in] Vellozo, Fl. Flumin. Icon. 7: tab. 122. 1827 [1831] (lectotype, designated here).

*Chaetocalyx polyphyllus* Benth. in Mart., Fl. Bras. 15(1A): 76. 1859. TYPE: Brazil. Minas Gerais, Fazenda de Jeronima, A. de St. Hilaire, cat. B, no. 1071 (lectotype, designated by Rudd [1958: 218], P [barcode] P-2297628 image!).

*Distribution.* *Nissolia tomentosa* is endemic to Brazil.

*Notes.* *Nissolia tomentosa* is easily distinguished by its 11- to 17-foliolate leaves. Rudd (1958) commented that *Chaetocalyx tomentosus* is morphologically close to *C. blanchetianus* (= *N. blanchetiana*) and *C. platycarpus* (= *N. peruviana*). However, these species differ as follows: the inflorescence is paniculate in *N. peruviana* versus racemose in *N. blanchetiana*; in *N. tomentosa* it can be a raceme or reduced to few flowers. *Nissolia blanchetiana* has the flowers, calyx, and calyx teeth larger than the other two species (2.5–3.5 cm long, 2.1–2.4 cm long, and 5–15 mm long, respectively, vs. 2–3 cm long, 7–8 mm long, and 0.5–2 mm long). Moreover, the number of leaflets is fewer in *N. blanchetiana* (5- to 7-foliolate) and *N. peruviana* (5-foliolate) than in *N. tomentosa*.

In the protologue of *Isodesmia tomentosa* the author stated, “Hab. in woods and bushy places at Imbuhy. Fl. Jan–March.” According to Stafleu and Cowan (1976), the Brazilian collection of *G. Gardner* is housed at BM. Two specimens of this species from the Gardner herbarium were located at BM. One of the collections

(BM-931584) is in flower with the handwritten annotation “350 Imbuhy... April 1841”; therefore, it does not fit the protologue, which states that it flowers January to March. The other collection (BM-931585), also in flower and fruit, presents a very similar handwritten annotation, even with the same number 350; however, it differs in the date “March 1837,” and it is eligible to be the type, although the author did not mention fruits in the protologue. Because only a single collection appearing to be original material has been located, we designate the BM duplicate of that collection as a lectotype.

*Additional specimens examined.* BRAZIL. 3000 ft., Apr. 1841 (fl.), *G. Gardner 350* (BM-931584). **São Paulo:** São José do Barreiro, 2 May 1926 (fl.), *Hoehne & A. Gehrt s.n.* (NY); Ubatuba, 1.5 km N da cidade, 29 abr. 1961 (fl.), *J. Mattos & N. Mattos 8918* (MO, NY).

**27. *Nissolia vincentina*** (Ker Gawl.) T. M. Moura & Fort.-Perez, comb. nov. Basionym: *Glycine vincentina* Ker Gawl., Bot. Reg. t. 799. 1824. *Chaetocalyx vincentinus* (Ker Gawl.) DC., Prodr. 2: 243. 1825, as “vincentina.” *Boenninghausia vincentina* (Ker Gawl.) Spreng., Syst. Veg. 3: 245. 1826. TYPE: Ker Gawler in Bot. Reg. (1824): pl. 799. 1824 (lectotype, designated here, Ker Gawler, 1824: pl. 799).

*Chaetocalyx scandens* (L.) Urb., Symb. Antill. 2(2): 292. 1900. Basionym: *Coronilla scandens* L., Sp. Pl. 2: 743. 1753. TYPE: Plumier, Pl. Amer. 5: t. 107, fig. 3. 1757 (lectotype, designated by Rudd [1958: 235]). Non *Nissolia scandens* J. Koenig ex Spreng. (1826).

*Chaetocalyx retusus* S. F. Blake, Contr. U.S. Natl. Herb. 20(13): 523. 1924. TYPE: Venezuela. Carabobo, on rd. from Puerto Cabello to San Felipe, collected in monsoon forest at Guaremales, 10–100 m, 20 June 1920 (fl.), *H. Pittier 8879* (holotype, US [barcode] US-1880 image!).

*Chaetocalyx vestitus* Standl., Publ. Field Mus. Nat. Hist., Bot. Ser. 8(1): 14–15. 1930. TYPE: Mexico. Yucatan: Xnocac, Dec. 1916 (fl.), *G. F. Gaumer & sons 23509* (holotype, F-59014!; isotypes, B [barcode] B-100367734 image!, BM [bc] BM-931588 image!, CAS [bc] CAS-1988 image!, GH [bc] GH-53339 image!, K [bc] K-222374 image!, MO-150842!, S [bc] S-G-8848 image!, US [bc] US-997165 image!).

*Chaetocalyx tenuipedicellatus* Pittier, Bol. Soc. Venez. Ci. Nat. 6: 190. 1940. TYPE: Venezuela. s. loc., *L. Williams 10398* (lectotype, designated by Rudd [1958: 235], F [barcode] F-59015!).

*Chaetocalyx scandens* (L.) Urb. var. *pubescens* (DC.) Rudd, Contr. U.S. Natl. Herb. 32(3): 236. 1958, syn. nov. Basionym: *Chaetocalyx pubescens* DC., Prodr. 2: 243. 1825. TYPE: Dominican Republic. Santo Domingo, *C. L. G. Bertero s.n.* (holotype, presumably at G [not located]; isotypes, H [barcode] H-1286988 image!, M [bc] M-233706 image!, MO [bc] MO-150840!).

*Distribution.* *Nissolia vincentina* occurs from Mexico to Brazil (Antilles, Brazil, Colombia, Dominican Republic, Mexico, and Venezuela).



*Notes.* *Nissolia vincentina* has longer pedicels than any other species: 5–25(–40) mm. This species is similar to *N. brasiliensis*; however, *N. vincentina* always has five leaflets per leaf versus (five to) nine to 11 in *N. brasiliensis*, the calyx tube in *N. vincentina* is shorter (3–4 mm) than in *N. brasiliensis* (6–8 mm), and these two species also differ in the proportion of the calyx tube to the calyx teeth (the calyx tube is three to four times as long as the calyx teeth in *N. brasiliensis* vs. equal to the adaxial calyx teeth in *N. vincentina*). Additionally, the pedicels in *N. brasiliensis* are 6–9 mm long. Rudd (1958) commented that *Chaetocalyx scandens* is characterized by extremely slender, subterete fruits, 1–2 mm in diameter.

*Additional specimens examined.* BRAZIL. **Bahia:** Jequié, Chácara Provisão, ca. de 4 km a E de Jequié, 6 May 1979 (fl.), S. A. Mori & T. S. Santos 11829 (NY); Jequié, Km. 7 das Estrada Jequié/Ipiaú, 10 Feb. 1983 (fr.), A. M. Carvalho & T. Plouman 1584 (F); Serra do Jatobá, about 3 km S of Milagres, on rd. to Jequié, 500 m, 3 May 1980 (fl.), R. M. Harley et al. 22024 (NY). COLOMBIA. Santa Marta, H. H. Smith 679 (BM, E, F); Barranquilla, s.d. (fl.), B. Elias 1592 (F). COSTA RICA. **Guanacaste:** La Cruz Cantón, W portion of Cerros Santa Elena, Península de Santa Elena, on S slope just SW of second-highest peak, 500–620 m, 12 Nov. 2004 (fl.), M. H. Grayum 12364 (BM, MO). DOMINICAN REPUBLIC. **Hispaniola:** Jaiquí Picado, limestone hills 20 mi. W of Santiago, 300–400 m, 21 May 1969 (fr.), A. H. Liogier 15296 (NY); Hispaniola, Santo Domingo, 17 Nov. 1930 (fl.), E. L. Ekman 15968 (F). GUADALOUPE. 1892 (fl.), Père Duss 2660 (NY). MARTINIQUE. Sep. 1900 (fl./fr.), Père Duss 4461 (NY); Rivière Blanche au Précheur, Couléé de laves de l'éruption de 1929, 60 m, 30 July 1940 (fl.), H. Stehle 4583 (F). MEXICO. **Oaxaca:** a 5 km al NE de Laollaga, 23 Sep. 1976 (fl.), O. Tellez & A. S. Magallanes 236 (MO, NY); Tehuantepec, camino de "Las Palmitas," subida al Cerro Guiengola, 800 m, 12 Sep. 1988 (fl.), L. Torres et al. 1000 (MO). **Yucatán:** Buena Vista Xbac, s.d. (fl.), G. F. Gaumer 1077 (F, NY); Yot Tzonot, s.d. (fl.), G. F. Gaumer 1336 (F); San Anselmo, s.d. (fl.), G. F. Gaumer 2165 (F). VENEZUELA. **Distrito Federal:** Vargas, Parroquia Catia la Mar, Escuela Naval, 22 Sep. 1987 (fl./fr.), N. Ramírez 2371 (NY), 31 Jan. 1989 (fl.), N. Ramírez 2641 (NY); quebrada San Julián, near Caraballeda, 15–75 m, 10 June 1945 (fl.), J. A. Steyermark 62938 (F). **Isla de Margarita:** El Valle, 8 Apr. 1901 (fl.), O. O. Miller & J. O. Johnston 259 (BM, F).

**28. *Nissolia weberbaueri*** (Harms) T. M. Moura & Fort-Perez, comb. nov. Basionym: *Chaetocalyx weberbaueri* Harms, Repert. Spec. Nov. Regni Veg. 17: 132. 1921. TYPE: Peru. Palambla, Apr. 1912 (fl.), A. Weberbauer 6020 (lectotype, designated here, GH [barcode] GH-53344 image!; isotypes, F [bc] F-43447!, F [bc] F-43448!, S [bc] S-9497 image!, US [bc] US-1877 image!).

*Distribution.* *Nissolia weberbaueri* is endemic to Peru.

*Notes.* *Nissolia weberbaueri* is characterized by the presence of glandular trichomes on the stems and peduncle, persistent triangular or narrowly triangular

bracts 7–9 × ca. 2 mm, flowers ca. 2 cm long, and calyces ca. 7 mm long with teeth narrowly triangular and 2–3 mm long (the calyx tube is ca. one and a half times to twice the length of the calyx teeth). However, the characterization of this species is still unclear because we have analyzed only one specimen (the isotype housed in F). Rudd (1958) commented that this is a distinctive but little-known species and that its sordid-tomentulose indument seems to be unique. She also suggested that *N. weberbaueri* seems to be similar to *Chaetocalyx latisiliquus* (≡ *N. latisiliqua*); however, in *N. weberbaueri* the calyx teeth are attenuate and 2–3 mm long, versus acute and ca. 1–2 mm long in *N. latisiliqua*.

In the protologue of the basionym the author stated, "Peru, Palamba...1000–1200 m... Weberbauer no. 6020—April 1912." According to Stafleu and Cowan (1979), the herbarium and types of Hermann Harms are housed at B; however, the curator there informed us that this collection is no longer housed at B. Duplicates of *Weberbauer 6020* were located at F (F0043447F, F0043448F0), GH (GH-53344), S (S-R-9497), and US (US-1877). All these duplicates (except F-43448) are in flower and fit the protologue. Due to the larger number of flowers and leaves in the GH specimen, we selected it as the lectotype of *Chaetocalyx weberbaueri*.

**29. *Nissolia wislizeni*** (A. Gray) A. Gray, J. Linn. Soc., Bot. 5: 25. 1861. Basionym: *Chaetocalyx wislizeni* A. Gray, Smithsonian Contr. Knowl. 3(5): 51. 1852. TYPE: Mexico. Near Chihuahua, *Wislizenus 151* (lectotype, designated by Rudd [1956: 181], GH [barcode] GH-53336 image!; isolectotypes, MO [bc] MO-2284238!, MO [bc] MO-2284239!).

*Distribution.* *Nissolia wislizeni* is found in the United States and Mexico.

*Notes.* *Nissolia wislizeni* is characterized by a fruit that is constricted between the seeds, with a reduced sterile, flat apex 3–6 × 1–2 mm, usually one half to one third the body's length (body 5–25 × 3–4 mm, holding two to three seeds). It has 2- to 3-flowered inflorescences and short, 5-foliolate leaves, 2–6 cm long, with lateral leaflets 10–20 × 8–12 mm and apical leaflets 6–20 × 4–12 mm. Rudd (1956: 182) stated, "the slightly recurved axis of the leaflet and the tendency of the leaflets to fold when disturbed makes herbarium specimens of *N. wislizeni* rather distinctive." She also observed that the reduced sterile terminal article characterizes this species, compared to the enlarged wing of all the other species traditionally assigned to *Nissolia*. As we commented before, *N. wislizeni* is similar to *N. schottii*, differing by the sterile, flat apex of the fruit measuring 6–18 × 6–7 mm in *N. schottii*, versus 3–6 × 1–2 mm in *N. wislizeni*.





The protologue states, “Dr. Wislizenus’s collection ... Battle-ground of Sacramento, near Chihuahua, Mexico.” The herbarium and types of *Asa Gray* are housed at GH (Stafleu & Cowan, 1976). One collection of *Nissolia wislizeni* collected by Dr. Wislizenus was located at GH under the barcode number GH-53336 (note that there are two different specimens and two different barcodes on the same sheet: *Wislizenus 151* [GH-53336] and *C. Wright 1007* [GH-254093]). We recognize *Wislizenus 151* (GH-53336) as the lectotype of *Chaetocalyx wislizeni* A. Gray ( $\equiv$  *N. wislizeni* (A. Gray) A. Gray), as Rudd (1956) has already designated.

*Additional specimens examined.* MEXICO. **Chihuahua:** hills & plains near Chihuahua, June–Aug. 1885 (fl.), *C. G. Pringle 618* (BM, E, F, MO). **Durango:** 7.9 mi. WSW Durango, along hwy. 40, 7 Aug. 1966 (fl.), *R. Kral 27464* (MO); Mezquital, El Refugio, 2000 m, Sep. 1976 (fr.), *J. A. Ochoa 56* (MEXU); Tepehuanes, al NW de Corrales, por la carretera a Tepehuanes, 1780 m, 26 Aug. 1983 (fl.), *E. Torrecillas 44* (BM). **Jalisco:** Huejuquilla, Rancho S. Nicolás, 25 km al S de Huejuquilla, brecha a Tenzompata, 1600 m, 6 Aug. 1990 (fl.), *A. Flores 2072* (MO). **San Luis Potosí:** chiefly in the region of San Luis Potosí, 6000–8000 ft., 1878 (fl.), *C. C. Parry & E. Palmer 133* (BM, E, F, MO); San Miguelito, 1879 (fl.), *J. C. Schaffner 793* (F). **Sonora:** San Pedro, 1851 (fr.), *C. Wright 1007* (MO). **Zacatecas:** open slope W of la Encantada, 11 Aug. 1948 (fl.), *R. L. Dessler 147* (MO); 7.5 mi. N of jct. rte. 45–49 on rte. 45, 2050 m, 16 Aug. 1979 (fl.), *W. L. Wagner et al. 4244* (MEXU); SE of Durango, along hwy. 45, 48 mi. NW of Fresnillo, 38 mi. NW of jct. of 45 & 49, 28 Sep. 1984 (fl.), *M. Lavin & S. Sundberg 5040* (MEXU); Villanueva, al sur de Villanueva por la carretera 54, desviación al poblado Laguna del Carretero, pastizal, 18 Sep. 1996 (fl.), *E. D. Entriquez & J. J. Balleza 1216* (MEXU). U.S.A. **Arizona:** Cochise, 16 Aug. 1977 (fr.), *C. D. Johnson 75-77* (MO).

#### FINAL REMARKS

Based on the new circumscription, the highest diversity of *Nissolia* is found in Mexico, followed by Brazil. Sixteen species occur in Mexico, 10 of them endemic, representing 53% and 33% of the species diversity, respectively. Nine species (eight of these until now recognized as *Chaetocalyx*) occur in Brazil, of which four are endemic (30% and 13% of the species diversity, respectively). Therefore, we can consider two centers of diversity for *Nissolia*, one in Mexico and the other in Brazil. More detailed phylogenetic and biogeographic studies are necessary to unveil the center of origin and dispersion route for this genus, and also the relationships among its species. The list of accepted names and their geographical distributions are presented in Table 1.

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