

CHROMOSOME COUNTS FOR *CALLITRICHE* (CALLITRICHACEAE) IN NORTH AMERICA

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ABSTRACT

Somatic chromosome numbers are reported for nine species and one variety of *Callitriche* (Callitrichaceae). The following new reports are included: $2n = 20$ (*C. nuttallii*, *C. marginata*), $2n = 40$ for one of four populations of *C. heterophylla* var. *heterophylla*, $2n = 40$ (*C. trochlearis*), $2n = 10$ (*C. peploides*, *C. terrestris*).

Key Words: *Callitriche*, chromosome numbers, North America

INTRODUCTION

Chromosome numbers vary considerably between species of *Callitriche* (Callitrichaceae), a family of ca. 50 species of largely temperate distribution. Diploid numbers range from $2n = 6$ to 40 (e.g., Schotsman, 1967; Philbrick, 1989). Yet, chromosome numbers are known for only approximately half of the species. The purpose of this contribution is to report on chromosome numbers of species of *Callitriche* that occur in North America. Herein, I report chromosome counts from 41 populations of the nine species and single variety that occur in this region.

MATERIALS AND METHODS

Chromosome counts were made from seedling root tips. Seeds were germinated on moist filter paper. Upon germination the seedlings were treated in 0.02% 8-hydroxyquinoline at 4°C for 2 hours and subsequently fixed in Carnoy's fixative (95% EtOH: chloroform: glacial acetic acid; 6:3:1) overnight at -5°C. After rinsing twice in distilled water, the root tips were hydrolyzed briefly in 1 N HCl and squashed in aceto-orcein. Counts were derived from a minimum of ten plants from each population. Voucher specimens are cited in Table 1. Voucher specimens are located at CONN.

RESULTS AND DISCUSSION

Chromosome counts were determined for 41 populations of the nine species and one variety of *Callitriche* in North America

Table 1. Chromosome number determinations for *Callitriche* in North America. All collections are by Philbrick unless otherwise noted.

- C. hermaphroditica* L. $2n = 6$. CANADA. **Alberta**. Edmonton, September 1985, 1609. **British Columbia**. Merritt, 28 August 1988, 2157. **Quebec**. Portneuf Co.: St. Augustin, 2 September 1988, *Philbrick & Bruneau* 2166. U.S.A. **California**. Madera Co.: 30 May 1987, 2022; Tuolumne Co.: 31 May 1987, 2033.
- C. heterophylla* var. *heterophylla* Pursh. $2n = 20$. U.S.A. **Mississippi**. Lowndes Co.: 15 March 1988, *Philbrick & Haynes* 2144. **New York**. St. Lawrence Co.: 19 September 1987, *Philbrick & Gale* 2112. **New Hampshire**. Rockingham Co.: 20 August 1990, 2112. $2n = 40$. **New Hampshire**. Carroll Co.: 29 November 1992, *Philbrick, Philbrick & Philbrick* 3192.
- var. *bolanderi* (Hegelm.) Fassett. $2n = 20$. CANADA. **British Columbia**. Vancouver Island, 8 June 1988, 2155. U.S.A. **California**. Madera Co.: 30 May 1987, 2021; Humboldt Co.: 9 June 1987, 2046; Riverside Co.: 22 May 1987, 2002. **Washington**. Jefferson Co.: 20 June 1987, *Philbrick, Busse & Philbrick* 2088.
- C. marginata* Torrey. $2n = 20$. CANADA. **British Columbia**. Vancouver Island, 7 June 1988, *Philbrick, Ceska, Ceska & Catling* 2156. U.S.A. **California**. San Diego Co.: 6 January 1986, 1598; Marin Co.: 5 June 1987, *Philbrick & Rubtzoff* 2040; Solano Co.: 2 June 1987, *Philbrick & Anderson* 2035.
- C. nuttallii* Torrey. $2n = 20$. U.S.A.. **Alabama**. Conecuh Co.: 14 March 1988, *Philbrick & Haynes* 2136; Butler Co.: 14 March 1988, *Philbrick & Haynes* 2137; Lowndes Co.: 14 March 1988, *Philbrick & Haynes* 2139; Pickens Co.: 15 March 1988, *Philbrick & Haynes* 2142. **Mississippi**. Kemper Co.: 15 March 1988, *Philbrick & Haynes* 2147.
- C. peploides* Nutt. $2n = 10$. U.S.A. **Alabama**. Mobile Co.: 13 March 1988, *Philbrick & Haynes* 2127; Escambia Co.: 13 March 1988, *Philbrick & Haynes* 2131; Conecuh Co.: 14 March 1988, *Philbrick & Haynes* 2135; Lowndes Co.: 14 March 1988, *Philbrick & Haynes* 2140.
- C. stagnalis* Scop. $2n = 10$. U.S.A. **Maryland**. St. Mary's Co.: 30 September 1984, 1386. **Oregon**. Jackson Co.: 11 June 1987, 2053; Clackamas Co.: 13 June 1987, 2067; Pacific Co.: 16 June 1987, 2083. **Washington**. Grays Harbor Co.: 22 June 1987, 2102.
- C. terrestris* Raf. $2n = 10$. U.S.A. **Mississippi**. Kemper Co.: 15 March 1988, *Philbrick, Haynes & McDaniels* 2145; Lowndes Co.: 15 March 1988, *Philbrick, Haynes & McDaniels* 2145. **Tennessee**. Dickson Co.: 29 April 1985, 1403; Benton Co.: 29 April 1985, 1404.
- C. trochlearis* Fassett. $2n = 40$. U.S.A. **California**. Mendocino Co.: 8 June 1987, 2043. **Oregon**. Coos Co.: 11 June 1987, 2057.
- C. verna* L. $2n = 20$. CANADA. **Quebec**. Portneuf Co.: St. Augustin, 2 September 1988, *Philbrick & Bruneau* 2167; Charlevoix Co.: 2 September 1988, *Philbrick & Bruneau* 2168. U.S.A. **California**. Sonoma Co.: 7 June 1987, 2041. **Colorado**. Larimer Co.: 4 August 1984, 3121. **New Hampshire**. Coos Co.: 4 September 1988, 2176.

north of Mexico. Counts for three species confirm those that have previously been published: $2n = 20$ for *C. heterophylla* var. *heterophylla* Pursh (e.g., Loeve and Kapoor, 1967; Taylor and Mulligan, 1968) and *C. heterophylla* var. *bolanderi* (Hegelm.) Fassett (e.g., Taylor and Mulligan, 1968), and $2n = 6$ for *C. hermaphroditica* L. (e.g., Love, 1982; Schotsman, 1967). It is notable that a single population of *C. heterophylla* var. *heterophylla* exhibited $2n = 40$ instead of the typical $2n = 20$. This is the first report of an octoploid population of this species, but it is yet unclear if it is of allopolyploid or autopolyploid derivation. The count for *C. stagnalis*, which is introduced from Europe (Fassett, 1951), is the same as reported from European populations (e.g., Schotsman and Andreas, 1980).

Prior to this study chromosome counts were unknown for five species of *Callitriche* in North America. Thus, the counts provided herein are the first for these species ($2n = 20$ for *C. marginata* Torrey and *C. nuttallii* Torrey, $2n = 10$ for *C. peploides* Nutt. and *C. terrestris* Raf., and $2n = 40$ for *C. trochlearis*).

The chromosome counts reported herein parallel the range in numbers in the genus worldwide (Philbrick, 1989). Based on $x = 5$ there are two phyletic chromosome number series in *Callitriche*: the euploid series ($2n = 10, 20, 40$) and aneuploid reduction series ($2n = 8, 6$). All the species in North America belong to the euploid series with the exception of *C. hermaphroditica* ($2n = 6$).

ACKNOWLEDGMENTS

The following people are thanked for providing valuable assistance with field work: Marcel Blondeau, Ann Bruneau, Monique Bruneau, Paula Busse, Adolf Ceska, Robert Haynes, Sidney McDaniel, and Graham Philbrick. This work was supported by a New England Botanical Club Research Grant, and National Science Foundation Grants BSR-8701285 to C.T.P. and BSR-8207125 to Gregory Anderson.

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Vol. 96, No. 887, including pages 207–294, was issued January 18, 1995.