

***ENTEROPOGONOPSIS* (POACEAE: CYNODONTEAE),
A NEW GENUS FOR *TETRAPOGON CHLORIDEUS* AND *T. BRANDEGEEI***

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ABSTRACT

Enteropogonopsis Wipff & Shaw, **gen. nov.**, is established to comprise two species: **Enteropogonopsis chloridea** (J. Presl) Wipff & Shaw, **comb. nov.**, and **Enteropogonopsis brandegeei** (Vasey) Wipff & Shaw, **comb. nov.** The new genus is segregated from the Eastern Hemisphere species of *Enteropogon* based primarily on molecular evidence and forms a clade adjacent to *Tetrapogon*. It is separated from *Tetrapogon* based on molecular and morphological evidence.

As part of ongoing work on the *Guide to Texas Grasses* (Shaw & Wipff, in prep.) and on the grasses of Texas in general, it is necessary to discuss aspects of the taxonomy that we are adopting — changes in rank, generic transfers to allow for the use of generic concepts, new or old, reinstatement of genera and species previously lost to synonymy, and clarification of characters used to delineate difficult genera or species complexes.

Peterson & al. (2015), studying the molecular phylogeny and classification of the Eleusininae, reported strong support for a monophyletic *Enteropogon* in a circumscription which included eight species from the Eastern Hemisphere (Africa, Australia, South Pacific, Japan, and South Asia). However, the two Western Hemisphere taxa of *Enteropogon* (*E. chlorideus* and *E. brandegeei*) were found to be sister to *Tetrapogon* as a moderately supported clade. These two species together have at one time been placed in seven other genera (*Chloris*, *Dinebra*, *Diplachne*, *Eutriana*, *Gouinia*, *Gymnopogon*, *Leptochloa*). Peterson & al. (2015) chose to treat these two species in *Tetrapogon* but also proposed an alternative taxonomy, supported by their data, that these two taxa, *E. brandegeei* and *E. chlorideus*, could also be placed into a new genus. We prefer their alternative classification proposal of placing two taxa into a new genus, which then brings the molecular and morphological data into congruence. Though molecular data align the taxa in a clade sister to *Tetrapogon*, the morphological data do not support their placement in *Tetrapogon*. See Table 1.

Fertile floret compression in an important character in separating genera in the Cynodonteae subtribe Eleusininae (Lazarides 1972; Anderson 1974; Clayton 1982; Simon 1984; Clayton & Renvoize 1986; Jacobs & Highet 1988). The compression of the fertile lemma separates the *Tetrapogon* (laterally compressed) clade from the adjacent *Enteropogon chlorideus* and *E. brandegeei* clade (dorsally compressed). The inflorescence type, lower lemma margins, and basal sheaths can be used to separate *E. chlorideus* and *E. brandegeei*, from the Eastern Hemisphere *Enteropogon*, thus reconciling the molecular results of Peterson & al. (2015).

Table 1. Comparison of the characters used to separate the genera *Enteropogon*, *Tetrapogon*, and *Enteropogonopsis*.

TAXON	Fertile Floret Compression	No. Fertile Florets	No. Sterile florets, apices, awns	Glumes	Inflorescence branches - arrangement	Lower lemma margin	Basal Sheaths	Source
<i>Tetrapogon</i>	Lateral	2-5	(1-)2-4 (-6) Clavate, awned or awnless	Large, broad Equal or Subequal	Single to multiple branches; digitate	Glabrous, Sparsely ciliate, Densely pubescent	Usually overlapping	1, 3, 4, 5
<i>Enteropogon</i>	Dorsal	1	1(-2) Acute, Awned (Awnless)	Subulate to Lanceolate Markedly unequal	Single to multiple branches; digitate, subdigitate	Scabrous	Usually not markedly overlapping	1, 2, 3, 4, 5
<i>Enteropogonopsis</i> <i>E. chlorideus</i> <i>E. brandegeei</i>	Dorsal	1	1 Acute, Awned	Narrowly lanceolate Markedly unequal	Branches arranged in a series of distant verticils or sub-verticils along a long panicle axis	Ciliate	Overlapping	1

1 Anderson (1974)

2 Jacobs and Highet (1988)

3 Clayton and Renvoize (1986)

4 Clayton & al. (1974)

5 Clayton (1982)

ENTEROPOGONOPSIS Wipff & Shaw, **gen. nov.**Type species, *Enteropogonopsis chloridea* (J. Presl) Wipff & Shaw

Differing from *Tetrapogon* in its dorsally compressed spikelets, with a single fertile and sterile floret per spikelet. Differing from *Enteropogon* in its panicles of 3-20 racemose branches arranged in a series of distant, well separated, verticils or subverticils, with most nodes having multiple branches, or occasionally with a single branch per node, in its panicle axis of 6-11 cm, in its lower lemmas with ciliate margins, and in its lower overlapping sheaths that are usually keeled.

Plants perennial, caespitose; with or without long, branched scaly rhizomes terminating in a cleistogamous spikelet. Sheaths overlapping at the base, keeled, glabrous or pubescent; ligules variable, a ciliate membrane to a prominent tuft of hairs; blades flat or folded, glabrous, scabrous or pilose. Panicles with (3-)5-20 racemose branches, branches arranged in a series of distant, well separated, verticils or sub-verticils, with most nodes having multiple branches, or occasionally with a single branch per node; panicle axis 6-11 cm long; branches (5-)6-18 cm long, ascending, spreading, reflexed; naked below, with 3-4 spikelets per cm, spikelets appressed. Spikelets dorsally compressed, with 1 bisexual and 1 sterile floret. Glumes markedly unequal. Lower lemmas dorsally compressed, glabrous, scabrous, or hirsute; margins hirsute to sparsely strigose above, apices acute to acuminate, often bidentate, awned; callus bearded. Sterile florets variable, narrowly cylindrical to ellipsoid or flattened, awned. Caryopses flattened, dorsally compressed. $2n = 40, 80$.

Distribution and habitat. The two species are distributed in the southwestern USA through Mexico to Honduras. *Enteropogonopsis chloridea* is found in grasslands, brushy areas, and old fields. *Enteropogonopsis brandegeei* is endemic to Baja California, where it grows on rocky slopes and in arroyos.

Enteropogonopsis chloridea (J. Presl) Wipff & Shaw, **comb. nov.** *Dinebra chloridea* J. Presl in C. Presl, Reliq. Haenk. 1(4–5): 291. 1830. *Eutriana chloridea* (J. Presl) Kunth, Enum. Pl. 1: 280. 1833. *Chloris chloridea* (J. Presl) Hitchc., Proc. Biol. Soc. Wash. 41: 162. 1928. *Enteropogon chlorideus* (J. Presl) Clayton, Kew Bull. 37: 419. 1982. *Tetrapogon chlorideus* (J. Presl) P.M. Peterson, Taxon 64: 460. 2015. **TYPE: MEXICO.** *T. Haenke s.n.* (holotype: PR; isotypes: MO, US–image!).

Enteropogonopsis brandegeei (Vasey) Wipff & Shaw, **comb. nov.** *Diplachne brandegeei* [as “brandegei”] Vasey, Proc. Calif. Acad. Sci., ser. 2: 213. 1889. *Gouinia brandegeei* (Vasey) Hitchc., Bull. Bur. Pl. Industr. U.S.D.A. 33: 21. 1903. *Leptochloa brandegeei* (Vasey) Hitchc., Bull. Bur. Pl. Industr. U.S.D.A. 33: 21. 1903. *Chloris brandegeei* (Vasey) Swallen, Amer. J. Bot. 22: 41. 1935. *Enteropogon brandegeei* (Vasey) Clayton, Kew Bull. 37: 419. 1982. *Tetrapogon brandegeei* (Vasey) P.M. Peterson, Taxon 64: 460. 2015. **LECTOTYPE** (Hitchcock, Contr. U.S. Natl. Herb. 17: 352. 1913): **MEXICO. Baja California Sur.** Magdalena Island, 18 Jan 1889, *T.S. Brandegee II* (US-image!).

“Originally named by Vasey to honor Townshend Stith Brandegee (1843–1925) and ... therefore to be spelled “brandegeei” as per Art. 60.12 and Rec. 60C.1(a)” (Peterson & al. 2015).

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LITERATURE CITED

- Anderson, D.E. 1974. Taxonomy of the genus *Chloris* (Gramineae). Sci. Bull. Brigham Young Univ., Biol. Ser. 19: 1–133.
- Clayton, W.D. 1982. Notes on subfamily Chloridoideae (Gramineae). Kew Bull. 37: 417–420.
- Clayton, W.D., S.M. Phillips, and S.A. Renvoize. 1974. Gramineae Part 2. Flora of Tropical East Africa. Published under the authority of the Minister for Overseas Development by the Crown Agents for Oversea Governments and Administrations, London.
- Clayton, W.D. and S.A. Renvoize. 1986. Genera Graminum: Grasses of the World. Kew Bull. Additional Ser. 13. Royal Botanic Gardens.
- Jacobs S.W.L. and J. Highet. 1988. Re-evaluation of the characters used to distinguish *Enteropogon* from *Chloris* (Poaceae). Telopea 3: 217–221.
- Lazarides, M. 1972. *Enteropogon*, in A revision of Australian Chloridoideae (Gramineae). Austral. J. Bot., Suppl. No. 5: 24–33.
- Peterson P.M., K. Romaschenko, and Y. Herrera Arrieta. 2015. A molecular phylogeny and classification of the Eleusininae with a new genus, *Micrachne* (Poaceae: Chloridoideae: Cynodonteae). Taxon 64: 445–467.
- Shaw, R.B. and J.K. Wipff. In prep. Guide to Texas Grasses, 2nd Revision.
- Simon, B.K. 1984. Two new species of *Enteropogon* (Poaceae: Chloridoideae) in Australia. Austrobaileya 2: 1–6.