


# The reinstatement of the genus *Xiphotheca (Fabaceae)*

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*Summary*

Schutte, A. L. & Van Wyk, B-E.: The reinstatement of the genus *Xiphotheca (Fabaceae)*. – *Taxon* 42: 43-49. 1993. – ISSN 0040-0262.

The reinstatement of the genus *Xiphotheca* Eckl. & Zeyh. (*Fabaceae*, tribe *Liparieae*) is proposed. A study of the morphology and alkaloids of the genus *Priestleya* DC. has shown remarkable differences between its two sections, *P.* sect. *Priestleya* and sect. *Aneisothea* DC. (= *Xiphotheca*). The latter differs in its geminate flowers, the non-intrusive calyx, the obtuse and pocketed keel petals, the uniform anthers, the shortly petiolate and pinnately veined leaves and the unique combination of alkaloids. A brief synopsis of the genus, including nomenclature, synonymy and typification, is presented.

## *Introduction*

When Candolle (1825a, b, 1825-1827) described the genus *Priestleya*, he subdivided it into two sections, viz.: *P.* sect. *Eisothea* with the calyx "intrusive" and *P.* sect. *Aneisothea* with the calyx gradually narrowed. In 1836 Ecklon & Zeyher established the genus *Xiphotheca* to include those species of the genus *Priestleya* with non-intrusive calyces, obtuse keel petals and long compressed pods. However, their successors (e.g.: Meyer, 1836; Walpers, 1839; Bentham, 1843; Harvey, 1862) followed Candolle's concept, since they argued that "the two sections run much into one another and are not distinguished by any essential character" (quoted from Bentham, 1843). The type of *Priestleya*, selected by Hutchinson (1964), is *P. myrtifolia* (Thunb.) DC. and belongs to *P.* sect. *Eisothea* which, by consequence, must bear the autonym *P.* sect. *Priestleya*.

As part of a study of relationships between the genera of the tribes *Podalyrieae* and *Liparieae*, we investigated the morphological and alkaloidal variation in the genus *Priestleya* in depth. The main distinctive characters between *P.* sect. *Aneisothea* (hereafter named *Xiphotheca*) and *P.* sect. *Priestleya* (*Priestleya* [s. str.], hereafter) are illustrated in Fig. 1, and discussed below.

## *Discussion*

The inflorescences provide some useful characters to distinguish between *Xiphotheca* and *Priestleya* s. str. (Fig. 1: X1, X2, P1, P2). In *Xiphotheca* the flowers are invariably arranged in axillary decussate 2-flowered inflorescences without an apical rachis extension. In *Priestleya* the rachis extension is invariably present (although sometimes caducous) and there are two basic types of inflorescences: (1) axillary subterminal racemes with 4 or more flowers as in *P. hirsuta* (Thunb.) DC. and related species [this type is also found in the genus *Liparia* L.], and (2) axillary decussate (2-)4-flowered inflorescences as in *P. vestita* (Thunb.) DC. and related species.

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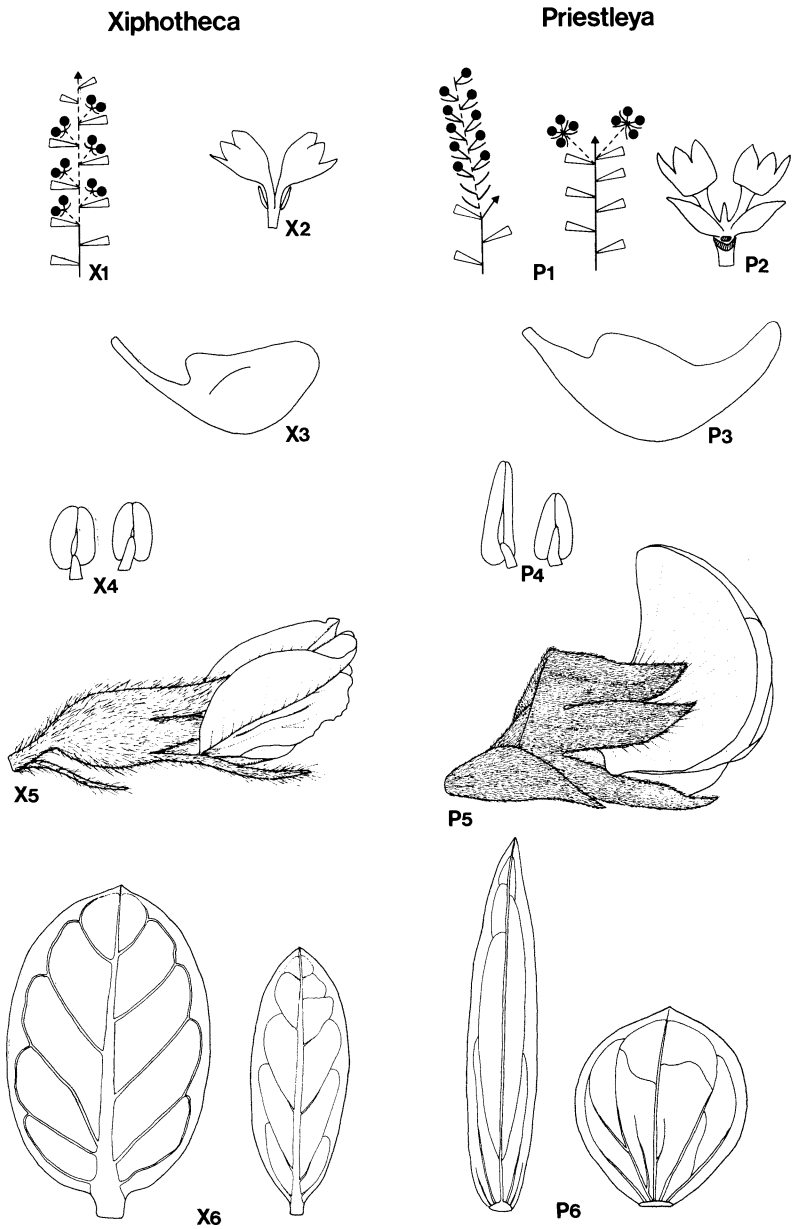


*Fig. 1.* Main distinctive characters between *Xiphotheca* (X) and *Priestleya* (P). 1, inflorescence structure: X1, 2-flowered, flowers opposite; P1, racemose or decussate, 4- or more-flowered. 2, inflorescence unit: X2, rachis extension absent; P2, rachis extension present. 3, keel petals: X3, obtuse and distinctly pocketed; P3, beaked and without a pocket. 4, one subbasifixed and one dorsifixed anther: X4, ± similar in size and shape; P4, distinctly dimorphic. 5, flowers in lateral view: X5, calyx narrowed to the base; P5, calyx "intrusive". 6, leaves: X6, distinctly petiolate and with pinnate venation; P6, petiole absent and with 3 or more primary veins. [X3-X5, *X. reflexa* (Thunb.) A. L. Schutte & B.-E. Van Wyk; X6, left: *X. tecta* (Thunb.) A. L. Schutte & B.-E. Van Wyk, right: *X. canescens* (Thunb.) A. L. Schutte & B.-E. Van Wyk, P3-P5, *P. umbellifera* (Thunb.) DC.; P6, left: *P. hirsuta* (Thunb.) DC., right: *P. vestita* (Thunb.) DC.]

There are some distinct differences in the structure of the flowers (Fig. 1: X5, P5). As mentioned above, the base of the calyx is attenuate in all but one species of *Xiphotheca* (*X. cordifolia* has the base of the calyx intrusive, at least in the fruiting stage) and invariably intrusive in *Priestleya*. The keel petals are obtuse and distinctly pocketed in *Xiphotheca*, but without a pocket and strongly beaked in *Priestleya* (Fig. 1: X3, P3). Strongly dimorphic anthers occur in *Priestleya*, whilst they are more or less similar in size and shape in *Xiphotheca* (Fig. 1: X4, P4). The mode of attachment of the filaments is alternately dorsifix and subbasifix in both taxa.

Leaf shape and size vary considerably within the two groups, but the presence of a short petiole in *Xiphotheca* is a useful diagnostic character to distinguish it from *Priestleya*, where the leaves are always totally sessile (Fig. 1: X6, P6). There is also a difference in the venation of the leaves. Three to five primary veins arise from the base of the leaves in *Priestleya*, in contrast to the pinnate venation of the leaves of *Xiphotheca*.

Perhaps the most convincing evidence in support of the reinstatement of *Xiphotheca* was found in the alkaloidal metabolites. While *Priestleya* has various tetracyclic quinolizidine alkaloids similar to those found in *Podalyria* (Van Wyk & al., 1992), *Xiphotheca* showed an unexpected combination of lupinine (a bicyclic quinolizidine) and anabasine (a piperidyl alkaloid) as the only major compounds (Van Wyk & al., 1991). What was even more remarkable was the uniformity of the alkaloid patterns, particularly in *Xiphotheca*. These results strongly support the discontinuity found in other characters.

A detailed cladistic analysis of relationships within the *Liparieae* and *Podalyrieae* is currently in progress and it is already clear to us that *Xiphotheca*, *Coelidium* Vogel and *Amphithalea* Eckl. & Zeyh. form a monophyletic clade, well separated from the remainder of the *Liparieae*. Apart from superficial similarities, we are unaware of any convincing evidence to support the wide generic concept of *Priestleya*.

*Priestleya* and *Liparia* undoubtedly form a monophyletic group (synapomorphies include the presence of a rachis extension, sessile leaves, unusual venation pattern). As a result *Priestleya* sensu lato is paraphyletic. We therefore propose the reinstatement of *Xiphotheca* as a genus.

***Xiphotheca*** Eckl. & Zeyh, Enum. Pl. Afric. Austral. 2: 166. 1836. – LT. (here designated): *Xiphotheca rotundifolia* Eckl. & Zeyh. [= *X. tecta* (Thunb.) A. L. Schutte & B.-E. Van Wyk].

= *Priestleya* sect. *Aneisothea* DC. in Ann. Sci. Nat. 4: 91, Jan 1825. – LT. (here designated): *Priestleya elliptica* DC. (*X. elliptica* (DC.) A. L. Schutte & B. E. Van Wyk).

Woody shrubs or shrublets. *Leaves* alternate or rarely opposite, simple, narrowly elliptic to almost circular, mostly flat, sometimes with recurved margins, pinnately veined; petiole very short, ± 1 mm long; stipules inconspicuous, often lacking. *Inflorescence* axillary, 2-flowered, pedunculate and with the two flowers opposite, aggregated into synflorescences of up to 16 flowers. *Bracts* linear to oblanceolate. *Bracteoles* minute, often lacking. *Corolla* yellow, longer than the calyx, glabrous. *Calyx* not "intrusive", usually narrowed to the base; upper two lobes fused higher up than lower three lobes; carinal lobe sometimes longer than the upper four. *Standard* suborbicular to elliptic. *Wing petals* oblong, longer than the keel; the tips imbricate.

*Keel petals* widely obovate, with distinct pockets, apex obtuse. *Stamens* diadelphous, the vexillary filament free; anthers ± uniform in size and shape, alternately dorsifixed and subbasifixed. *Pistil* sessile; style slender, slightly upcurved, glabrous; ovary with 4 or more ovules, densely sericeous to tomentose. *Pods* coriaceous, usually linear, sometimes obliquely-oblong, somewhat compressed, 4- to many-seeded, densely sericeous to tomentose. *Seeds* oblong-reniform; hilum elliptic, surrounded by a collar-like aril.

*Xiphotheca* is endemic to the fynbos region of the Cape Province of South Africa. The distribution range stretches from Nieuwoudtville in the north western Cape south eastwards to the Outeniqua Mountains in the southern Cape.

An investigation of morphological variation within the genus *Xiphotheca* showed that the following nine species can be recognized:

1. ***Xiphotheca canescens*** (Thunb.) A. L. Schutte & B.-E. Van Wyk, **comb. nov.** ≡ *Hypocalyptus canescens* Thunb., Nov. Gen. Pl. 11: 153, Jun 1800. – LT. (here designated): South Africa, "e Cap. b. Spei", *Thunberg s.n.* (UPS, Herb. Thunberg No. 16339!).

= *Priestleya schlechteri* L. Bolus in Ann. Bolus Herb. 4: 125. 1928. – LT. (here designated): South Africa, Cape Province, Calvinia Div., Onder Bokkeveld, Oorlogs-kloof [3119AC], *Schlechter 10943* (BOL, sheet I!; isolectotype: BM!, BOL sheet II!, G!, K!, LD (x2)!, S!, W!, Z!). [Note: Louisa Bolus must have been unaware of the fact that this species had been described by Thunberg (1800) more than a century earlier.]

2. ***Xiphotheca elliptica*** (DC.) A. L. Schutte & B.-E. Van Wyk, **comb. nov.** ≡ *Priestleya elliptica* DC., Prodr. 2: 122. 1825. – LT. (here designated): South Africa, Cape Province, "Cap. de B. Esp.", 1816, *Lambert s.n.* (G-DC!, specimen no. 10). [Note: The Lambert specimen in G-DC is an obvious choice for lectotypification, because the figure referred to in the original description (Candolle 1825-1827: t. 33) was clearly drawn from this specimen.]

= *Ingenhoussia verticillata* E. Mey., Comm. Pl. Afr. Austr. 1: 21. 1836. – LT. (here designated): South Africa, Cape Province, Dutoitskloof, 3000-3500 ped. [3319CA/CC], *Drège s.n.* (P!; isolectotype: K!, S!). [Note: The specimen in P has been annotated by Meyer himself and is therefore chosen as lectotype.]

3. ***Xiphotheca guthriei*** (L. Bolus) A. L. Schutte & B.-E. Van Wyk, **comb. nov.** ≡ *Priestleya guthriei* L. Bolus in Ann. Bolus Herb. 4: 125. 1928. – T.: South Africa, Cape Province, hills near Elim [3419DA], *Guthrie 3866* (BOL!).

4. ***Xiphotheca fruticosa*** (L.) A. L. Schutte & B.-E. Van Wyk, **comb. nov.** ≡ *Lotus fruticosus* L., Syst. Nat.: 1179. 1759. – LT. (here designated): Without locality, *anon. s.n.* (S, Linnaeus Type Herb. No. S293.5!).

= *Crotalaria lanata* Thunb., Prodr. Pl. Cap.: 124. 1800. – LT. (here designated): South Africa, Cape Province, "e Cap. b. Spei", *Thunberg s.n.* (UPS, Herb. Thunberg No. 16557!).

= *Priestleya villosa* DC., Prodr. 2: 122. 1825, nom. illeg. ≡ *Xiphotheca villosa* Eckl. & Zeyh., Enum. Pl. Afric. Austral. 2: 166. 1836. – LT. (here designated): South Africa, Cape Province, "Cap. de B. Esp.", 1816, *Lambert s.n.* (G-DC!, specimen No. 11). [Note: Although apparently based on the illegitimate *Liparia villosa* L., this is an independent name since the type of *Borbonia tomentosa* L. (and automatic type of *L. villosa*) is explicitly excluded by being cited under *Priestleya vestita*. *P. villosa* DC. is nevertheless illegitimate, since it includes, as var. β, the legitimate *Lotus fruticosus* L. (1759: 1179) the epithet of which ought to have been adopted by Candolle. Under Art. 7.13 of the *Code*, *P. villosa* is not automatically typified by the type of *L. fruticosus* but is open to lectotypification.]

– *"Borbonia tomentosa* var. β", Linnaeus, Sp. Pl.: 707. 1753.

– *"Borbonia tomentosa"* auct. (non L.): Bergius, Descr. Pl.: 190. 1767, p.p.

– *"Priestleya tomentosa"* auct. (non (L.) Druce): Druce in Bot. Soc. Exch. Cl. Brit. Isles 4: 641. 1917, p.p.; Salter in Adamson & Salter, Fl. Cape Penins.: 462. 1950, p.p.

– *"Liparia villosa"* auct. (non L.): Linnaeus, Mant. Pl. 2: 269. 1771, p.p.; Houttuyn, Pflanzensyst. 4: 240. 1779, p.p.; Reichard, Syst. Pl. 3: 480. 1780, p.p.; Gmelin, Syst. Nat.: 1113. 1792, p.p.; Willdenow, Sp. Pl. 3: 1117. 1802, p.p.; Sprengel, Syst. Veg. 3: 271. 1826, p.p. [Note: The name *Liparia villosa*, proposed by Linnaeus (1771), is an illegitimate renaming of *B. tomentosa* L. (1753), and is automatically based on the same type. Since no original specimens of *B. tomentosa* are known, the obligate type of both names is plate 24, fig.1 in Seba (1734). It belongs to the species currently known as *Priestleya vestita* (Thunb.) DC., the correct name of which is therefore *P. tomentosa* (L.) Druce.]

5. ***Xiphotheca lanceolata*** (E. Mey.) Eckl. & Zeyh., Enum. Pl. Afric. Austral. 2: 167. 1836. ≡ *Priestleya lanceolata* E. Mey. in Linnaea 7: 150. 1832. – LT. (here designated): South Africa, Cape Province, "Kapsche Fläche bei Constantia" [Cape Flats at Constantia, 3418AB], *Ecklon s.n.* (S!). [Note: The original specimen in S was annotated by Meyer himself: *Priestleya lanceolata* mihi", and is therefore chosen as lectotype. It agrees well with the description, which was made from a fruiting specimen. It is possible that *Ecklon & Zeyher 1230* represents the same collection, but we are not absolutely certain, and therefore do not consider the specimen in SAM as an isolectotype, even though it is obviously the same species.]

= *Priestleya glauca* Salter in J. S. African Bot. 8: 256. 1942. – T.: South Africa, Cape Province, on lower slopes of Hercules' Pillar (Justenberg) [Joostenberg, 3318DD], *Pillans 6264* (BOL!; isotype: K!, NBG!). [Note: Salter overlooked the earlier *P. lanceolata* of Meyer (1832), probably because Harvey (1862) wrongly cited that name as a synonym of *"Priestleya sericea"* (i.e., *X. reflexa*).]

6. ***Xiphotheca reflexa*** (Thunb.) A. L. Schutte & B.-E. Van Wyk, **comb. nov.** ≡ *Crotalaria reflexa* Thunb., Prodr. Pl. Cap.: 125. 1800. – LT. (here designated): South Africa, "e Cap. b. Spei", *Thunberg s.n.* (UPS, Herb. Thunberg No. 16576!).

– *"Priestleya sericea"* auct. (vix (L.) DC.): E. Meyer in Linnaea 7: 150. 1832; Harvey in Harvey & Sonder, Fl. Cap. 2: 20. 1862; Salter in Adamson & Salter, Fl. Cape Penins.: 462. 1950. [Note: There is no specimen under the name *Liparia sericea* L. (1771: 269) in Linnaeus's herbarium. From the short diagnosis it is not possible to

establish the identity of the species. Candolle when proposing the new combination *Priestleya sericea* (Candolle 1825b: 122) applied it to a specimen in G-DC (specimen No. 8) which clearly belongs to a species of *Amphithalea*, not *Xiphotheca*.]

- *"Priestleya axillaris"* auct. (non (Lam.) DC.): Candolle, Prodr. 2: 122. 1825, p.p.; Candolle, Mém. Légum.: 197. 1826, p.p.; Don, Gen. Syst. 2: 132. 1832, p.p.; E. Mey., Comm. Pl. Afr. Austr. 1: 20. 1836, p.p.; Walpers in Linnaea 13: 469. 1839, p.p. [Note: Candolle (1825b) cited *Borbonia axillaris* Lam. as basionym, but the original specimen in the Lamarck Herbarium (P-LA No. 14881) belongs to a species of *Amphithalea*. However, the illustration in Candolle (1825-1827: t. 32) was definitely made from a specimen in G-DC (bottom right hand fragment on specimen No. 9) and belongs to the present species.]
- *"Xiphotheca axillaris"* auct. (non (Lam.) Eckl. & Zeyh.): Ecklon & Zeyher, Enum. Pl. Afric. Austral. 2: 167. 1836, p.p.
  [Note: *Ecklon & Zeyher 1229* in S belongs to the present species.]

**7.** ***Xiphotheca tecta*** (Thunb.) A. L. Schutte & B.-E. Van Wyk, **comb. nov.** ≡ *Liparia tecta* Thunb., Prodr. Pl. Cap.: 124. 1800. ≡ *Priestleya tecta* (Thunb.) DC., Prodr. 2: 122. 1825. – LT. (here designated): South Africa, Cape Province, "Paardeberg [3318DB], Picketberg [Piketberg, 3218DC/DD], Hottentots Hollandberg [3418BB]", *Thunberg s.n.* (UPS, Herb. Thunberg No. 17009!; isolectotype: S!).

= *Xiphotheca rotundifolia* Eckl. & Zeyh. Enum. Pl. Afric. Austral. 2: 166. 1836. ≡ *Priestleya rotundifolia* (Eckl. & Zeyh.) Walp. in Linnaea 13: 469. 1840. ≡ *Priestleya tecta* var. *rotundifolia* (Eckl. & Zeyh.) Harv. in Harvey & Sonder, Fl. Cap. 2: 20. 1862. – LT. (here designated): South Africa, Cape Province, "in lapidosis laterum montium prope "Waterfall" [3319AC] in valle "Tulbagh" (Worcester)", *Ecklon & Zeyher 1224* (S!, with generic description in Zeyher's hand; isolectotype: S!).

= *Xiphotheca polycarpa* Eckl. & Zeyh., Enum. Pl. Afric. Austral. 2: 166. 1836. – LT. (here designated): South Africa, Cape Province, "in locis lapidosis laterum montium prope "Klapmuts" [3318DD] (Stellenbosch)", *Ecklon & Zeyher 1225* (S!, large, fruiting specimen; isolectotype: S!, fruiting fragment, W!).

= *Priestleya stokoei* L. Bolus in Ann. Bolus Herb. 4: 69. 1927. – T.: South Africa, Cape Province, Stellenbosch Div., foothills of mountains near Lourensford [3418BB], Somerset West, *Stokoe 1375* (BOL!). [Note: The shape of the leaves was the only character used to distinguish *P. stokoei* from *Xiphotheca tecta*, and we regard these two taxa as conspecific.]

**8.** ***Xiphotheca cordifolia*** A. L. Schutte & B.-E. Van Wyk, **sp. nov.** – T.: South Africa, Cape Province, Worcester district, Hex River Mountains, Milner Kloof [3319AD], *Esterhuysen 31640* (BOL; isotypes: K, S).

A specibus omniis generis foliis oppositis cordatis sparse pubescentibus et calycis basi intrusi differt.

**9.** ***Xiphotheca phylicoides*** A. L. Schutte & B.-E. Van Wyk, **sp. nov.** – T.: South Africa, Cape Province, Oudtshoorn district, lower N slopes of Outeniqua Mountains, on farm "Klein-Moerasrivier" [3322CC], *Vlok 2640* (PRE; isotypes: BOL, JRAU, K, NBG).

*Xiphothecae ellipticae* similis sed foliis supra ± glabris, infra sericeo-canescentibus, et marginibus foliorum valde recurvatis differt (folia *X. ellipticae* plana, in faciebus ambabus dense tomentosa sunt).

*Acknowledgements*

We are very grateful to Dr. C. E. Jarvis (BM) and Dr. D. J. B. Killick (PRE) for their comments on the typification of some Linnaean names and to Dr. H. F. Glen (National Botanical Institute, Pretoria) for the Latin translations. We also thank the directors and staff of all the mentioned herbaria for loans of specimens and especially the European herbaria for allowing us to study their collections during visits in 1990, 1991 and 1992.

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