

NOTES ON *PHILADELPHUS* (HYDRANGEACEAE)

JAMES HENRICKSON
Plant Resources Center
University of Texas,
Austin, Texas 78713
henrickson@utexas.edu

ABSTRACT

Philadelphus texensis S.Y. Hu and *P. ernestii* S.Y. Hu (Hydrangeaceae, subg. *Deutzioides*) both occur in central Texas and adjacent northern Mexico (Coahuila). They are primarily distinguished by the presence of an understory of more slender, crinkled hairs on the adaxial leaf surface in *P. texensis* that is absent in *P. ernestii*. Due to their overall similarity and variation exhibited by that key character, they are here treated as *P. texensis* var. *texensis* (including *P. texensis* var. *coryanus*) and ***P. texensis* var. *ernestii*** (S.Y. Hu) Henrickson, **comb. et stat. nov.** A lectotype is designated for *P. texensis*. ***Philadelphus microphyllus* A. Gray var. *pumilus*** (Rydb.) Henrickson, **comb. nov.** (replacing *P. microphyllus* var. *stramineus* (Rydb.) Henrickson), accounts for the autonymic establishment of the epithet 'pumilus' at varietal rank.

In 1956 Shiu-Ying Hu published in her monumental taxonomic monograph of the genus *Philadelphus* (Hu 1954-1956) three closely related taxa from the Hill Country of central Texas: *P. ernestii* S.Y. Hu, *P. texensis* S.Y. Hu, and *P. texensis* var. *coryanus* S.Y. Hu.

The above taxa are widely branched, multistemmed shrubs 0.5–1(–2) m tall, with slender, ± sparsely strigose-sericeous stems. Leaves are opposite, lanceolate to lance-ovate, 1–3(–4.7) cm long, 0.5–1(–2.3) cm wide, entire, acute to rounded (when shorter) at the tips, cuneate to sometimes rounded at the bases above petioles 2–7 mm long. The lateral buds are produced axillary to the petiole (not in pockets below the petiole base as in *Philadelphus microphyllus*). The 4-merous flowers are solitary and terminal on central and lateral branches. The pedicels, hypanthia (that cover the lower portion of the ovary — there is no hypanthial tube above the ovaries) and sepals are green, sparsely sericeous-strigose or glabrous. Sepals are valvate, acute-acuminate, 2.5–5.5 mm long. Petals are white, oblong-ovate to ovate, 8–14 mm long, 3.5–5(–10) mm wide, ± entire, obtuse-rounded to acute, sometimes notched (by splitting) at the tip. Stamens are 11–24 in number, with short, thickish, separate, white filaments, but in (older?) flowers, filaments can become purple at the base with this color continuing to the petal bases. The ± half-inferior ovaries have 4 carpels, their styles combine into a central clavate structure 1.5–2.8 mm long with a short, slender base and a much broader terminal portion 1.0–1.6 mm long that bears the 4 broadly linear stigmatic structures that extend up and sometimes beyond the central style column. The loculicidal, turbinate capsules are 3–6 mm diameter, bear the persistent sepals and contain numerous, elongate, slender-fusiform seeds that are rounded (not caudate) at the distal end (Fig. 1. a-d).

The plants commonly occur in open, rocky limestone slopes where they are not crowded out by other shrubs. In moist, shaded conditions the plants can be quite large; in drier conditions they are smaller, sometimes more twiggy with thicker leaves.

Within *Philadelphus*, these plants fall within subg. *Deutzioides* S.Y. Hu, in which Hu recognized three sections, eight species, and seven varieties. Sect. *Hirsutus* Rydb. consists of *P. hirsutus* Nutt. (including *P. sharpianus* S.Y. Hu), which has larger flowers with styles 3–4(–6) mm long, larger, often serrate leaves, and a distribution from North Carolina to Tennessee and Arkansas. Sect. *Serpyllifolius* S.Y. Hu, with *P. texensis* of central Texas and Mexico (central Coahuila) and *P.*

serpyllifolius A. Gray of trans-Pecos Texas and Mexico, has shorter styles 1.5-2.5 mm long, and shorter, entire, sericeous-strigose leaves, with the adaxial leaf surface also having an understory vestiture of more slender, tightly crinkled hairs. Sect. *Pseudoserpyllifolius* S.Y. Hu, with *P. ernestii* of central Texas and Mexico (northern Coahuila) and *P. mearnsii* H.W. Evans ex Rydb. (including *P. hitchcockianus* S.Y. Hu) of southern New Mexico again has smaller flowers with styles only 1.5–2.8 mm long, smaller, entire leaves that are sericeous-strigose on both surfaces — they lack an understory vestiture of more slender hairs.

Of the above-noted species, the eastern *Philadelphus hirsutus* is a larger shrub, with larger, often toothed leaves, and with flowers borne in terminal clusters of 1–3(–5). It is morphologically distinct and geographically isolated from the Texas plants. The central Texas *P. ernestii* has smaller, entire leaves and smaller, usually solitary flowers. The more westerly *P. texensis* is similar to *P. ernestii*, differing primarily in having an understory vestiture of slender, crinkled hairs that are also present in the still more western *P. serpyllifolius*. *Philadelphus serpyllifolius*, however, is distinguished in being both strigose and hirsute (with many erect hairs) on the upper leaf surface.

In all these taxa larger hairs form a sericeous to strigose vestiture of long, tapered, antrorsely oriented, unicellular hairs (Fig 2. a-b). The outer hair surfaces are verrucose, with scattered nipple-like projections covering the surface. They range from 0.3-1.5 mm in length and to 20–33 μm in basal diameter, and they can be abruptly curved above slender bases or more gradually curved; when the walls are thick they are straight, when thinner, they are more wavy in orientation. The more slender, understory hairs, present only in sect. *Serpyllifolius*, are also verrucose and range from 3–5.5 μm in diameter and are so crinkled that the length cannot be determined (Fig. 2b).

The three taxa named by S.Y. Hu, referred to above, are distinguished primarily in the distribution of hairs on the leaves and hypanthia. In all three taxa the upper (adaxial) leaf surface has a sparsely sericeous-strigose vestiture consisting of verrucose hairs 0.3–0.7(–1.0) mm long, to 17–28 μm in thickness. The hairs are usually strongly appressed and number 1–3 per 1 mm of leaf width. On the abaxial (lower) surface the hairs are longer (0.3–1.5 mm) to 15–33 μm thick, closely or loosely appressed, often somewhat wavy when the walls are thinner, but more dense, numbering 6–14 per 1 mm of leaf width (Fig. 2a).

In plants of *Philadelphus texensis*, the abaxial leaf surface also has a close understory vestiture of very slender, thin-walled, verrucose crinkled hairs as previously noted (Fig. 2b).

When initially proposed by Hu (1956), *Philadelphus ernestii* was known from two collections by Ernest Palmer from Kendall Co., Texas. Vestiture of the abaxial (lower) leaf surfaces consisted of only the larger, elongate, variously appressed-wavy hairs. The hypanthia-sepals were also sparsely strigose-sericeous. *Philadelphus texensis* var. *texensis*, initially known from five collections from Bexar to Edwards cos., Texas, differed in its lower leaf vestiture consisting of an overstory of loosely appressed larger hairs and an understory of the above-noted slender, crinkled hairs. In the original collections the hypanthia and sepals were glabrous or with a few hairs on the base of the hypanthium.

Philadelphus texensis var. *coryanus*, in contrast, was erected to recognize a single V.L. Cory collection from Bandera Co., Texas, that had more appressed hairs on the hypanthium and sepals as in *P. ernestii* in a plant otherwise referable to *P. texensis*.

As more collections are now available, the hypanthium-sepal vestiture characters have proven to be highly variable with both glabrous and weakly to moderately sericeous-strigose hypanthia-sepals occurring in material referable to both named species, sometimes differing even in one gathering and on the same plant. In *Philadelphus ernestii*, 18 of 29 (62%) of the collections seen by me had hypanthia-sepals either weakly or moderately hairy. The others were glabrous. In *P. texensis* 12 of 22 (59%) collections had glabrous hypanthia, the remaining having some sericeous vestiture.

Regarding leaf vestiture, in *Philadelphus ernestii*, of the 34 collections observed, variable amounts of understory vestiture occurred in 7 (20%) of the collections, these from Kendall and Blanco cos., Texas. This varied from the presence of a few small crinkled hairs at the tips of some young leaves to a sometimes dense partial covering of the understory only on some leaves. Specifically, understory hairs were seen in the following collections of *P. ernestii*: Kendall Co.: Cibolo Creek, E of Cascade Caverns, *Pfeiffer 1* (SMU); same area, *Pfeiffer 2* (SMU); Spring Creek, near Boerne, *Palmer 11492* (A, TEX, but not SMU); same area, *Palmer 11595* (A, ARIZ, but not POM); Blanco Co.: Pedernales Falls State Park, *Carr 14768* (TEX); same area, Henrickson 24600-L (TEX); from the Narrows on the Rio Blanco, *Tharp 42-17* (A, GH).

In contrast the understory vestiture character that defines *Philadelphus texensis* is usually moderately stable over its range. However in one collection (Medina Co.: Bear Bluff Ranch, *Carr 19550*, SMU, TEX) the understory vestiture is very sparse and absent in some leaves. When less dense, 30-40× magnification is needed to see the underlying hairs. The vestiture is sometimes difficult to evaluate as the understory vestiture may diminish over a season.

The presence of understory vestiture on occasional leaves indicates that we are not dealing with a simple present-absent genetic-based character. Rather it seems to be a phenotype expressed, or not expressed, or partially expressed in various plants or only in portions of a plant. It is apparent that the development of the understory vestiture is a character independent of that of the longer, thicker, consistently present, overstory hairs.

The occurrence of understory hairs only on some leaves of a plant causes one to ask if it is perhaps also influenced by other factors. Regardless, the present classification of the complex follows the presence vs. absence of this understory vestiture.

There are other variable characters found in both *Philadelphus ernestii* and *P. texensis*. Petals in both can be broadly oblong-ovate, bluntly rounded or ovate and more acute at the tip, and in some *P. texensis* the petal tips can twist, further emphasizing the narrow tip. Petals in both taxa sometimes can become notched at the tips as the initially cupped petals reflex and the distal-most portion tears, leaving a distinct terminal notch — this perhaps not a genetic trait. Both taxa have occasional plants within populations with purple coloration at the filament and petal bases but this may develop only in older flowers.

All this indicates that *Philadelphus texensis* and *P. ernestii* are part of a single variable complex differing conspicuously in the presence or absence of abaxial understory hairs. But is it valid to recognize a second species for a subgroup of plants that differs only in a single, sometimes variably expressed character, especially when the two taxa involved show similar overall variation patterns? The Texas flora is full of such taxa based on a single-character differences — but that is due to the proclivities of some Texas botanists.

Interestingly the same condition occurs in related genera of Hydrangeaceae, namely *Fendlera*, where in *F. rupicola* A. Gray sensu lato, the smaller understory hairs that are more plumose with the verriculae extended into finger-like projections. The understory hairs can be present or absent, and this is often consistent in a population or over large areas, but in some regions it varies from population to population and again some plants have some leaves with sparse understory hairs, others not. In Mexican *Cercocarpus breviflorus* (Rosaceae), leaves are typically closely canescent on the abaxial surface, but in some plants, all or just some leaves are abaxially glabrous (pers. observation) with again some plants or populations having only glabrous undersurfaces. Is it wise to classify the taxa on the basis on some minor, possibly single-gene character that may be inconsistently expressed on some plants, just because it is relatively conspicuous?

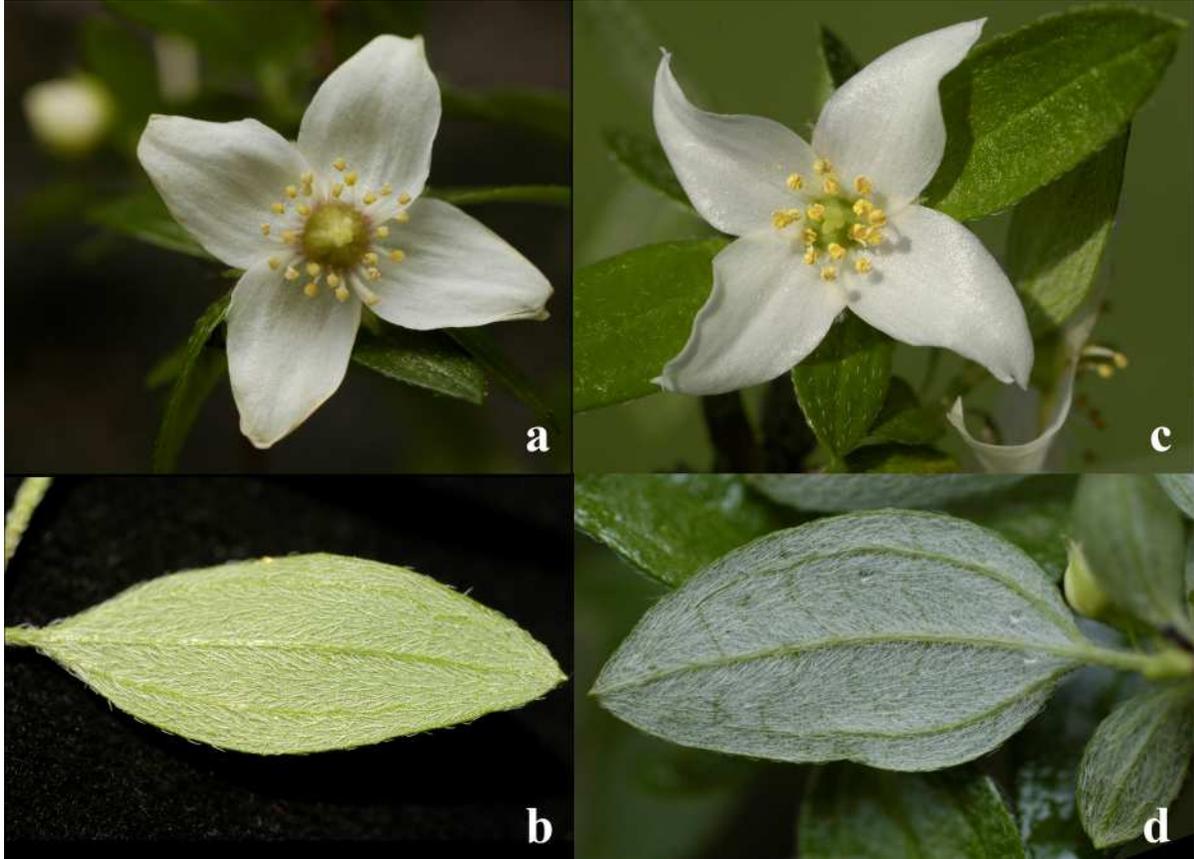


Figure 1. Flowers and leaves *Philadelphus texensis* var. *ernestii* (Henrickson 24600) (a-b) and *Philadelphus texensis* var. *texensis* (Henrickson 24602) (c-d). Flowers are \pm 25 mm diam.; leaves \pm 20 mm long.

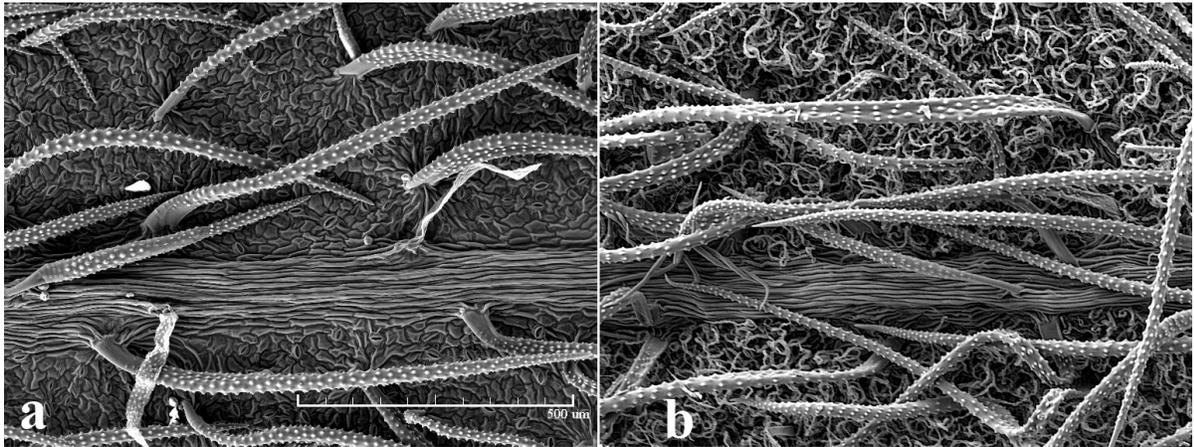


Figure 2. SEM of abaxial leaf surfaces of *Philadelphus texensis* var. *ernestii* (a) and *P. texensis* var. *texensis* (b). Magnification scale = 500 μ m (0.5 mm).

I consider that this pattern of variation can be used in an effective argument to combine *Philadelphus texensis* and *P. ernestii* into a single species. The presence or absence of the understorey hairs does not in itself provide or even indicate any sort of isolating mechanism between two species — it is just a more or less conspicuous character. Therefore the two taxa are treated here as a single species, and it is only with a nod to the forthcoming Flora of North America treatment of *Fendlera* by R.L. McGregor, that I recognize two, what I consider to be weak, varieties as designated below.

Philadelphus texensis* S.Y. Hu var. *texensis

Philadelphus texensis S.Y. Hu, J. Arnold Arbor. 37: 54. 1956. **LECTOTYPE (designated here): USA. Texas.** Bexar Co.: 30 mi N of San Antonio, on Upper Classeus Ranch on ledge of limestone bluff, *E.D. Schulz 115* (US!; isolectotype: fragment A).

Philadelphus texensis S.Y. Hu var. *coryanus* S.Y. Hu, J. Arnold Arbor. 37: 55. 1956. **TYPE: USA. Texas.** Bandera Co.: Vanderpool, Can Creek, *V.L. Cory 49413* (holotype: A!).

***Philadelphus texensis* S.Y. Hu var. *ernestii* (S.Y. Hu) Henrickson, **comb. et stat. nov.** *Philadelphus ernestii* S.Y. Hu, J. Arnold Arbor. 37: 50. 1956. **TYPE: USA. Texas.** Kendall Co.: Near Boerne, Spring Creek, *E.J. Palmer 11595* (holotype: A!; isotype: MO!).**

The taxa are restricted to the Hill Country of central Texas, with outlying populations in northern Mexico (Fig. 3). *Philadelphus texensis* is known from Bexar, Kendall, Bandera, Medina, Uvalde, Real, and Edwards cos., Texas, with outlying collections from the Sierra de la Madera and Sierra San Marcos near Cuatro Ciénegas in central Coahuila. *Philadelphus texensis* var. *ernestii* occurs to the northeast of var. *texensis* in Travis, Blanco, Hays, Kendall, and Bandera cos., Texas, and in the Serranias del Burro in northern Coahuila. Both taxa occur in Kendall and Bandera cos.

The occurrence of outlying populations in Coahuila of both varieties indicates that the taxa have had broader distributions in the past but have since contracted during interpluvial times, with the more southern Mexican populations surviving in higher elevations in montane canyons (1600-2400 m) and the Texas populations at higher latitudes but at lower elevations (250-600 m) in the Hill Country of central Texas. Populations of both taxa occur in similar moist limestone microhabitats along drainages, in moist canyons.

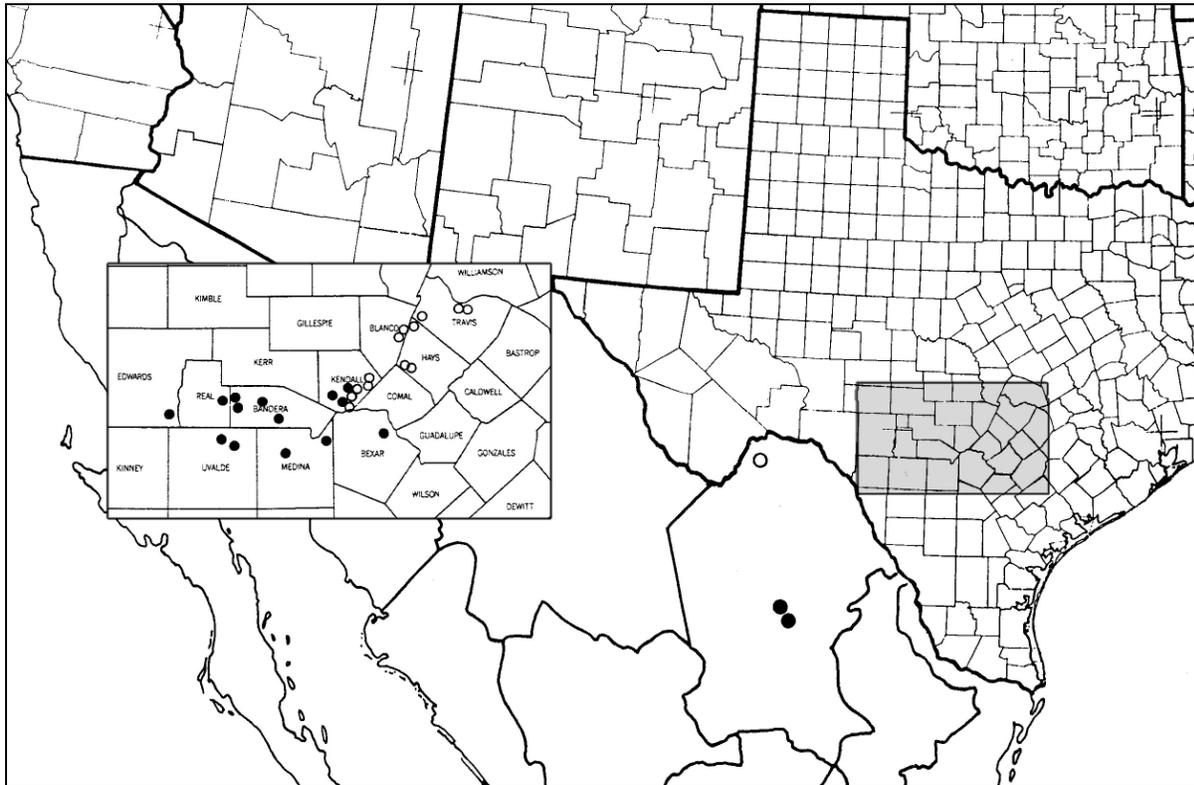


Figure 3. Distribution of *Philadelphus texensis* var. *ernestii* (open circles) and var. *texensis* (solid circles) in counties of central Texas and the state of Coahuila, Mexico. Gray area in central Texas expanded on far left.

A nomenclatural problem with *Philadelphus microphyllus* var. *stramineus* (Rydb.) Henrickson

It turns out that the recognition of the combination *Philadelphus microphyllus* var. *stramineus* (Rydb.) Henrickson (J. Bot. Res. Inst. Texas 1: 901. 2007), which is inclusive of *P. pumilus* Rydb. (N. Amer. Fl. 22: 173. 1905) and *P. pumilus* var. *ovatus* S.Y. Hu (J. Arnold Arbor. 37: 32. 1956), is superseded by a varietal autonym, *P. pumilus* var. *pumilus*, established by the creation of *P. pumilus* var. *ovatus* S.Y. Hu (McNeill et al. 2012, Art. 26.3). Article 11.6 of the Code notes that the autonym (var. *pumilus*) has priority over the name that established it (e.g., var. *ovatus*) and thus var. *pumilus* (established in 1956) has priority over var. *stramineus* (established in 2007). The correct combination at the rank of variety under *P. microphyllus* is as follows.

- Philadelphus microphyllus** A. Gray var. **pumilus** (Rydb.) Henrickson **comb. nov.** *Philadelphus pumilus* Rydb., N. Amer. Fl. 22: 173. 1905. *Philadelphus microphyllus* subsp. *pumilus* (Rydb.) C.L. Hitchc., Madroño 7: 49. 1943. *Philadelphus pumilus* Rydb. var. *pumilus* (autonym established by S.Y. Hu, J. Arnold Arbor. 37: 31. 1956). **TYPE: USA. California.** Riverside Co.: San Jacinto Mts., rocky places, vicinity of Tamarack Valley, 8600 ft, Jul-Aug 1901, *H.M. Hall* 2500 (holotype: NY 186334; isotypes: CAS, E, MO, UC!, US, fragments A!, UC!).
- Philadelphus stramineus* Rydb., N. Amer. Fl. 22: 172. 1905. *Philadelphus microphyllus* subsp. *stramineus* (Rydb.) C.L. Hitchc., Madroño 7: 47. 1944. *Philadelphus microphyllus* var. *stramineus* (Rydb.) Henrickson, J. Bot. Res. Inst. Texas. 1: 901. 2007. **TYPE: USA. California.** Mono Co.: White Mountains, Aug 1888, *W.H. Shockley s.n.* (holotype: NY 00186337; isotypes: NY 00186338, UC!, fragments A!, UC!).
- Philadelphus pumilus* var. *ovatus* S.Y. Hu, J. Arnold Arbor. 37: 31. 1956. **TYPE: USA. California.** Riverside Co.: Tacquitz Canyon, abundant on rock crevices on desert side of the mountain, 31 Jul 1921, *E.C. Jaeger* 463 (holotype: US 00096963; isotype fragment: A).

A new combination is needed for the variety of *Philadelphus microphyllus* in California.

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