

TYPIFICATION OF *HETEROTHECA VILLOSA* (ASTERACEAE: ASTEREAE)

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ABSTRACT

An earlier selection for neotype of *Amellus villosus* Pursh is interpreted as a plant of *Heterotheca ballardii* and is superseded by a different choice. Both the earlier and current choice are Nuttall collections from along the Missouri River in 1811 and are mounted on the same PH sheet.

Authentic type material for *Amellus villosus* Pursh (1814) cannot be located (Semple 1990, confirmed here). It is argued here that Semple (1990) inadvertently chose as neotype of *A. villosus* a specimen more closely matching the type of *Chrysopsis ballardii* Rydb. than the taxon to which the names *A. villosus* and *Heterotheca villosa* (Pursh) Shinnery sensu stricto have been applied. If Semple's choice is followed, the name *H. villosa* (Pursh) Shinnery sensu stricto must be applied to plants that have been identified as *H. villosa* var. *ballardii* (Rydb.) Semple and a different name must be applied to plants traditionally identified as *H. villosa* (*Chrysopsis foliosa* Nutt. 1841 and *Chrysopsis mollis* Nutt. 1841 are available). The course taken here is to supersede Semple's choice of neotype, maintaining the traditional concepts and nomenclature for "ballardii" and "villosa."

In the protologue for *Amellus villosus*, Pursh (1814) cited plants collected by John Bradbury, who was a member of the Astorian expedition (Bradbury 1817; Wikipedia 2016; World Heritage Encyclopedia 2016). Thomas Nuttall also was a member of the expedition and made collections. Bradbury's collections were quickly sent to England, where Pursh studied them.



The Astorian expedition set out from St. Louis, Missouri, in mid March 1811 and traveled up the Missouri River, on 12 June reaching a cluster of Arikara Indian villages near the confluence of the Grand and Missouri rivers, near present-day Mobridge in Walworth County, South Dakota (Fig. 1). From there a party including Bradbury and Nuttall traveled farther upriver, on 20 June reaching Fort Lisa (referred to by Bradbury as "Fort Mandan") in present North Dakota, just north of what is now Stanton in Mercer County. From there, they returned downstream, leaving 26 June, to the Arikara site, where they remained until both Bradbury and Nuttall departed on 17 August and returned directly to St. Louis.

Figure 1. Sites of the Arikara Indian villages (blue, South Dakota) and Fort Lisa (red, North Dakota) along the Missouri River (blue highlight). John Bradbury and Thomas Nuttall were at and between these sites in 1811 and the type collection of *Amellus villosus* probably was made somewhere along this ca. 160 mile stretch. Plants identified as "villosa" and "ballardii" are sympatric in this area (see Maps 3 and 5 in Nesom 2020).

As related by Semple (1990), Pursh drew the description of *Amellus villosus* from a Bradbury collection that he saw either at LIV in Liverpool or in the Lambert Herbarium (at Lambert's estate in Boyton, England). In the protologue, Pursh indicated "v.s." in the main text (p. 564) and "v.s. in Herb. Bradbury" in the Supplementum, (p. 750; see Figs. 2 and 3). In the preface to his flora (p. xvii), Pursh noted that "I am also highly indebted to William Roscoe, Esq. [at the Liverpool Botanic Garden], who very obligingly communicated to me Mr. Bradbury's Plants collected in Upper Louisiana."

One Bradbury collection of *Heterotheca* is extant in the LIV herbarium, identified by Semple as *H. camporum* (Greene) Shinnars. It is without locality data. *Heterotheca camporum* occurs in the vicinity of the Missouri River in east-central Missouri (near St. Louis) and Bradbury probably made the collection there in 1810 before setting out with the Astorian expedition. The Astorian expedition as it moved upriver was quickly out of the geographic range of *H. camporum* and too early in its flowering season. Vestiture of *H. camporum* would not be characterized as "villosissimus," and, as noted by Semple, the leaves of *H. camporum* characteristically are serrate (contrasting with the Pursh protologue for "villosus").

Pursh's diagnosis for *Amellus villosus* (Fig. 2) could match numerous species of *Heterotheca*; his specification of "on the Missouri" as the type locality and the timing of his publication (in late 1813, closely following the Astorian expedition) make it probable that the plant was either 'villosa' or 'ballardii,' the only two heterothecas (other than *H. angustifolia* in southern South Dakota and *H. camporum*) that occur on the expedition's route along the Missouri River. Pursh's phrase "floribus axillaribus brevi-petiolatis" seems to match Nuttall's more specific description in 1818 of *Inula villosa* (Fig. 3) as "branches subcorymbose, flowers fastigate," in which case both descriptions probably referred to *H. villosa* as currently understood. Nuttall's description could not apply to "ballardii" (see comments below).

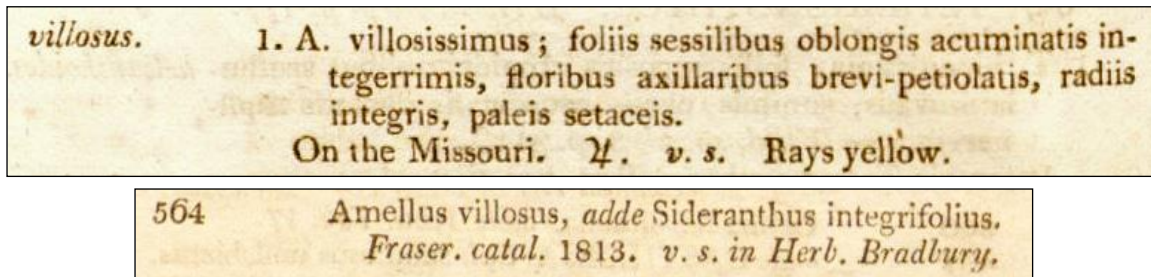


Figure 2. Pursh's 1814 main entry for *Amellus villosus*, p. 564 (above, main entry) and p. 750 (below, Supplementum, referring to p. 564).

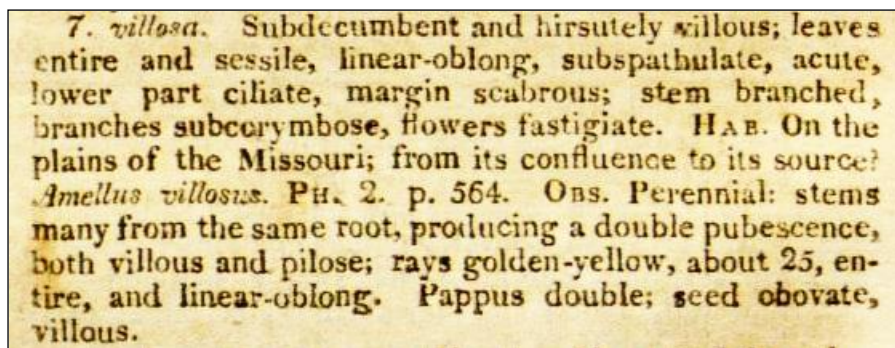


Figure 3. Nuttall's 1818 description of *Inula villosa* (Pursh) Nutt. The phrases "branches subcorymbose, flowers fastigate" and "stems ... producing a double pubescence, both villous and pilose" refer to *Heterotheca villosa* as traditionally understood, not to *Heterotheca ballardii*.

Simple choice of neotype for *Amellus villosus* is a Nuttall collection at PH with Nuttall's handwritten annotation as "*Chrysopsis* **villosa*, Missouri." The PH sheet has 3 stems, all three identified by the single Nuttall label — Semple's annotation notes that "The three *Nuttall s.n.* collections are from different plants" (as also observed earlier by Lloyd Shinnars by annotation of the PH sheets; I agree). Stem 1 (Semple's neotype) in the concept here is "*ballardii*." Stem 2 is "*villosa*." Stem 3 is "*camporum*."

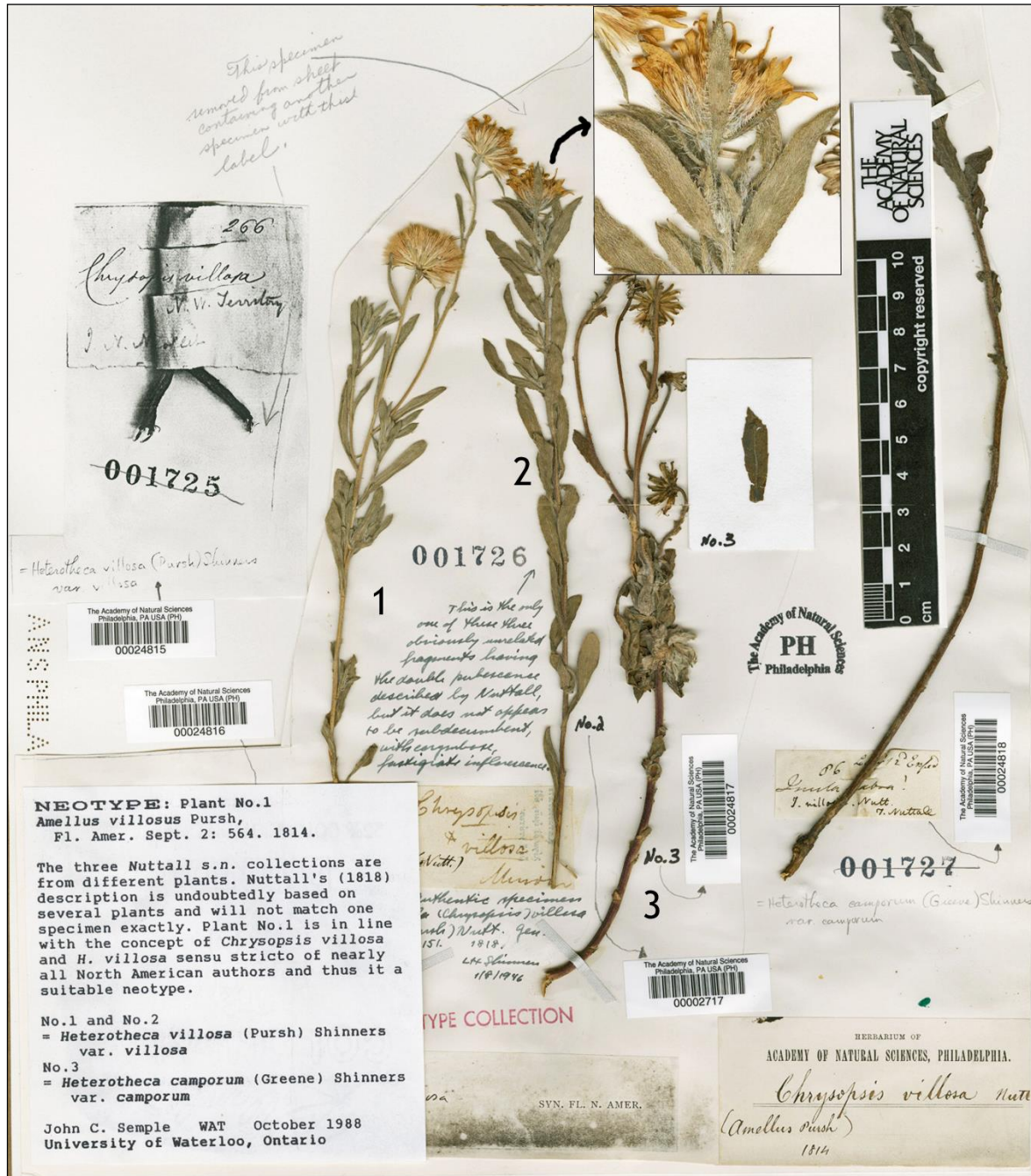


Figure 4. Sheet at PH with three *Nuttall* collections (all originally as "001726") from along the Missouri River. Stem 1 is Semple's neotype of *Amellus villosus*, identified here as "*ballardii*," stem 2 is my choice of neotype for *A. villosus*; stem 3 is conspecific with the lectotype of *Heterotheca camporum* (Greene) Shinnars.

Semple (1990, p. 224) wrote that "Nuttall may have penned the name "*Chrysopsis *villosa*" on his collection in the field in 1811. If Bradbury was aware of this (they did travel together) and added it to a label of his collection of the same taxon along with location data, then Pursh may have seen the epithet and adopted it." Semple's interpretation seems likely to me, with the caveat that stems 1 and 2 probably were recognized by Nuttall in the field as different in growth habit and vestiture.

Stem 1 (PH 24816, Semple's neotype). This stem has relatively long peduncles with solitary heads without capitular bracts, like "*ballardii*," but the vestiture is antrorsely loosely strigose-villous, more like "*villosa*." The stem vestiture of "*villosa*" in the Dakotas region is characteristically 2-storied; that of stem 1 is single-storied. I identify stem 1 as "*ballardii*" perhaps with influence (in vestiture) of "*villosa*." The type of *Chrysopsis ballardii* (Fig. 7) has vestiture similar to stem 1, PH 24816, not like that more characteristic of "*ballardii*" over its range, and it perhaps also is introgressed from *H. villosa*. Semple (1990, p. 224) noted that "Shinners apparently rejected [stem 1] as a match for Nuttall's taxon for lack of a double pubescence, but the fragment does have this trait as well as 'flowers fastigiate' and an apparently more subdecumbent habit." I do not see a "fastigiate" arrangement of heads or the "double pubescence" on stem 1.

Stem 2 (PH 2717, designated here as neotype, superseding the previous choice). The stem vestiture is 2-storied, matching "*villosa*." The single head appears to be solitary on a stem densely leaf to immediately below the head (see Fig. 4 inset); this evidently is an early-season stem with distal axillary buds that would have formed a closely corymboid ('fastigate') capitulescence characteristic of "*villosa*" (see comparable stem and expanded inset in Fig. 5; characteristic morphology in Fig. 6). The resemblance in vestiture between PH 2717 and traditionally identified "*villosa*" also was noticed by L.H. Shinners; his handwritten note in annotation, pointing to stem 2, says that "This is the only one of these three obviously unrelated fragments having the double pubescence described by Nuttall, but it does not appear to be subdecumbent with corymbose, fastigiate inflorescence."

Amellus villosus Pursh, Fl. Amer. Sept. 2: 564 and 750. 1814 [1813]. *Inula villosa* (Pursh) Nutt., Gen. N. Amer. Pl. 2: 151. 1818. *Diplopappus villosus* (Pursh) Hook., Fl. Bor.-Amer. 2: 22. 1834. *Chrysopsis villosa* (Pursh) Nutt. ex DC., Prodr. 5: 327. 1836. *Diplogon villosum* (Pursh) Kuntze, Revis. Gen. Pl. 1: 334. 1891. *Heterotheca villosa* (Pursh) Shinners, Field & Lab. 19: 71. 1951. **TYPE: USA. [South Dakota or North Dakota].** **Protologue:** "On the Missouri," June or early July, *J. Bradbury s.n.* (holotype: apparently lost or destroyed, fide Semple 1990).

Superseded NEOTYPE (Semple 1990, p. 225): ["UNITED STATES. Missouri, [in 1811], *Nuttall s.n.* (PH-001726!, shoot no. 1)," Fig. 4. **Locality as deduced:** Along the Missouri River in South Dakota or North Dakota, July or August, 1811. The left stem (shoot no. 1) of the original three stems of "PH-1726" has a barcode of 00024816.

New NEOTYPE (designated here): **Label:** "Missouri, Nuttall." **Locality as deduced:** Along the Missouri River in South Dakota or North Dakota, July or August 1811, *T. Nuttall s.n.* (PH-001726/00002717!, stem no. 2, and digital image!, Fig. 4).



Figure 5. *Heterotheca villosa* sensu stricto (in sense of the present study; *H. villosa* var. *villosa* as annotated by Semple 1993). Larson 5370 (MIN) from Dunn Co., North Dakota. Early season collection. Inset shows first head on immature branch, with axillary buds below; typical corymboid arrangement of heads developing on 2 branches on right. This morphology is similar to that of the new designated neotype (Fig. 4, stem 2).



Figure 6. *Heterotheca villosa*, characteristic morphology of closely corymboid capitulescence (heads "fastigate"), heads with capitular bracts, and 2-storied stem vestiture. *Roberts s.n.* (MIN) from Hennepin Co., Minnesota.



Figure 7. Holotype of *Chrysopsis ballardii* (MIN), from Chaska in Carver Co., Minnesota.



Figure 8. Representative specimen of "ballardii" (in sense of the present study; *H. villosa* var. *ballardii* as annotated by Semple 1993). *Stephens 12607* (MIN) from Mercer Co., North Dakota.

ACKNOWLEDGEMENTS

I'm grateful to John Strother for his helpful review and editing and staff at PH for their hospitality.

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