

NEW HOST RECORDS FOR TEPHRITID FLIES (DIPTERA)
FROM *CIRSIIUM* AND *SAUSSUREA* THISTLES
(ASTERACEAE) IN CALIFORNIA

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Abstract.—Twenty new host records are described for five species of tephritid flies (Diptera, Tephritidae) from 15 species of *Cirsium* and *Saussurea* thistles (Asteraceae, Cardueae) in California. All are adult rearing records from field populations of host thistles. The number and gender of flies reared from each host species are reported. The new records are: (i) *Chaetostomella undosa* reared from *Cirsium brevistylum* and stems of *C. occidentale*. (ii) *Orellia occidentalis* reared from *C. brevistylum* and *C. vulgare*, and from heads of *Cirsium andersonii*, *C. andrewsii*, *C. callilepis*, *C. cymosum*, *C. proteanum*, and *C. tioganum*. (iii) *Paracantha genalis* reared from root crowns or stem bases of *Cirsium cymosum* and *C. vulgare*. (iv) *Paracantha gentilis* reared from heads of *C. callilepis*, *C. campylon*, *C. ciliolatum*, *C. douglasii*, *C. hydrophilum vaseyi*, *C. pastoris*, and *C. proteanum*. (v) *Tephritis signatipennis* reared from heads of *Saussurea americana*. Two records are from the weedy naturalized bull thistle (*Cirsium vulgare*), and three records are from native thistles that are considered rare (*Cirsium campylon*, *C. ciliolatum*, and *C. hydrophilum vaseyi*). The record for *Tephritis signatipennis* is the first known host rearing record from the thistle tribe. Previous host records of these five flies are also summarized.

Native thistles (Asteraceae, Cardueae) in North America consist of species of *Centaurea*, *Cirsium*, and *Saussurea*, of which *Cirsium* with ca. 130 spp. is by far the largest genus (Moore and Frankton, 1974; Ownbey et al., 1975; USDA, SCS, 1982). Thistles also constitute an important group of weeds in North America including pestiferous naturalized species of *Acroptilon*, *Carduus*, *Centaurea*, *Cirsium*, *Cynara*, *Onopordum* and *Silybum* (USDA, SCS, 1982). Tephritid flies (Diptera, Tephritidae) in North America include many harmless native species, native and introduced pests of fruit crops, and naturalized beneficial biological control agents for weedy naturalized thistles (Cole, 1969; Foote and Blanc, 1963; Julien, 1982; Wasbauer, 1972).

We report here 20 new host records for five species of native tephritid flies from 15 species of *Cirsium* and *Saussurea* thistles (Asteraceae, Cardueae) in California. All are adult rearing records from natural populations of thistles. The number and gender of flies reared from each new host collection are recorded. The new host records are for the flies *Chaetostomella undosa* (Coquillett), *Orellia*

occidentalis (Snow), *Paracantha genalis* Malloch, *Paracantha gentilis* Hering, and *Tephritis signatipennis* Foote. The new host records are from the host thistles *Cirsium andersonii* (Gray) Petrak, *C. andrewsii* (Gray) Jeps., *C. brevistylum* Cronq., *C. callilepis* (Greene) Jeps., *C. campylon* H. Sharsm., *C. ciliolatum* (L. Henders.) J. T. Howell, *C. cymosum* (Greene) J. T. Howell, *C. douglasii* DC., *C. hydrophilum* (Greene) Jeps., *C. vaseyi* (Gray) J. T. Howell, *C. occidentale* (Nutt.) Jeps., *C. pastoris* J. T. Howell, *C. proteanum* J. T. Howell, *C. tioganum* Congd., *C. vulgare* (Savi) Tenore, and *Saussurea americana* A. Eat. Previous host records for these flies were found in Cole (1969), Foote and Blanc (1963), Goeden (1983), Lamp and McCarty (1982), Steck (1984), and Wasbauer (1972). Seventeen of the new host records are a result of an entomofaunal study of native and naturalized thistles begun by the authors in 1982. We collected samples of thistles in the field and brought them back to the laboratory for the rearing of adult insects. Host material gathered in 1982 consisted of periodic collections of ten whole plants per population. Host material gathered in 1983 consisted of thistleheads only that were collected at a stage between flowering and seed dissemination. The numbers of heads that were collected for each 1983 thistlehead sample are specified. Three of the new host records result from collections made by L. A. Andres of our laboratory, and K. E. Frick and R. B. Hawkes, formerly affiliated with this laboratory.

The host plants of these five species of flies appear to be restricted to species of composites (Asteraceae). *Chaetostomella undosa* and *Paracantha genalis* appear to pupate in the stems or roots of their hosts, while *Orellia occidentalis*, *Paracantha gentilis*, and *Tephritis signatipennis* pupate in the heads of their hosts. All new host records are from native thistles except for the records of *Orellia occidentalis* and *Paracantha genalis* from the weedy naturalized bull thistle, *Cirsium vulgare*. *Paracantha gentilis* was reared from the heads of three *Cirsium* species that are considered rare: *Cirsium campylon*, *C. ciliolatum*, and *C. hydrophilum vaseyi* (Federal Register, 1980, 1983). The host record for *Tephritis signatipennis* is the first known host rearing record from the thistle tribe, Cardueae.

R. W. Pemberton determined the tephritid species, and the identity of representative specimens of these was confirmed by F. L. Blanc. C. E. Turner determined the thistle species, and these determinations were confirmed by G. D. Barbe. Voucher specimens of flies and thistles are retained in our laboratory.

HOST RECORDS

Plant names preceded by asterisk are new records.

Chaetostomella undosa (Coquillett)

(*Orellia undosa* Coquillett)

Artemisia tridentata Nutt., *Artemisia* sp., (Asteraceae, Anthemideae) (Cole, 1969); but see Steck, 1984.

Cirsium cymosum and *C. scariosum* Nutt., (Steck, 1984, and pers. comm.). Steck (pers. comm.) also has electrophoretic identification of larvae from *C. coloradoense* (Rydb.) Cockl.

**Cirsium brevistylum*. Fandango Pass Rd., Modoc Co., CA, by L. A. Andres, host material coll. 17-V-61; 1 ♂ emerged by 14-VIII-61.

- **Cirsium occidentale*. Abbotts Lagoon, Pt. Reyes, Marin Co., CA, by RWP¹, SSR¹ and CET¹, host stems coll. 22-VI and 13-VII-82; 1 ♀, 2 ♂ emerged by 1-X-83.

***Orellia occidentalis* (Snow)**

Cirsium canescens Nutt., *C. edule* Nutt., *C. hydrophilum*, *C. occidentale*, *C. parryi* (Gray) Petrak, *C. pastoris*, *C. quercetorum* (Gray) Jeps., (Wasbauer, 1972). *C. flodmanii* (Rydb.) Arth., *C. ochrocentrum* Gray, and *C. undulatum* (Nutt.) Spreng. (Lamp and McCarty, 1982). *C. scariosum* Nutt., (Steck, 1984, and pers. comm.).

- **Cirsium andersonii*. Hwy. 49 at Bassetts, Sierra Co., CA, by RWP and CET, 71 host heads coll. 17-VIII-83; 2 ♀, 1 ♂ emerged by 1-X-83, 14 ♀, 9 ♂ emerged by 2-VII-84. Scott Mt. Pass, Hwy. 3, Trinity Co., CA, by CET and RWP, 100 host heads coll. 11-IX-83; 1 ♀ emerged by 1-X-83, 1 ♂ emerged by 7-VI-84.
- **Cirsium andrewsii*. Abbotts Lagoon, Pt. Reyes, Marin Co., CA, by SSR, RWP and CET, host heads coll. 13-VII-82; 1 ♀, 1 ♂ emerged by 1-X-83. Host heads coll. 3-VIII-82; 9 ♀, 11 ♂ emerged by 11-I-83, 18 ♀, 22 ♂ emerged by 11-V-83, 13 ♀, 6 ♂ emerged by 1-X-83. Host heads coll. 24-VIII-82; 2 ♀, 4 ♂ emerged by 1-X-83. Host heads coll. 14-IX-82; 2 ♂ emerged by 1-X-83. By RWP and CET, 100 host heads coll. 21-VI-83; 1 ♀, 1 ♂ emerged by 1-X-83.
- **Cirsium brevistylum*. Fort Bragg, Mendocino Co., CA, by K. E. Frick, host material coll. 7-II-62; 2 ♂ emerged. 8 km W. of Fort Bragg, Mendocino Co., CA, by R. B. Hawkes, host material coll. 30-VII-70; 3 ♀ emerged by 27-VIII-70.
- **Cirsium callilepis*. Coffee Creek Rd., 24 km W. of Hwy. 3, Trinity Co., CA, by SSR and CET, host heads coll. 17-VIII-82; 1 ♂ emerged by 1-X-83.
- **Cirsium cymosum*. Slough Rd., S. of Louie Rd. exit I-5, Siskiyou Co., CA, by SSR and CET, host heads coll. 8-VII-82; 3 ♀, 1 ♂ emerged by 11-I-83.
- **Cirsium proteanum*. Blackbird Valley off Mines Rd. N.E. of Mt. Hamilton, Santa Clara Co., CA, by SSR, RWP, and CET, host heads coll. 19-VII-82; 4 ♀, 4 ♂ emerged by 1-X-83. By CET and RWP, 100 host heads coll. 21-VII-83; 1 ♀, 2 ♂ emerged by 1-X-83, 3 ♀, 2 ♂ emerged by 29-V-84, 2 ♀, 1 ♂ emerged by 1-X-84. Highway 198, 8.5 km E. of Hwy. 25, Monterey Co., CA, by RWP and CET, 100 host heads coll. 12-VII-83; 2 ♀, 4 ♂ emerged by 2-VII-84, 1 ♀, 2 ♂ emerged by 31-XII-84.
- **Cirsium tioganum*. Sagehen Creek research station road off Hwy. 89, Nevada Co., CA, by RWP and CET, 106 host heads coll. 18-VIII-83; 1 ♀ emerged by 7-VI-84. Note: *Cirsium tioganum* has often been called *Cirsium acaulescens* Gray, *C. drummondii* Torr. and Gray, and *C. foliosum* (Hook.) DC. in California.
- **Cirsium vulgare*. Westwood, Lassen Co., CA, by K. E. Frick, host material coll. 8-28-62; 1 ♂ emerged.

***Paracantha genalis* Malloch**

Cirsium californicum Gray, (Goeden, 1983).

- **Cirsium cymosum*. Frontage Rd., Edgewood exit I-5, 5.6 km N. of Weed, Siskiyou Co., CA, by CET, SSR and RWP, 2 larvae (each in the crown of a rosette) coll.

¹ The authors' names are abbreviated when cited as collectors of specific records. RWP = Robert W. Pemberton; SSR = Sara S. Rosenthal; CET = Charles E. Turner.

25-V-82; 2 ♂ emerged by 9-VI- and 1-VII-82. 1 puparium (in the crown of a rosette) and 5 puparia and 1 larva (in the stem bases of a headed plant) coll. 14-VI-82; 3 ♀, 1 ♂ emerged by 3-VII-82.

**Cirsium vulgare*. Callahan, Siskiyou Co., CA, by CET, SSR and RWP, 1 larva (in the crown of a rosette) coll. 27-VII-82; 1 ♀ emerged by 17-XI-82.

Paracantha gentilis Hering

Cirsium centaureae (Rydb.) K. Schum., *C. sierrae-bernardino* (invalid and uncorrelated name, possibly *C. californicum*, *C. edule* Nutt., and *C. vulgare* (Wasbauer, 1972). *C. cymosum*, and *C. scariosum* (Steck, 1984, and pers. comm.). Steck (pers. comm.) also has electrophoretic identification of larvae from *C. coloradoense*.

**Cirsium callilepis*. Coffee Creek Rd. 19.9 km W. of Hwy. 3, Trinity Co., CA, by RWP and CET, 100 host heads coll. 5-VIII-83; 1 ♀, 2 ♂ emerged by 1-X-83.

**Cirsium campylon*. Blackbird Valley off Mines Rd. N.E. of Mt. Hamilton, Santa Clara Co., CA, by SSR, RWP and CET, host heads coll. 19-VII-82; 1 ♀ emerged by 18-VIII-82 and 1 ♂ emerged by 17-XI-82.

**Cirsium ciliolatum*. York Rd. at Mulloy Rd., N.E. of Montague, Siskiyou Co., CA, by CET and RWP, 100 host heads coll. 23-VI-83; 30 ♀, 31 ♂ emerged by 1-X-83, 1 ♀, 1 ♂ emerged by 22-XII-83, 1 ♀, 3 ♂ emerged by 15-VI-84.

**Cirsium douglasii*. Cecilville Rd., 8 km S.W. of Callahan, Siskiyou Co., CA, by CET, SSR and RWP, host heads coll. 7-VII-82; 1 ♀ emerged by 1-X-83. Hwy. 3 S. of Scott Mt. Pass, Trinity Co., CA, by CET and RWP, 43 host heads coll. 5-VIII-83; 1 ♂ emerged by 1-X-83.

**Cirsium hydrophilum vaseyi*. West Point Inn trail, Mt. Tamalpais, Marin Co., CA, by RWP and CET, 100 host heads coll. 6-VII-83; 1 ♀ emerged by 24-V-84.

**Cirsium pastoris*. Cecilville Rd., 8 km S.W. of Callahan, Siskiyou Co., CA, by CET, SSR and RWP, host heads coll. 17-VIII-82; 5 ♀, 11 ♂ emerged by 22-X-82. Slough Rd., S. of Louie Rd. exit I-5, Siskiyou Co., CA, by CET and RWP, 100 host heads coll. 29-VI-83; 55 ♀, 56 ♂ emerged by 1-X-83, 1 ♀ emerged by 5-VI-84. Frontage Rd., Edgewood exit I-5, 5.6 km N. of Weed, Siskiyou Co., CA, by RWP and CET, 100 host heads coll. 3-VIII-83; 1 ♀, 1 ♂ emerged by 1-X-83. Callahan, Siskiyou Co., CA, by CET and RWP, 100 host heads coll. 5-VIII-83; 5 ♀, 10 ♂ emerged by 1-X-83, 1 ♂ emerged by 6-VI-84.

**Cirsium proteanum*. Blackbird Valley off Mines Rd. N.E. of Mt. Hamilton, Santa Clara Co., CA, by SSR, RWP and CET, host heads coll. 19-VII-82; 3 ♀, 5 ♂ emerged by 31-VII-82 and 1 ♀, 3 ♂ emerged by 16-VIII-82. Host heads coll. 10-VIII-82; 3 ♀, 1 ♂ emerged by 13-X-82. By RWP and CET, 100 host heads coll. 21-VII-83; 53 ♀, 70 ♂ emerged by 1-X-83, 1 ♂ emerged by 22-XII-83, 1 ♀, 1 ♂ emerged by 29-VI-84. Hwy. 41, 5.9 km W. of the Kern-Kings Co. line, Kern Co., CA, by CET and RWP, 100 host heads coll. 16-VI-83; 2 ♀, 1 ♂ emerged by 1-X-83. Hwy. 198, 8.5 km E. of Hwy. 25, Monterey Co., CA, by CET and RWP, 100 host heads coll. 12-VII-83; 9 ♀, 10 ♂ emerged by 1-X-83.

Tephritis signatipennis Foote

Machaeranthera canescens (Pursh) Gray (Asteraceae, Astereae), (Wasbauer, 1972).

**Saussurea americana*. S. slope of White Mt., old Pacific Crest Trail above Horse Creek, Siskiyou Co., CA, by CET and RWP, 100 host heads coll. 10-IX-83; 9 ♀, 19 ♂ emerged by 13-X-83.

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