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Revision of the western Nearctic species of *Empis* subgenus *Enoplempis* (Diptera: Empididae)

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Abstract

The species of the *Empis* subgenus *Enoplempis* Bigot from western North America, including the Rocky Mountains westward, are revised. A total of 75 species are recorded from this region, including 54 new species. The western species are classified into 12 species groups as follows: the *Empis* (*En.*) *arrecta* species group—*E*. (*En.*) *arrecta* **sp. nov.**, *E*. (*En.*) *diokra* **sp. nov.**, *E*. (*En.*) *occidentalis* **sp. nov.**, *E*. (*En.*) *shoshona* **sp. nov.**; the *Empis* (*En.*) *bigoti* species group—*E.* (*En.*) *aerobatica* Melander, *E.* (*En.*) *bigoti* Melander, *E*. (*En.*) *collinsi* **sp. nov.**, *E*. (*En.*) *montgomeryi* **sp. nov.**, *E*. (*En.*) *multifaria* **sp. nov.**, *E*. (*En.*) *paraerobatica* **sp. nov.**, *E.* (*En.*) *podagra* Melander; the *Empis* (*En.*) *canaster* species group—*E*. (*En.*) *arizonensis* **sp. nov.**, *E.* (*En.*) *canaster* Melander, *E*. (*En.*) *chillcotti* **sp. nov.**, *E*. (*En.*) *contrasta* **sp. nov.**, *E.* (*En.*) *falcata* Melander, *E*. (*En.*) *fitzgeraldi* **sp. nov.**, *E*. (*En.*) *safra* **sp. nov.**, *E*. (*En.*) *sagehenensis* **sp. nov.**, *E*. (*En.*) *spokanensis* **sp. nov.**, *E*. (*En.*) *subcanaster* **sp. nov.**; the *Empis* (*En.*) *clava* species group—*E*. (*En.*) *clava* **sp. nov.**, *E*. (*En.*) *mariposa* **sp. nov.**, *E*. (*En.*) *tularensis* **sp. nov.**; the *Empis* (*En.*) *delumbis* species group—*E.* (*En.*) *delumbis* Melander, *E*. (*En.*) *floricola* **sp. nov.**, *E*. (*En.*) *sphaera* **sp. nov.**, *E*. (*En.*) *spiculata* **sp. nov.**, *E*. (*En.*) *tripenicillata* **sp. nov.**; the *Empis* (*En.*) *geneatis* species group—*E*. (*En.*) *fisheri* **sp. nov.**, *E*. (*En.*) *geneatis* (Melander), *E*. (*En.*) *oharai* **sp. nov.**, *E*. (*En.*) *subgeneatis* **sp. nov.**; the *Empis* (*En.*) *manca* species group—*E*. (*En.*) *bova* **sp. nov.**, *E.* (*En.*) *manca* Coquillett, *E*. (*En.*) *submanca* **sp. nov.**, *E*. (*En.*) *wilderae* **sp. nov.**; the *Empis* (*En.*) *mira* species group—*E*. (*En.*) *macdonaldi* Sinclair, Brooks & Cumming, *E.* (*En.*) *mira* (Bigot), *E.* (*En.*) *submira* Sinclair, Brooks & Cumming, *E.* (*En.*) *williamturneri* Sinclair, Brooks & Cumming, *E.* (*En.*) *winkleri* Sinclair, Brooks & Cumming; the *Empis* (*En.*) *nodipoplitea* species group—*E.* (*En.*) *nodipoplitea* Steyskal; the *Empis* (*En.*) *teres* species group—*E.* (*En.*) *scotti* **sp. nov.**, *E.* (*En.*) *scutica* **sp. nov.**, *E.* (*En.*) *teres* Melander, *E.* (*En.*) *undulasetosa* **sp. nov.**; the *Empis* (*En.*) *turgida* species group—*E.* (*En.*) *turgida* **sp. nov.**, *E.* (*En.*) *woodleyi* **sp. nov.**; and the *Empis* (*En.*) *valentis* species group—*E.* (*En.*) *aeripes* Melander, *E.* (*En.*) *disconvenita* Melander, *E.* (*En.*) *dolabraria* Melander **stat. rev.**, *E*. (*En.*) *flavobulla* **sp. nov.**, *E*. (*En.*) *fresno* **sp. nov.**, *E.* (*En.*) *mixopolia* Melander, *E*. (*En.*) *paraeripes* **sp. nov.**, *E*. (*En.*) *subaeripes* **sp. nov.**, *E.* (*En.*) *valentis* Coquillett. Additionally, the following 17 western species are unplaced to species group: *E*. (*En.*) *aphela* **sp. nov.**, *E*. (*En.*) *blodgettensis* **sp. nov.**, *E*. (*En.*) *californica* **sp. nov.**, *E*. (*En.*) *cerina* **sp. nov.**, *E.* (*En.*) *culcitella* **sp. nov.**, *E*. (*En.*) *delnortensis* **sp. nov.**, *E.* (*En.*) *dubitata* **sp. nov.**, *E.* (*En.*) *genista* **sp. nov.**, *E*. (*En.*) *holoptica* **sp. nov.**, *E*. (*En.*) *manning* **sp. nov.**, *E.* (*En.*) *missoula* **sp. nov.**, *E*. (*En.*) *oregonensis* **sp. nov.**, *E.* (*En.*) *poplitea* Loew, *E.* (*En.*) *richardvockerothi* **sp. nov.**, *E.* (*En.*) *sierraensis* **sp. nov.**, *E*. (*En.*) *susanae* **sp. nov.**, *E*. (*En.*) *yakimensis* **sp. nov.** The following new synonymy is designated: *E.* (*En.*) *bullifera* Kessel & Kessel = *E.* (*En.*) *bigoti*. Lectotypes are designated for the following species: *E.* (*En.*) *aeripes*, *E.* (*En.*) *disconvenita*, *E.* (*En.*) *dolabraria*, *E.* (*En.*) *mixopolia*, *E.* (*En.*) *aerobatica*, *E.* (*En.*) *podagra*, *E.* (*En.*) *canaster*, *E.* (*En.*) *falcata*, *E.* (*En.*) *delumbis*, *E.* (*En.*) *manca*, *E.* (*En.*) *teres* and *E.* (*En.*) *poplitea*. A key to all the western species is presented with distributions illustrated. The form of nuptial gift presentation displayed within this group, including the use of balloons (with or without prey) and unwrapped prey is indicated for species when known.

In addition, new eastern records are listed and two new species from eastern North America are described (*E*. (*En*.) *deceptiva* **sp. nov.** and *E*. (*En.*) *joanae* **sp. nov.**). A complete list of all known species and species groups in the subgenus *Enoplempis* is also provided.

Key words: dance flies, balloon flies, North America, new species, species groups, phylogeny, nuptial gifts, mating behaviours

Introduction

Dance flies (Empididae) in the *Empis* L. subgenus *Enoplempis* Bigot are an exclusively North American group, which were recently revised by Sinclair *et al*. (2013) for species found east of the Rocky Mountains and by Sinclair *et al*. (2021) for the western species belonging to the *E*. (*Enoplempis*) *mira* species group. The subgenus is of particular interest because of the diverse array of nuptial gifts used in courtship displays, from unwrapped prey to wrapped prey in secreted froth, to hollow empty secreted balloons without prey (Sinclair *et al*. 2013). We have continued to amass material from western North America by borrowing specimens from various collections and through our own collecting efforts. The remaining western species are now revised and fully illustrated in this paper, including description of over 50 new species. An identification key to all the western species is provided, including those in the *E*. (*Enoplempis*) *mira* species group. Behavioural observations, when known, are compiled for all North American species, including behaviours inferred from label data and morphology. In addition, we discuss the evolution of various nuptial gifts used in the courtship behaviours displayed by the group and consider broad phylogenetic patterns within the subgenus at the species group level.

Material & methods

This study is based on the examination of over 6000 specimens, which are borrowed from or deposited in the following institutions: American Museum of Natural History, New York, USA (AMNH); Brigham Young University, Monte Bean Museum, Provo, USA (BYU); California Academy of Sciences, San Francisco, USA (CAS); Canadian National Collection of Insects, Ottawa, Canada (CNC); California State Collection of Arthropods, Sacramento, USA (CSCA); Colorado State University Insect Collection, Fort Collins, USA (CSUC); Cornell University Insect Collection, Ithaca, USA (CUIC); University of Guelph Insect Collection, Guelph, Canada (DEBU); Essig Museum of Entomology, University of California, Berkeley, USA (EMEC); Biosystematics Laboratory, Kyushu University, Fukuoka, Japan (KUMF); Natural History Museum of Los Angeles County, Los Angeles, USA (LACM); Lyman Entomological Museum, McGill University, Ste-Anne-de-Bellevue, Canada (LEM); Museum of Comparative Zoology, Harvard University, Cambridge, USA (MCZ); Montana Entomology Collection, Montana State University, Bozeman, USA (MTEC); Oregon State Department of Agriculture, Salem, USA (ODAC); Oregon State Arthropod Collection, Oregon State University, Corvallis, USA (OSAC); Oxford University Museum of Natural History, Oxford, UK (OUMNH); Royal British Columbia Museum, Victoria, Canada (RBCM); Royal Ontario Museum, Toronto, Canada (ROM); University of Alaska Museum, Entomology Collection, Fairbanks, USA (UAM); Spencer Entomological Museum, University of British Columbia, Vancouver, Canada (UBCZ); Bohart Museum of Entomology, University of California, Davis, USA (UCDC); Entomology Research Museum, University of California, Riverside, USA (UCRC); University of New Hampshire, Durham, USA (UNHC); United States National Museum of Natural History, Washington D.C., USA (USNM); W.F. Barr Entomological Museum, University of Idaho, Moscow, USA (WFBM); Washington State University, Pullman, USA (WSU).

Label data for primary types are cited from the top downward, with the data from each label in quotation marks. Labels are cited in full with original spelling, punctuation, and date, with label lines delimited by a slash (/). Additional information is included in square [ ] brackets. The repository of each type is given in parentheses. Secondary type data are abridged and listed alphabetically.

Geographic coordinates for collecting localities were compiled for each species using data on the specimen labels. For specimen labels lacking geographic coordinates, latitude and longitude values were estimated by the authors using Google Earth or Google Maps, and appear in square brackets following the locality name. Coordinates were uploaded to SimpleMappr.net (Shorthouse 2010), which was used to produce the species distribution maps.

For some species, the section "Possible additional material (unassociated females)" is included to list additional extralimital distributional records which are based only on tentatively identified female specimens. These records require eventual confirmation by the collection of a male from the same locality and are not plotted on the associated distribution maps.

Pinned specimens were photographed using Leica Application Suite X (LASX) with a Leica M205C microscope and Leica DMC5400 camera. Male terminalia were macerated in 85% lactic acid heated in a microwave oven for several intervals of 20–30 seconds. Terminalia were subsequently examined in glycerin on a depression slide and illustrated.

Terms used for adult structures follow those of Cumming & Wood (2017). The following abbreviations are used in the descriptions for thoracic setae: acr—acrostichal setae, dc—dorsocentral setae, npl—notopleural setae, pprn—postpronotal setae; presut spal—presutural supra-alar setae; psut spal—postsutural supra-alar setae; pal—postalar setae, sctl—scutellar setae.

The following abbreviations are used in the material examined sections: Cpgd—campground; Ck—creek; Co.—county; Cyn—canyon; E—east; for.—forest; ft—feet; Hwy—highway; Lk.—lake; MT—Malaise trap; N—north; NF—National Forest; NP—National Park; nr—near; Pk—park; Pkwy—parkway; PP—provincial park; R—river; Rd—road; Rec.—recreation; S—south; str.—stream; Tr.—trail; W—west. The following abbreviations are used for the most common collectors: ALM—A.L. Melander; BHP—B.H. Poole; BJS—B.J. Sinclair; CHM—C.H. Mann; DDW—D.D. Wilder; JGC—J.G. Chillcott; JAP—J.A. Powell; PHA—P.H. Arnaud, Jr; SEB—S.E. Brooks; SJF—S.J. Fitzgerald; WFB—W.F. Barr; WJH—W.J. Hanson; WJT—W.J. Turner.

New significant records for eastern North American species and two new species of eastern North American *Empis* (*Enoplempis*) are listed and described in Appendix 1.

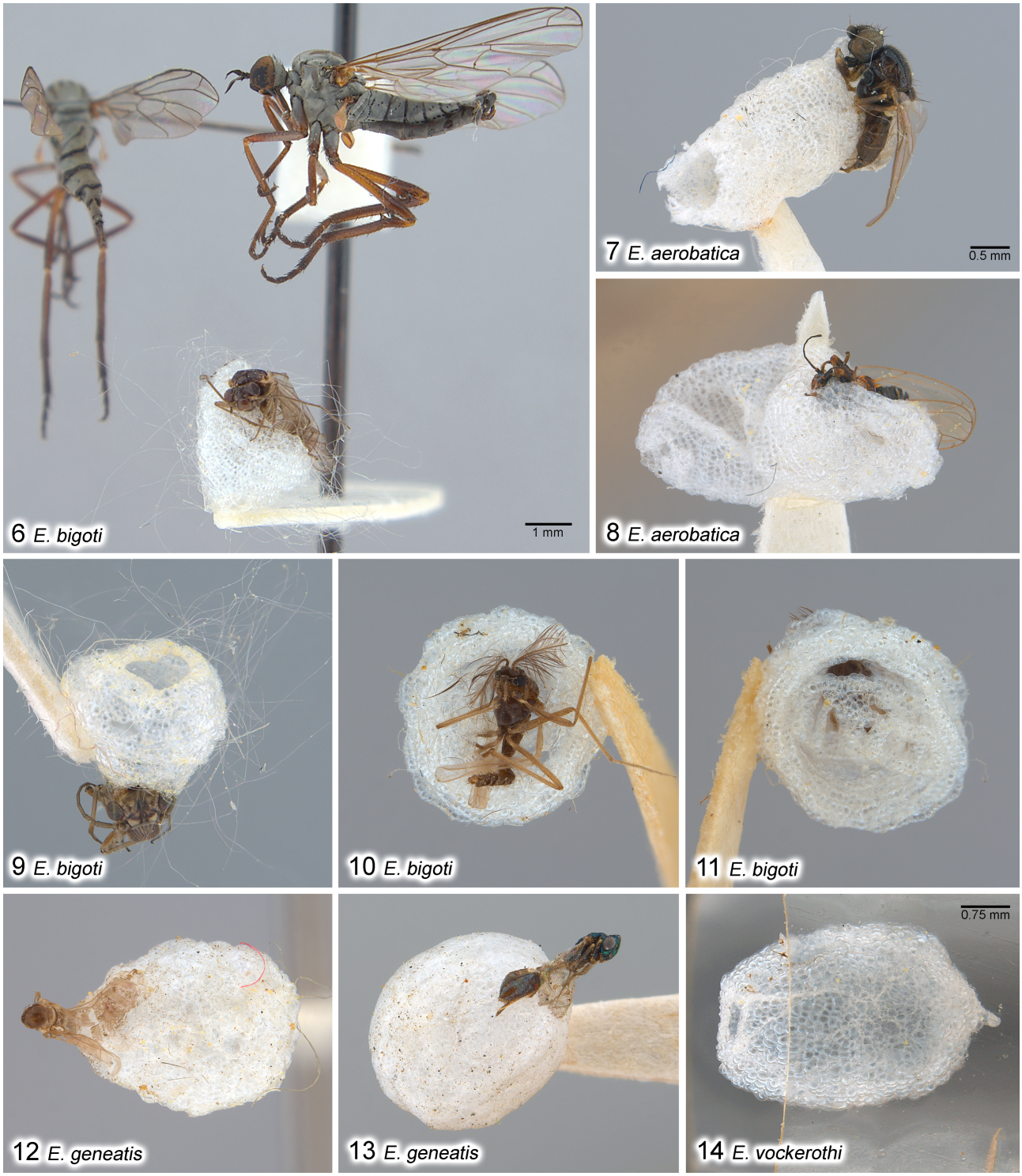


FIGURES 1–3. *Empis* (*Enoplempis*) species *in situ*. **1,** *E*. (*En*.) sp. in *manca* species group, on leaf of *Actostaphylos purissima* P.V. Wells in Santa Barbara Co., California (photograph by Alice Abela); **2,** *E*. (*En*.) *multifaria* **sp. nov.**, on flower of *Nemophila menziesii* Hooker & Arnott in Santa Clara Co., California (photograph by Robin Gwen Agarwal); **3,** *E*. (*En*.) *bigoti* Melander, flying mating pair (male on top) with balloon in Contra Costa Co., California (photograph by Ken-ichi Ueda).





FIGURES 4–5. *Empis* (*Enoplempis*) species *in situ*. **4,** *E.* (*En.*) *fitzgeraldi* **sp. nov.** in Benton Co., Oregon (photograph by Connor Dooley); **5,** *E.* (*En.*) *genista* **sp. nov.** in Los Angeles Co., California (photograph by Graham Montgomery).



FIGURES 6–14. Balloons of *E*. (*Enoplempis*) species. **6,** *E*. (*En*.) *bigoti* Melander (New York Creek, California), mating pair collected with balloon, prey: Psocoptera; **7,** *E*. (*En*.) *aerobatica* Melander (3 mi. S Helmer, Idaho), prey: Chloropidae; **8,** same, prey: Psyllidae; **9,** *E*. (*En*.) *bigoti* Melander (New York Creek, California), prey: Psocoptera; **10,** same, paratype of *E. bullifera* Kessel & Kessel (Novato, California), prey: Chironomidae; **11,** same, opposite end of balloon; **12,** *E*. (*En*.) *geneatis* (Melander) (Briones Reg. Pk, California), prey: Sciaridae; **13,** same (Mill Valley, California), prey: Chalcidoidea; **14,** *E*. (*En*.) *vockerothi* Cumming, empty prey-less balloon (Hocking Co., Ohio). Balloons all at same scale, except *E*. (*En*.) *vockerothi*.

Empis (*Enoplempis* Bigot)

Enoplempis Bigot, 1880a: 63 [1880b: xlvii]. Type-species, *E. mira* Bigot (monotypy) (Evenhuis & Pont 2004).

Diagnosis. Typical features of the subgenus are as follows: male head dichoptic to holoptic; face setose only in *E*. (*En*.) *geneatis* group; prosternum bare; labellum setose, short and fleshy, not prolonged; acrostichals and dorsocentrals usually short; apical scutellar setae often widely separated; wing (Figs 45, 181, 201, 332) with M_1 and M_2 complete to wing margin; anal vein (CuA+CuP) complete (reaching wing margin) or incomplete, axillary excision acute to obtuse, axillary lobe well or little developed; male hindleg frequently modified with tibia and femur variously armed with tubercles, lobes, series of prominent setae, or bristle pencils (*e.g.*, Figs 16, 17, 31, 43, 51, 58, 70, 74, 86, 99, 106, 117, 133, 138, 156, 166, 178, 190, 196, 204, 210, 220, 226, 232, 242, 254, 261, 272, 277, 301, 310, 323, 334, 347); right and left hindlegs normally symmetrical; tarsomeres 2–5 of all legs (in both sexes) usually with two ventral rows of short spine-like setae (Figs 145, 224, 356, 365); tarsomere 4 usually with ventral apicolateral pair of spine-like setae; male pregenital segments generally unmodified, except some western species; sclerites of male segment 8 usually narrowly separated or fused laterally; ejaculatory apodeme in anterior view, often inverted Y-shaped, rarely T-shaped or flattened; female without usual empidine secondary sexual features, such as expanded and darkened wings, pennate leg scales (except row of short slightly thickened pennate scales on mid and hind femur of *E*. *tridentata* Coquillett), and silvery abdominal pruinescence; extensive eversible darkened abdominal pleural membrane (?pleural sac) observed in females of some species.

TABLE 1. Nuptial gifts and courtship behaviours observed for *Empis* (*Enoplempis*) species. Observed directly, or inferred from prey, label data, or morphology.

Nuptial gift/ courtship	Species	Citation
Unwrapped prey	*Empis* (*En.*) *aeripes*	
	Empis (*En.*) *amytis*	Sinclair *et al*. (2013)
	Empis (*En.*) *blodgettensis*	
	Empis (*En.*) *bova*	
	Empis (*En.*) *collinsi* (?)	
	Empis (*En.*) *delumbis*	
	Empis (*En.*) *fitzgeraldi*	
	Empis (*En.*) *genista*	
	Empis (*En.*) *gulosa*	Alcock (2015)
	Empis (*En.*) *montgomeryi*	
	Empis (*En.*) *penicillata*	Sinclair *et al*. (2013)
	Empis (*En.*) *podagra*	
	Empis (*En.*) *poplitea*	Alcock (1973)
	Empis (*En.*) *richardvockerothi*	
	Empis (*En.*) *valentis*	
	Empis (*En.*) *wilderae*	
Frothy balloons with edible prey	*Empis* (*En.*) *aerobatica*	Kessel (1955)
	Empis (*En.*) *bigoti*	Kessel & Kessel (1951)
	Empis (*En.*) *sphaera*	
Balloons with inedible prey	*Empis* (*En.*) *geneatis*	Kessel & Karabinos (1947); Kessel (1955)
Empty prey-less balloons	*Empis* (*En.*) *fisheri*	
	Empis (*En.*) *oharai*	
	Empis (*En.*) *snoddyi*	Sadowski *et al*. (1999)
	Empis (*En.*) *vockerothi*	Sinclair *et al*. (2013)
Female swarms (?)	*Empis* (*En.*) *aeripes*	
	Empis (*En.*) *tridentata*	Sinclair *et al*. (2013)

Geographical distribution and diversity. The subgenus is widespread across North America, recorded as far north as Alaska in the west and New Brunswick in the east, and south to southern California, Arizona, New Mexico, Texas and Florida. A complete list of the 96 known species (95 described, one unnamed) within the subgenus *Enoplempis*, including those described in this paper, is provided and arranged by species group in Appendix 2.

Nuptial gift presentation. The types of nuptial gift presented by males to females in species of *Empis* (*Enoplempis*) for which we have direct or inferred observations, range depending on the species (Table 1), from unwrapped prey to wrapped prey in secreted froth (referred to as balloons, Figs 3, 6–13), to hollow empty secreted balloons without prey (Fig. 14) (Sinclair *et al*. 2013, 2021; Alcock 2015).

Flower visitation. Records from the material examined sections of the included species of *E*. (*Enoplempis*) indicate that males and females are found on a variety of flowers in at least the plant families Adoxaceae, Anacardiaceae, Apiaceae, Asteraceae, Boraginaceae (Fig. 2), Brassicaceae, Caprifoliaceae, Ericaceae, Geraniaceae, Lauraceae, Liliaceae, Polygonaceae, Ranunculaceae, Rhamnaceae, Rosaceae, Salicaceae, Sapindaceae and Saxifragaceae, where adults appear to consume nectar using their relatively long mouthparts. Consequently, species in this subgenus are significant pollinators, presumably, of many plant families.

Empis (*Enoplempis*) *arrecta* species group

(Figs 15–40)

Four species are included in this group, *E*. (*En.*) *arrecta* **sp. nov.**, *E*. (*En.*) *diokra* **sp. nov.**, *E*. (*En.*) *occidentalis* **sp. nov.** and *E*. (*En.*) *shoshona* **sp. nov.**, which are distinguished by the male cercus with upright, narrow anterior lobe and low posterior lobe (*e.g.*, Figs 15, 22, 26), phallus with lateral roughened lobe (*e.g.*, Fig. 25), subepandrial process present (*e.g.*, Fig. 26), abdomen tergites shiny in both sexes, without pruinescence (*e.g.*, Figs 15, 22), and male hind femur with preapical row of thickened posterior setae (*e.g.*, Figs 19, 20).

Empis (*Enoplempis*) *arrecta* sp. nov.

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(Figs 15, 16, 23–25, 40)

Type material. HOLOTYPE ♂, labelled: "Calif: TulareCo./ Johnsondale [35°58′N 118°32′W] 2/ mi. E. IV-27-64"; "Prunus/ subcordata"; "C.A. Toschi/ collector"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *arrecta* Sinclair,/ Brooks & Cumming [red label]" (EMEC). **PARATYPES: USA. California:** *Mariposa County*: Yosemite Valley [37°44′N 119°34′W], 27.v.1921, E.C. Van Dyke (2♂, CAS); same data except, 26.v.1921 (1♂, CAS); same data except, 20.v.1921 (1♂, CAS); same data except, 11.vi.1921 (1♂, CAS). *Tuolumne County*: 4 km S Mather, Middle Fork Cpgd [37°51′N 119°51′W], Middle Fork Tuolumne River, 24.v.1969, PHA (1♂, 1♀, USNM).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *arrecta* species group by a single narrow process on the male hind tibia, hind tibia distinctly broadened apically (Figs 15, 16) in both sexes, scutum with three brownish vittae and male cercus very slender with short, horizontal truncate posterior lobe at base.

Description. Wing length 5.0–5.2 mm. **Male.** Similar to *E.* (*En.*) *diokra* **sp. nov.**, except as follows: head with eyes separated on frons by width of anterior ocellus. Frons linear, slightly expanded above antennae.

Thorax with brownish vittae along acr row and dc rows in anterior view.

Legs with hind femur slightly expanded preapically, with 3 slender, curved finger-like processes, middle process with blacked apex; apex with preapical row of 5–6 flattened, black, curved posteroventral setae, anterior setae longer and straighter; preapical anterior seta not developed (Figs 15, 16). Hind tibia arched with narrow base and expanded distal half; anteroventral digitiform process long, projecting obliquely to posterior side of tibia; process with black lateral setae, longest apically; without posteroventral process; with seta dividing in half posteroapical comb; apical half of tibia with anterodorsal and posterodorsal setae less than width of tibia (Figs 15, 16). Hind tarsus with tarsomere 1 slightly inflated, half width of tibia.

Abdomen with pregenital segments mostly unmodified; posteroventral corner of tergite 6 with broad, membranous rounded notch; sclerites of segment 8 fused. Terminalia (Figs 23–25): dark reddish brown, shiny, except epandrium with some pruinescence; cercus shiny and yellowish brown. Cerci fused medially; erect, slender, projecting dorsally

with thick peg-like setae near and on apex; anterior margin with several thickened subapical setae; base with horizontally projecting truncate lobe with setae more than twice width of lobe; without prolonged hooked lobe. Subepandrial process very short, slightly longer than twice basal width. Epandrial lamella subrectangular, higher than long; broadly fused with cercus anteriorly with rounded lobe opposite base of cercus; posterior margin without knob-like projection; setae similar to cercal setae. Hypandrium more than half height of epandrium; apex rounded, with shallow notch medially; without setae. Phallus with outer expanded sheath on basal half; apex of sheath with pair of lateral lobes with apex and inner margin jagged, tooth-like; anterior margin of basal sheath prolonged to apex of phallus, tapered and flattened, with jagged, tooth-like lateral margin and pair of obliquely projecting sickle-shaped lobes with tooth-like margin; phallus projecting from posterior margin of basal sheath, extending to slightly beyond epandrium margin; apical half of phallus with setae and spiny projections along posterior face (Figs 24, 25); ejaculatory apodeme slightly more than half-length of epandrium, T-shaped, with lateral apodemes ventrally.

Female. Similar to male, except as follows: frons slightly broader than width of anterior ocellus; hindleg without modified setae and processes; hind tibia expanded apically, hind tarsomere 1 slightly inflated.

Geographical distribution and seasonal occurrence (Fig. 40). *Empis* (*En.*) *arrecta* **sp. nov.** is only known from central California. Adults have been collected from April to June.

Etymology. The species name is from the Latin for upright, in reference to the form of the male cercus in this and similar species.

Nuptial gift presentation. Form unknown.

***Empis* (*Enoplempis*) *diokra* sp. nov.**

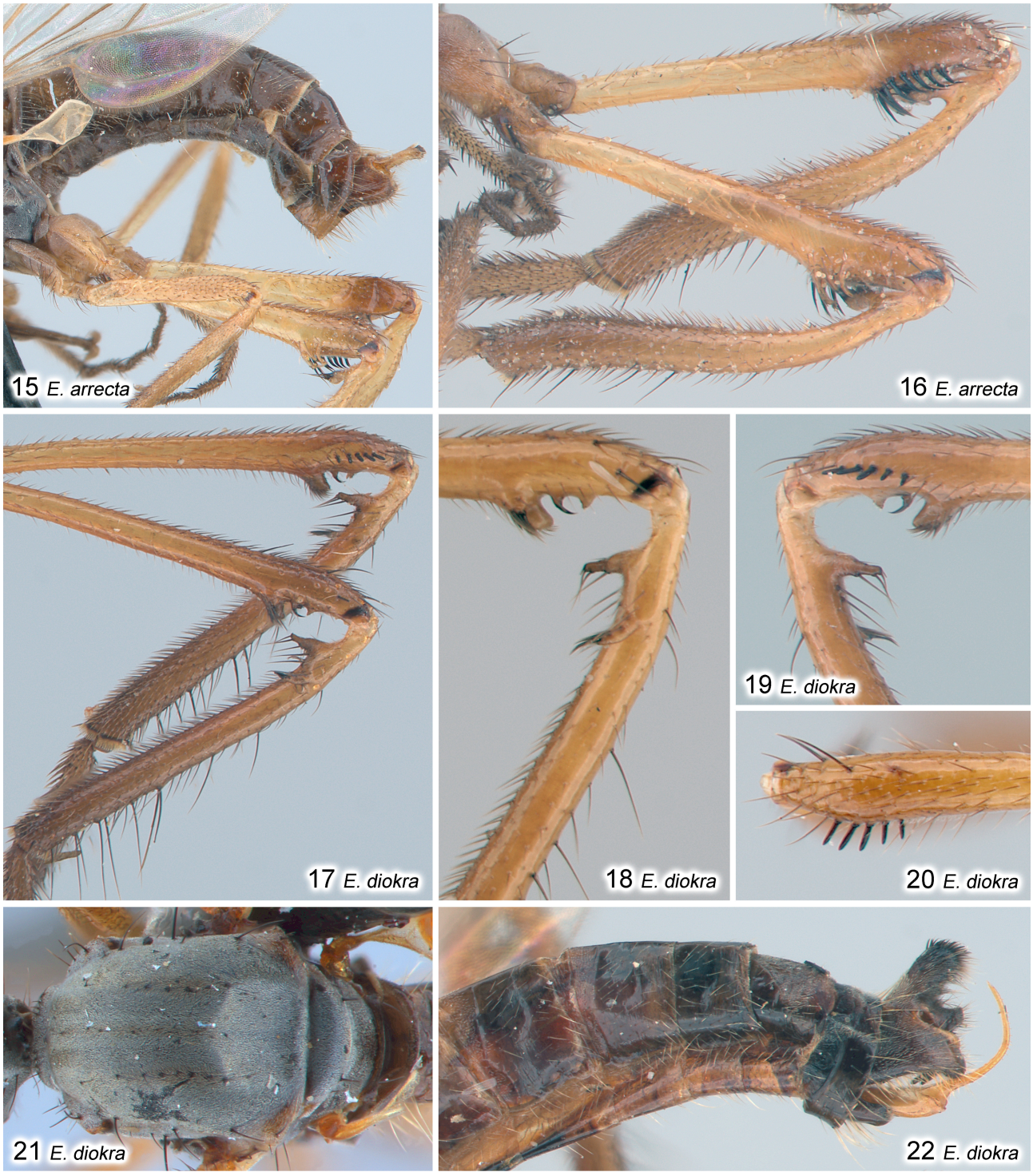
urn:lsid:zoobank.org:act:B855ACB7-33C4-4A59-994F-0FE36B907114

(Figs 17–22, 26, 27, 40)

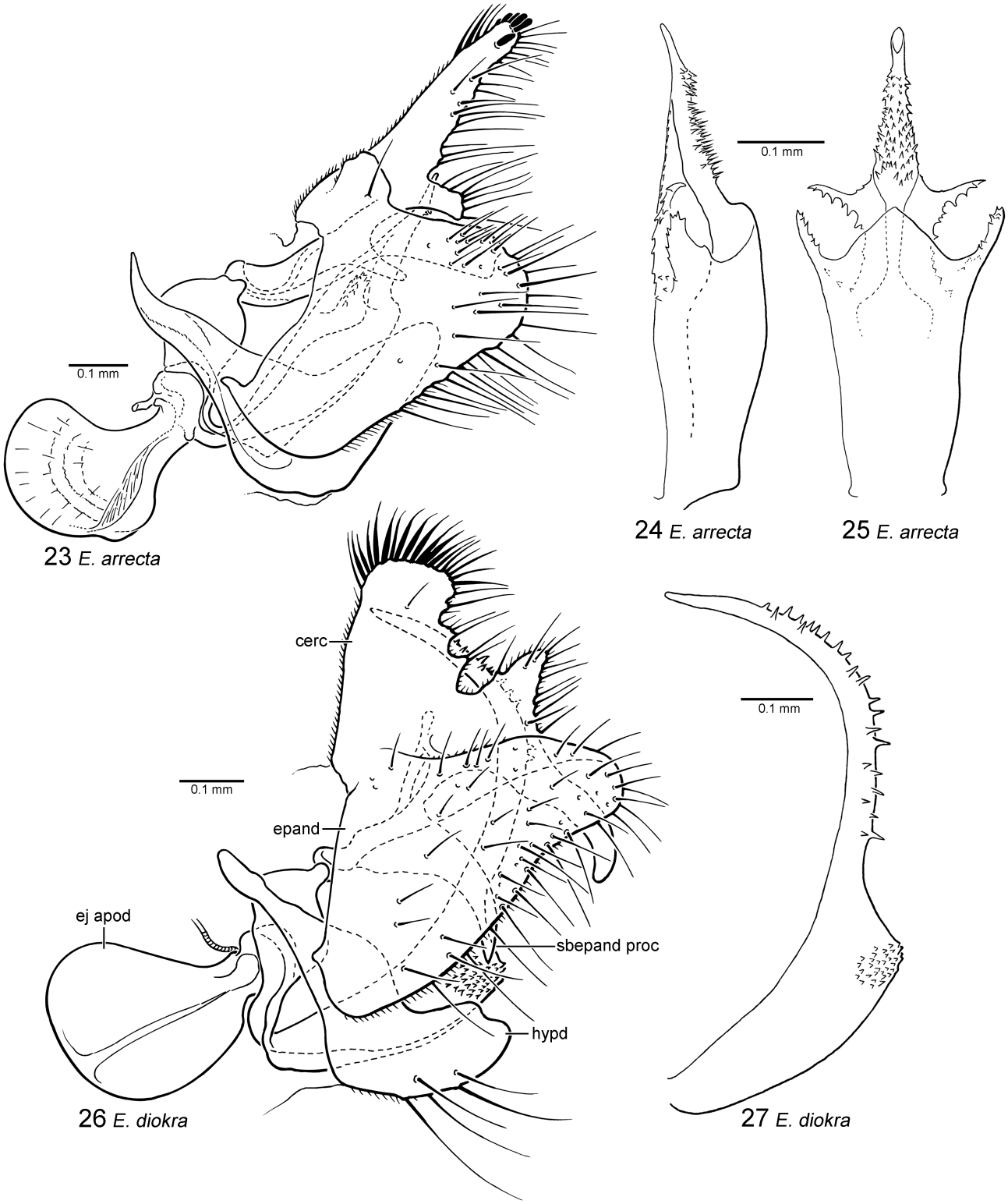
Type material. HOLOTYPE ♂, labelled: "Echo L. [39°39′N 105°36′W] 10,600'/ Mt. Evans, COLO./ July 25 1961/ C.H. Mann"; "CNC/ 1078371"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *diokra* Sinclair,/ Brooks & Cumming [red label]" (CNC). **PARATYPES: USA. Colorado:** *Clear Creek County*: Chicago Ck [39°42′N 105°36′W], 8800 ft, 2.viii.1961, CHM (1♀, CNC); same data as holotype (1♂, CNC); Mt. Evans, Doolittle Ranch [39°40′N 105°36′W], 9800 ft, 23.vii., 3.viii., 6.viii.1961, JGC (2♂, 4♀, CNC); same data except, 3.viii., 10.viii.1961, BHP (2♂, 2♀, CNC); same data except, 31.vii.1961, CHM (1♀, CNC); same data except, 23.vii., 3.viii., 10.viii.1961, W.R.M. Mason (4♂, CNC); same data except, 23.vii., 3.viii.1961, BHP (6♀, CNC). *Larimer County*: Estes Pk [40°22′N 105°31′W], 11.viii.1952, R.R. Dreisbach (1♂, CNC); same data except, 14.vii.1934, ALM (1♂, USNM). *Jackson County*: N Grizzly Ck Cpgd [40°33′N 106°36′W], 17.vii.1946, M.T. James (1♂, CSUC); Muddy Pass [40°22′N 106°34′W], 8800 ft, 15.viii.1961, BHP (2♂, CNC); Rabbit Ears Pass [40°23′N 106°36′W], 11.viii.1965, G.F. Knowlton (1♂, UCDC). *Summit County*: Loveland Pass [39°39′N 105°52′W], W. slope, 9850 ft, 8.viii.1961, BHP (3♂, CNC). **Idaho:** *Bonneville County*: Swan Valley [43°27′N 111°20′W], 12 mi. N, 23.vi.1964, WFB (1♂, WFBM). **Utah:** *Cache County*: Cowley Cyn [41°46′N 111°37′W], 5–13.vii., 13–20.vii.1989, WJH (2♂, LACM); Franklin Basin [41°59′N 111°35′W], 15–21.vii.1995, WJH, S. Keller (1♂, 1♀, LACM); Green Cyn [41°46′N 111°44′W], 27.vii.1984, MT, WJH (1♂, LACM); Logan Cyn, Twin Ck [41°51′N 111°34′W], 6–13.vii.1979, MT (5♂, 1♀, LACM); Logan Cyn, Twin Ck, 1–8.vii.1988, WJH (2♂, LACM); Logan Cyn [41°51′N 111°34′W], 9.vii.1974, G.F. Knowlton (1♂, LACM); Logan Cyn, Turner Cpgd [41°53′N 111°34′W], 10–20.vi.1985, WJH (1♂, LACM); Tony Grove Cyn [41°53′N 111°36′W], 12–19.vii.1983, MT, WJH (2♂, LACM); Tony Grove Ck [41°53′N 111°36′W], 29.vi–8.vii.1994, WJH (1♂, LACM); same data except, 1–3.vii.1990 (1♂, LACM); same data except, Tony Grove Jct, 6–12.vii.1990 (1♂, 1♀, LACM); W Hodges Cyn [41°52′N 111°33′W], 18–21.vii.1978, WJH (1♂, LACM). *Tooele County*: Stansbury Mts, S. Willow Can. [40°29′N 112°35′W], 8.vii.1954, G.F. Edmunds, *Symphoricarpos rotundifolius* (1♂, BYU).

Possible additional material (unassociated female). USA. Oregon: *Marion County*: Willamette NF, French Ck Rd, 44°46.423′N 122°12.683′W, 10.vii.2013, 840 m, French Ck, BJS (1♀, CNC).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *arrecta* species group by a pair of narrow processes on the male hind tibia, hind tibia not broadened apically (Figs 17–19), scutum without three brownish vittae and male cercus broad basally with short upright posterior lobe.



FIGURES 15–22. Male thorax, abdomen and terminalia, and hindleg of the *E*. (*Enoplempis*) *arrecta* species group. **15,** *E*. (*En*.) *arrecta* **sp. nov.**, abdomen, terminalia and hindlegs, lateral view; **16,** same, hindlegs, anterior and posterior views; **17,** *E*. (*En*.) *diokra* **sp. nov.**, hindlegs, anterior and posterior views; **18,** same, hind femur tibia joint, anterior view; **19,** same, hind femur tibia joint, posterior view; **20,** same, apex of hind femur, dorsal view; **21,** same, thorax, dorsal view; **22,** same, abdomen and terminalia, lateral view.



FIGURES 23–27. Male terminalia of the *E*. (*Enoplempis*) *arrecta* species group. **23,** *E*. (*En*.) *arrecta* **sp. nov.**, lateral view; **24,** same, phallus, lateral view; **25,** same, phallus, posterior view; **26,** *E*. (*En*.) *diokra* **sp. nov.**, lateral view; **27,** same, phallus, lateral view. Abbreviations: cerc—cercus; ej apod—ejaculatory apodeme; epand—epandrium; hypd—hypandrium; sbepand proc—subepandrial process.

Description. Wing length 4.7–5.4 mm. **Male.** Head dark in ground-colour, with greyish pruinescence. Eyes closely approximated, separated by width of 2–3 ommatidia, upper ommatidia not enlarged. Frons forming small triangular plate above antennae and smaller triangular plate below ocellar triangle; without short setulae along inner margin of eye. Face without setae; slightly parallel-sided towards mouthparts, with oral margin dark and shiny. Ocellar triangle elevated, with thin greyish pruinescence, with pair of parallel ocellar setae and several pairs of short setulae. Occiput bearing single row of setae, slightly shorter than ocellar setae, longer and finer ventrally; postocular setae shorter than occipital row, stronger and longer dorsally; postocellar region with several short setae. Postpedicel and stylus dark brown, pedicel and scape slightly paler; scape 2× longer than pedicel, with short, black setae; pedicel with ring of apical setae; postpedicel long and tapered, more than 4× longer than basal width; stylus 1.5× longer than basal width of postpedicel. Palpus pale, yellowish brown, with dark setulae. Proboscis reddish brown, length less than 2× head height; labellum with short, dark setae.

Thorax dark brown in ground-colour, densely grey pruinescent (Fig. 21), with thin whitish vittae along dc rows and either side of acr row when viewed at certain angles; apex of postpronotal lobe yellowish brown. Proepisternum with several pairs of short brown setae on lower section; upper proepisternum in front of spiracle without setae. Prosternum bare. Antepronotum with row of short, brownish setae. Postpronotum with 1 long seta and several short, dark setae. Scutum with short, fine uniserial acr; dc slightly longer, stronger than acr, increasing in length posteriorly; 2 posterior npl, with 1 shorter anterior npl; 1 presut spal; 1 psut spal; 1 pal. Scutellum with 1 pair of long, widely separated apical sctl, with 1 pair of outer marginal setae; disc bare. Laterotergite with narrow patch of strong, dark setae. Anterior and posterior spiracles yellowish brown.

Legs slender, yellowish brown to reddish brown, apex of tibiae and tarsi darker; fore coxa with thin greyish pruinescence. Coxae with thin dark setae. Hind trochanter with numerous setulae. Fore femur sparely clothed in short, brownish setae. Fore tibia similarly sparsely setose with 1 short anterodorsal seta near mid-length; several weakly differentiated dorsal and ventral preapical setae. Fore tarsomere 1 slender, not swollen; all tarsomeres with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur with dense whitish ventral pile; anteroventral and posteroventral row of fine setae, shorter than width of segment. Mid tibia with 2–3 pairs of short anterodorsal and posterodorsal setae and several preapical setae. Mid tarsus similar to fore tarsus. Hind femur slightly expanded preapically, with short, knob-like anteroventral process, shorter than half width of femur, with tuft of black setae directed posteriorly; anteroventral process flanked by broader inner lobe with ring of short apical setae; short, conical lobe posterior to inner lobe bearing hook-like seta; shorter, pointed ventral lobe posterior to hooked-tipped lobe; without posteroventral preapical lobe; apex with preapical row of 5–6 flattened, black, short blunt posterior setae; preapical anterior seta strong, shorter than width of femur (Figs 17–20). Hind tibia with narrow, arched anteroventral digitiform process on basal quarter, slightly proximal to process of femur (when legs folded), with crown of black setae and several lateral setae; posteroventrally with digitiform process with broad basal half and strongly attenuated and tapered, arched apical half, with pair of long subapical lateral setae, nearly as long as process; without seta in posteroapical comb; apical half of tibia with long anterodorsal and posterodorsal setae, nearly twice width of tibia (Figs 18, 19). Hind tarsus with tarsomere 1 slightly inflated, half width of tibia with several strong anterodorsal and posterodorsal setae.

Wing infuscate with dark veins, base of wing and calypters yellowish brown; all veins complete (except Sc), well sclerotized, except CuA+CuP rather weak. Basal costal seta absent. R_5 and M_1 divergent near wing margin; R_5 ending at or slightly beyond wing tip; radial fork acute. Halter pale, yellowish brown.

Abdomen shiny, without pruinescence, reddish brown with pale, golden setae, especially longer laterally. Pregenital segments mostly unmodified; tergite 6 with posteroventral corner slightly prolonged, rounded; sclerites of segment 8 narrowly separated. Terminalia (Figs 22, 26, 27): dark reddish brown with hypandrium shiny and phallus orange brown. Cerci separated; erect, projecting dorsally with crown of dense, black setae; posterior margin with several setose projections; base broad, expanded dorsally into short, rounded lobe; base prolonged posteriorly into strong, arched, slightly hooked lobe. Subepandrial process strongly hooked, similar to hooked cercal lobe. Epandrial lamella subtriangular, longer than high; broadly fused with cercus anteriorly; posterior margin without knob-like projection; setae similar to cercal setae. Hypandrium short, truncate, with shallow notch laterally and curved posterior margin; several long setae basally. Phallus with expanded base, with posterior and lateral margins with minute roughened region; strongly attenuated beyond base, strongly arched apically with cylindrical, papilla-like projections (Fig. 27); apex emerging well beyond epandrium; ejaculatory apodeme more than half-length of epandrium, T-shaped, with lateral apodemes medially.

Female. Similar to male, except as follows: frons slightly broader than width of anterior ocellus; hindleg without modified setae and processes.

Geographical distribution and seasonal occurrence (Fig. 40). *Empis* (*En.*) *diokra* **sp. nov.** is known from Colorado, Utah, Idaho and possibly Oregon. Adults have been collected from June to August.

Etymology. The species name is derived from Greek for a pair of projections, in reference to the two narrow processes on the hind tibia of this species.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *occidentalis* sp. nov.

urn:lsid:zoobank.org:act:91BBA842-C556-4255-8A74-CBFBD2F75672
(Figs 28–31, 35–37, 40)

Type material. HOLOTYPE ♂, labelled: "U.S.A.: CALIFORNIA:/ Marin County, Liberty Gulch, Mt. Tamalpais [37°57′N 122°37′W]/ 27-IV-1978 D. Wilder"; "D. Dee Wilder/ Collection [yellow label]"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *occidentalis* Sinclair,/ Brooks & Cumming [red label]" (CAS). **PARATYPE: USA. Oregon:** *Benton County*: Corvallis [44°34′N 123°16′W], 10.v.1930, J. Wilcox (1♂, USNM).

Possible additional material (unassociated females). USA. Washington: *Jefferson County*: 6 km W Olympic NP [47.819°N 124.251°W], trib. of Hoh R, 6.vii.1989, BJS (2♀, CNC). *Pacific County*: Hwy 401 W of Naselle, 46°18.566′N 123°48.073′W, 13.vii.2013, Bean Ck, 40 m, BJS (2♀, CNC); *Pierce County*: Elbe [46°45′N 122°11′W], 27.vi.1935, ALM (1♀, USNM).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *arrecta* species group by a single narrow process on the male hind tibia, hind tibia strongly clavate with setae longer than width of tibia (Fig. 29), scutum with three brownish vittae and male cercus with hooked lobe basally.

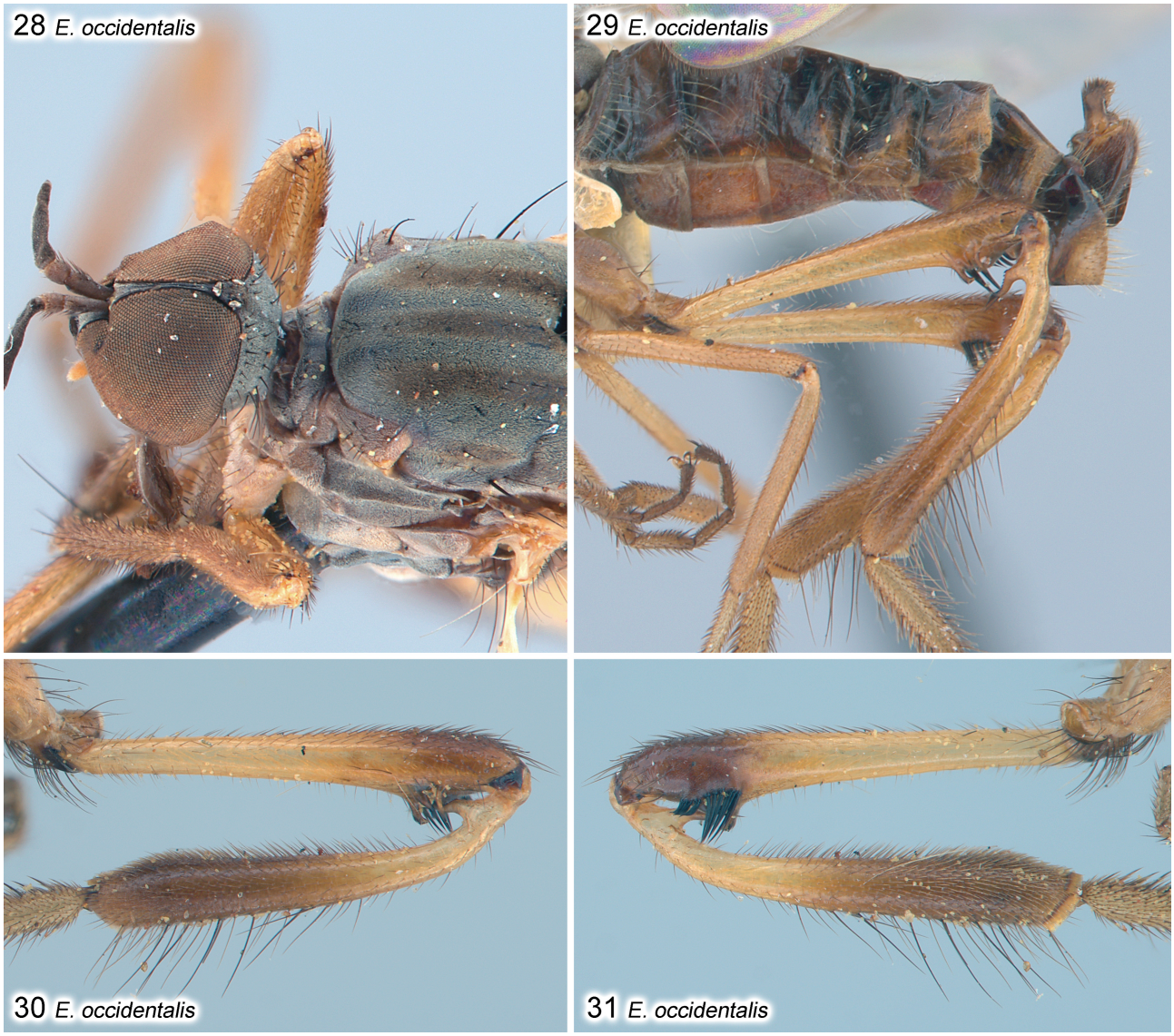
Description. Wing length 5.3–6.1 mm. **Male.** Similar to *E.* (*En.*) *diokra* **sp. nov.**, except as follows: head with eyes closely approximated, narrowly separated by less than width of anterior ocellus. Face slightly divergent towards mouthparts.

Thorax with brownish vittae along acr row and dc rows in anterior view (Fig. 28).

Legs with apical swelling of hind femur and apical half of hind tibia darker. Hind femur with 3 slender, curved finger-like processes, middle process with blackened apex; apex with preapical row of *ca* 10 flattened, black, curved posteroventral setae, proximal setae closely approximated and distal setae *ca* half-length of straighter proximal setae; preapical anterior seta not strongly developed (Figs 29–31). Hind tibia arched with narrow base and strongly expanded on distal half; anteroventral digitiform process long, projecting obliquely to posterior side of tibia; process with anterior margin with very short, knob-like setae, long setae confined to apex; without posteroventral process; with seta dividing in half posteroapical comb; apical half of tibia with anterodorsal and posterodorsal setae twice as long as width of tibia (Figs 29–31). Hind tarsus with tarsomere 1 somewhat inflated, half width of expanded tibia.

Abdomen dark, shiny, without pruinescence, with pregenital segments mostly unmodified; tergite 6 with posteroventral corner slightly prolonged, rounded; tergite 6 with thickened posterior margin, slightly prolonged laterally, overlapping tergite 7; tergite 7 with thickened posterior margin; sclerites of segment 8 thickened, fused laterally. Terminalia (Figs 35–37): dark reddish brown with hypandrium shiny, phallus orange brown. Cerci fused medially; erect, projecting dorsally with crown of dense, black setae; posterior margin with small, rounded projections; base expanded into short, hooked lobe with slender dorsal setae; base without prolonged posteriorly directed hooked lobe. Subepandrial process not developed. Epandrial lamella with broadly rounded, expanded posterior margin, longer than high; broadly fused with cercus anteriorly; posterior margin without knob-like projection; setae short along posterior margin. Hypandrium broad, expanded, enclosed by epandrial lamellae; apex truncate, rounded; without setae. Phallus with outer expanded sheath on basal two-thirds; apex of sheath with pointed extension and inner longer extension bearing ventrally projected lobe with apex jagged, tooth-like; phallus projecting from posterior margin of basal sheath, extending between base of cerci with slightly arched narrow section; posterior margin of phallus with spiny projections (Figs 36, 37); ejaculatory apodeme more than half-length of epandrium, T-shaped, with lateral apodemes near lower margin of central apodeme.

Female. Similar to male, except as follows: frons slightly broader than width of anterior ocellus; hindleg without modified setae and processes; hind femur with fine, white pile beneath.



FIGURES 28–31. Male head, thorax, abdomen and terminalia, and hindleg of *E*. (*Enoplempis*) *occidentalis* **sp. nov. 28,** head and thorax, dorsal view; **29,** abdomen, terminalia and hindlegs (holotype), lateral view; **30,** hindleg, anterior view; **31,** hindleg, posterior view.

Geographical distribution and seasonal occurrence (Fig. 40). *Empis* (*En*.) *occidentalis* **sp. nov.** is known from California and Oregon, and possibly Washington. Adults have been collected from April to July.

Etymology. The species name is Latin for western, in reference to the western North American distribution of this species.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *shoshona* sp. nov.

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(Figs 32–34, 38–40)

Type material. HOLOTYPE ♂, labelled: "USA: ID: Shoshone Co./ Rd 50; E Calder; St. Joe NF/ 20.vi.2014, 680 m/ N47°14.725′ W116°02.473′/ ex. roadside str. B.J. Sinclair"; "CNC/ 1078372"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *shoshona* Sinclair,/ Brooks & Cumming [red label]" [dissected] (CNC). **PARATYPE: USA. Idaho:** same data as holotype except, 47°15.820′N 116°08.803′W, roadside streams/ seeps (1♀, CNC).



FIGURES 32–34. Holotype male head, thorax and hindleg of *E.* (*Enoplempis*) *shoshona* **sp. nov. 32,** head and thorax, dorsal view; **33,** hindlegs, lateral view; **34,** hind femur tibia joint, anterior and posterior views.

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *arrecta* species group by a pair of narrow processes on the male hind tibia, hind tibia not broadened apically (Fig. 33), scutum without three brownish vittae and male cercus with broad, prolonged posterior process along epandrial margin with short ventroapical lobe.

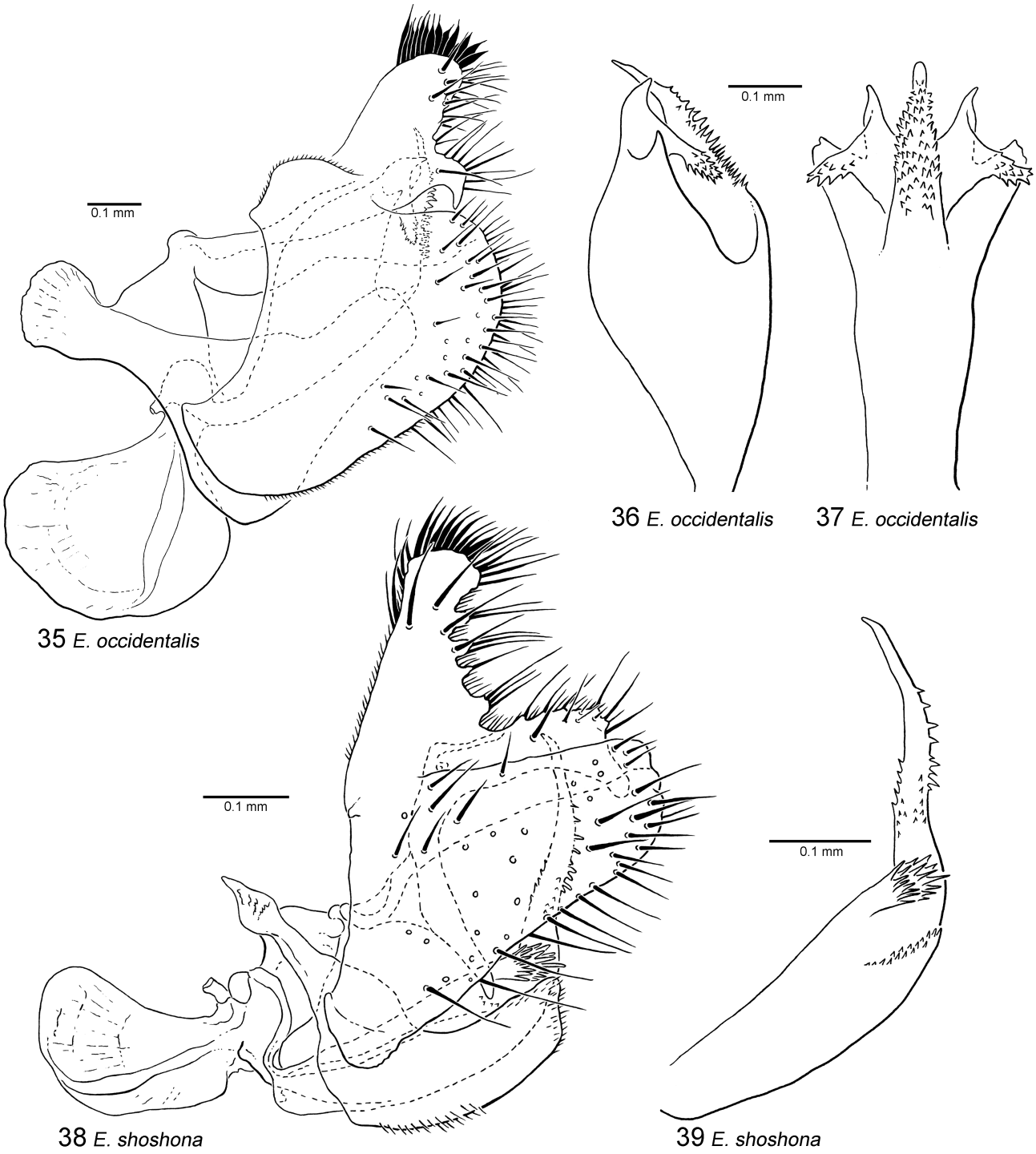
Description. Wing length 4.0 mm. **Male.** Similar to *E.* (*En.*) *diokra* **sp. nov.**, except as follows: head with eyes closely approximated, only very narrowly separated.

Thorax with thin whitish vittae along dc rows and either side of acr row when viewed at certain angles (Fig. 32). Anterior and posterior spiracles whitish (dried from alcohol).

Legs with apical fourth of hind femur and apical half of hind tibia darker. Hind femur slightly expanded preapically, with short, knob-like anteroventral process, shorter than quarter width of femur, with tuft of black setae directed posteriorly; anteroventral process flanked by broader inner lobe with ring of short apical setae and posterior face with apically projected spine; short, conical lobe posterior to inner lobe bearing hook-like seta; shorter, pointed ventral lobe posterior to hooked-tipped lobe; without posteroventral preapical lobe; apex with preapical row of 3–4 flattened, black, short blunt posterior setae; preapical anterior seta strong, shorter than width of femur (Figs 33, 34). Hind tibia narrowed basally and slightly twisted; with narrow, straight anteroventral digitiform process on basal quarter, slightly proximal to process of femur (when legs folded), with row of lateral setae; posteroventrally with digitiform process similar to anteroventral process, tapered with several lateral setae; with seta in posteroapical comb; apical half of tibia with long anterodorsal and posterodorsal setae, twice as long as width of tibia (Fig. 33).

Abdomen with pregenital segments unmodified; tergite 6 without posteroventral corner prolonged. Terminalia (Figs 38, 39): cerci separated; erect, projecting dorsally with crown of dense, black thickened setae; posterior margin with several setose projections; base broad, prolonged posteriorly along margin of epandrium, with ventrally directed apical extension. Subepandrial process strongly hooked, directed ventrally towards hypandrium. Epandrial lamella subrectangular, longer than high; broadly fused with cercus anteriorly; posterior margin without knob-like projection; setae similar to cercal setae. Hypandrium elongate, truncate, with shallow broad notch medially; bare,

without setae. Phallus with expanded base, tuft of papilla-like projections at apex of expanded base near apex of hypandrium; strongly attenuated beyond base, arched apically with cylindrical, papilla-like projections along posterior margin; anterior margin with roughened surface (Fig. 39); apex emerging slightly beyond epandrium; ejaculatory apodeme about half-length of epandrium, T-shaped, with lateral apodemes medially.



FIGURES 35–39. Male terminalia of the *E*. (*Enoplempis*) *arrecta* species group. **35,** *E*. (*En*.) *occidentalis* **sp. nov.**, lateral view; **36,** same, phallus, lateral view; **37,** same, phallus, posterior view; **38,** *E*. (*En*.) *shoshona* **sp. nov.** (holotype), lateral view; **39,** same, phallus (holotype), lateral view.

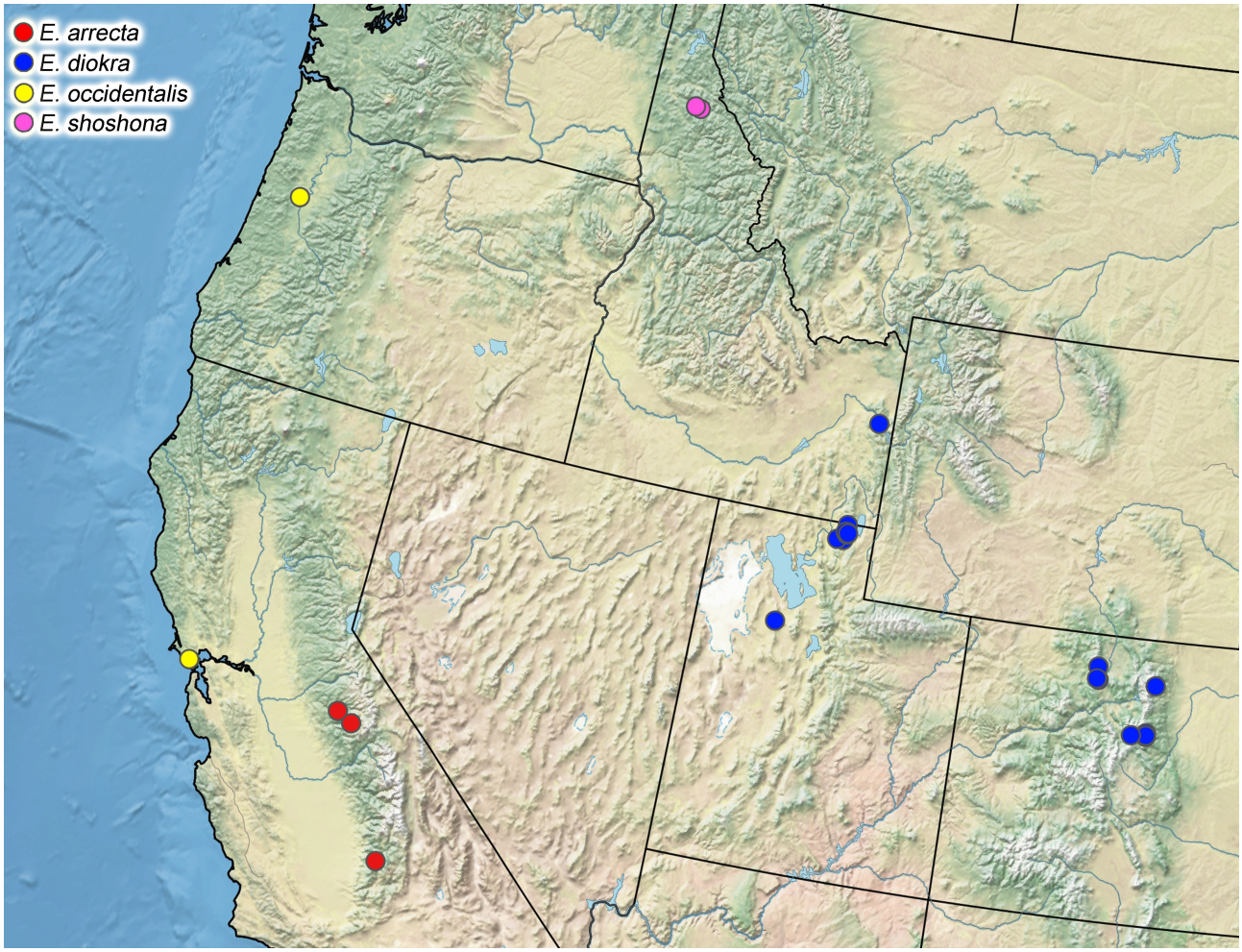


FIGURE 40. Known geographical distribution of the *E.* (*Enoplempis*) *arrecta* species group: *E.* (*En.*) *arrecta* **sp. nov.**, *E.* (*En.*) *diokra* **sp. nov.**, *E.* (*En.*) *occidentalis* **sp. nov.**, *E.* (*En.*) *shoshona* **sp. nov.**

Female. Similar to male, except as follows: frons subequal in width to width of anterior ocellus; hindleg without modified setae and processes; hind femur with strong anteroventral seta on apical fourth.

Geographical distribution and seasonal occurrence (Fig. 40). *Empis* (*En.*) *shoshona* **sp. nov.** is only known from Shoshone County in Idaho, collected in June.

Etymology. The species name is in reference to the type locality, Shoshone County, Idaho and is a noun in apposition.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *bigoti* species group

(Figs 2, 3, 6–11, 41–81, 91, 92)

Seven species are included in this group, *E.* (*En.*) *aerobatica* Melander, *E.* (*En.*) *bigoti* Melander, *E.* (*En.*) *collinsi* **sp. nov.**, *E.* (*En.*) *montgomeryi* **sp. nov.**, *E.* (*En.*) *multifaria* **sp. nov.**, *E.* (*En.*) *paraerobatica* **sp. nov.** and *E.* (*En.*) *podagra* Melander, which are distinguished by the phallus usually strongly attenuated at mid-length with narrowed, sinuous apical half (*e.g.*, Figs 52, 53, 77, 92), hypandrium bare, subepandrial process present, apex of epandrial lamella usually slightly upturned (*e.g.*, Figs 61, 91), abdomen either mostly entirely shiny (*e.g.*, Fig. 73) or with distinct shiny tergal bands separated by dense pruinescence (*e.g.*, Fig. 71, except *E.* (*En.*) *collinsi*, Fig. 48), and male hind femur with preapical row of thickened posterior setae (*e.g.*, Fig. 44). In addition, males of this species group (*i.e.*, *E.* (*En.*) *aerobatica*, *E.* (*En.*) *bigoti*) produce balloons (Figs 6–11).

Empis (*Enoplempis*) *aerobatica* Melander

(Figs 7, 8, 41–45, 52, 54)

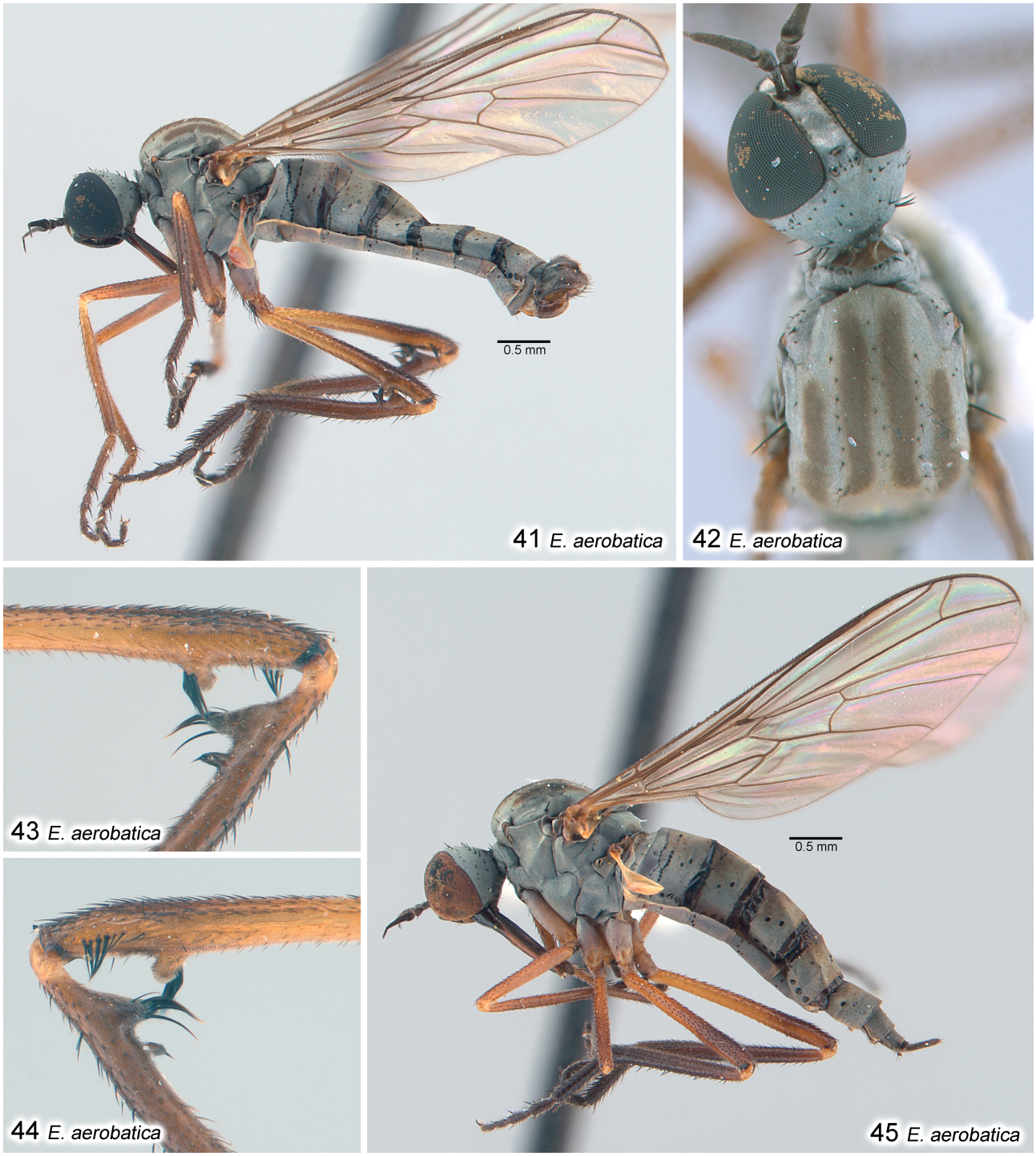
Empis aerobatica Melander, 1902: 323. Type locality: Idaho, USA.
E. (*Enoplempis*) *aerobatica*: Melander, 1928: 142 (assigned to subgenus *Enoplempis*).
Empis aerobatica: Melander, 1965: 458 (catalogue); Yang *et al*., 2007: 130 (catalogue).

Type material examined. LECTOTYPE (here designated in order to fix identity of the species) ♂, labelled: "Moscow [46°48′N 116°52′W]/ Idaho"; "JM Aldrich/ Coll"; "Cotype/ No. 41825/ U.S.N.M. [red label]"; "June 17/ 1899"; "Empis/ aerobatica/ Mel."; "LECTOTYPE/ *Empis aerobatica* Melander/ des. Sinclair, Brooks &/ Cumming 2025 [red label]" [♂ lectotype, ♀ paralectotype, mounted as pair with chloropid prey on balloon] (USNM). **PARALECTOTYPES: USA. California:** *Kern County*: (1♀, USNM) [= *E. bigoti*]. S. California (1♂, CUIC) [= *E. bigoti*]. **Idaho:** Same data as lectotype (5♂, 2♀, USNM).

Notes on type specimens. Melander (1902) stated that this species was based on seven males and four females from California and Idaho. The Idaho specimens are exemplars from the balloon-making flies reported in Aldrich & Turley (1899). The single male and female from California were misidentified and represent *E. bigoti*.

Additional material examined. USA. Idaho: *Latah County*: Bovill [46°51′N 116°23′W], 17.vi.1911 (1♂, USNM); same data except, 18.vi.1911 (1♂, USNM); 3 mi. S Helmer [46°48′N 116°28′W], 22.v.1971, WJT (2♂, 1♀, WSU); same data except, nr L. Boulder Cpgd, Potlatch R, 25.v.1986, 2600 ft (3♂, WSU); same data except, 6.vi.1987 (1♀, WSU); same data except, 24.v.1985, *Amelanchier* (4♂, 1♀, WSU); same data except, swarm (5♂, 5♀ mounted as pairs with Chloropidae, Psyllidae, Chalcidoidea and Ceratopogonidae prey on balloons, WSU; 2♂, 1♀, WSU); Potlatch R, 3 mi. S Helmer, nr Lk. Boulder Cpgd [46°48′N 116°28′W], 2600–2800 ft, 29.v.1991, S.D. Gaimari (1♂, 3♀, CNC; 2♂, 3♀, CSCA); same data except, 15.vi.1991, P. McLelland (1♂, CSUC); Lost Ck, 12 mi. ENE Potlatch [46°57′N 116°41′W], 2700 ft, 13.v.1980, *Amelanchier* fls (3♂, 3♀, WSU); same data except, 1.vii.1980, MT (1♀, WSU); same data except, 1–3.vii.1980 (1♀, WSU); Moscow [46.73°N 117.00°W] (2♂, USNM); 6 mi. NE Moscow, 29.vi.1975, JAP (1♀, EMEC); 7 mi. NNE Moscow, 2700 ft, 29.vi.1975, WJT (1♂, WSU); Moscow Mtn [46°48′N 116°52′W], 23.vi.1952, E.I. Schlinger [1♂, UCDC]; same data except, 3.vii.1968, WFB (1♂, WFBM); same data except, 27.vi.1962, 3000 ft, A.P. Gupta (1♀, WFBM); Moscow Mtn, Moscow Mtn Rd, 46°47.721′N 116°54.093′W, 1000 m, 22.vi.2014, cascading str., BJS (3♂, CNC); Strychnine Ck nr Laird Pk [46°56′N 116°38′W], 15 mi. ENE Potlatch, 2900 ft, 22.vi.1979, WJT (8♂, 7♀, WFBM); same data except, 1.vii.1980, *Physocarpus* (11♂, 5♀, WSU); Troy, Hwy 8 at mm 15 W Fk Ck, 747 m, 46.733°N 116.757°W, 9.vi.2009, E09-62a, I.S. Winkler (1♂, CNC). *Nez Perce County*: Lenore [46°30′N, 116°3′W], 10.v.1959, WFB (1♂, WFBM); Spalding [46°26′N 116°49′W], 19.v.1961, WFB (1♂, WFBM); Waha [46°12′N 116°51′W], 18.vi.1909 (1♀, 2 pinned balloons with Cecidomyiidae prey, USNM). *Shoshone County*: Rd 50 E Calder, 690 m, St. Joe NF, Huckleberry Cpgd, 47°15.953′N 116°5.449′W, 20.vi.2014, *ex* roadside str., BJS (1♀, CNC). **Oregon:** *Baker County*: U. Goose Ck, 34 mi. SE Union [44°56′N 117°25′W], 4160 ft, 24–25.vi.1977, sweeping *Anaphalis* flowers, WJT (3♀, WSU); Velvet Ck [45°1′N 117°31′W], 28 mi. SE Union, 4720 ft, Wallowa-Whitman NF, 17.vi.1977, sweeping, WJT (1♂, WSU). *Wallowa County*: Minam SP [45°47′N 117°43′W], 9.vi.1971, WJT (3♂, 1♀, WSU). **Washington:** *Asotin County*: Fields Spring SP [46°4′N 117°10′W], 27.vi.1972, W.B. Garnett (1♂, WSU); same data except, 4 mi. S Anatone, 7.vi.1973, 3500–4000 ft, MT, D. Corredor (1♂, WSU); same data except, 12–13.vi.1974, MT with dry ice, WJT (1♀, WSU); same data except, 26.vi.1974 (1♂, WSU). *Columbia County*: Tucannon Fish Hatch., 20 mi. E Dayton [46°19′N 117°39′W], 2650 ft, 12.v.1979, sweeping, WJT (2♂, 1♀, WSU). *Spokane County*: Valleyford [47°31′N 117°14′W], 19.vi.1919, ALM (1♂, USNM). *Whitman County*: 8 mi. SW Pullman, Lyle Grove Biol. Area [46°43′N 117°11′W], 2100 ft, 26.v.1979, MT, WJT (1♂, WSU); same data except, 30.v.1979, S. Woods (1♂, WSU); same data except, 4.vi.1979 (2♀, WSU); same data except, 4–6.vi.1979 (1♂, WSU); same data except, 6.vi.1979 (2♂, WSU); same data except, 6–8.vi.1979 (1♂, WSU); same data except, 20–22.vi.1979 (1♀, WSU); Union Flat [46°34′N 117°8′W], 16.vi.1916 (2♂, USNM); same data except, 3.vi.1918 (1♂, USNM). *Yakima County*: 4 km NW Cliffdell, Sawmill Flat Cpgd, between Naches R and Hwy 410, 46°58′25″N 121°05′46″W, 785 m, 19.vi.2005, sweep, C.J. Borkent, CJB05-21 (1♂, LEM).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *bigoti* species group by narrow, shiny anterior and posterior bands on the abdominal tergites in both sexes (Figs 41, 45), male hind femur with median inflated ventral lobe oval and distinct (Fig. 44), upper section of phallus strongly bent and tapered, and basal section of phallus not projecting beyond base of upper section.



FIGURES 41–45. Male habitus, thorax, hindleg and female habitus of *E.* (*Enoplempis*) *aerobatica* Melander. **41,** male habitus, lateral view; **42,** thorax, dorsal view; **43,** hind femur tibia joint, anterior view; **44,** hind femur tibia joint, posterior view; **45,** female habitus, lateral view.

Redescription. Wing length 4.7–5.6 mm. **Male.** Head dark in ground-colour, with greyish pruinescence. Dichoptic, upper ommatidia not enlarged. Frons parallel-sided, subequal to width of ocellar triangle; with short setulae along inner margin of eye. Face without setae; parallel-sided, with oral margin dark and shiny. Ocellar triangle slightly elevated, with thin greyish pruinescence, with pair of very short ocellar setae, shorter than length of triangle, with several shorter posterior setulae. Occiput bearing several irregular rows of strong setae, slightly longer than ocellar setae, longer and finer ventrally; postocular setae not differentiated; postocellar region without setae.

Antenna dark; scape 1.5× longer than pedicel, with short, black setae; pedicel with ring of apical setae; postpedicel long, gradually tapered, 3× longer than basal width; stylus slightly longer than basal width of postpedicel. Palpus pale, orange brown, with dark setulae. Proboscis reddish brown, slightly longer than head height; labellum with short, dark setae.

Thorax dark brown in ground-colour, densely grey pruinescent. Scutum with 2 pairs of broad, brownish vittae, medial pair ending at prescutellar depression (Fig. 42). Proepisternum with several short, black setae, similar to occipital setae; upper proepisternum in front of spiracle without setae. Prosternum bare. Antepronotum with row of short, black setae, longer laterally. Postpronotum with 1 short seta and several short, dark setae. Scutum with very short uniserial acr on anterior half; dc slightly longer, extending to scutellum; 1 strong posterior npl, with several shorter anterior setae; several presut spal setulae; 0 psut spal; 2 pal setulae. Scutellum with 2–3 pairs of very short sctl setulae, widely separated medially; disc bare. Laterotergite with row of several strong, black setae. Anterior and posterior spiracles pale.

Legs slender, short, femora orange to brown, darker apically, especially on hind femur; tibiae darker, tarsi brown; coxae orange in ground colour, clothed in dense greyish pruinescence, concolourous with pleura (Fig. 41). Coxae with stiff, black setae. Hind trochanter with short setulae. Fore femur clothed in short, black setae. Fore tibia without distinct erect setae, except several preapical setae. Fore tarsomere 1 slender, not swollen; all tarsomeres with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur clothed in short, black setae. Mid tibia often with 3–4 anterodorsal and posterodorsal setae; several preapical setae. Mid tarsus similar to fore tarsus. Hind femur with setal tufted anteroventral process arising from inflated, oval ventral lobe; apex with preapical row of 5–6 strong, black posterior setae, longer than width of femur; preapical anterior seta sometimes weakly developed (Figs 43, 44). Hind tibia with proximal half shallowly twisted; anteroventral digitiform process on basal quarter, slightly proximal to process of femur (when legs folded), with black setae on inner margin, shorter than length of process; posteroventrally with broad, triangular process opposite inflated process of femur, with long, black lateral and apical setae, longer than process, with anterior base with dense pruinescence; with seta in posteroapical comb; 3–4 strong, black anterodorsal and posterodorsal setae, shorter than width of tibia (Figs 43, 44). Hind tarsus broader than fore tarsus, otherwise similar in chaetotaxy.

Wing infuscate with dark veins; veins complete, except Sc and CuA+CuP. Basal costal seta absent. R_5 and M_1 parallel near wing margin; R_5 ending at wing tip; radial fork broad. Halter pale, yellowish brown.

Abdomen dark, with dense greyish pruinescence, similar to scutum with very short setae sparse on distal tergites; anterior and posterior margins of tergites distinctly glossy (often anterior margin retracted within preceding segment). Pregenital segments unmodified, except sclerites of segment 8 fused, forming ring. Terminalia (Fig. 52): dark brown with hypandrium and phallus shiny orange brown. Cercus shorter than epandrium, subrectangular; base of cercus fused with epandrium; dorsal margin slightly attenuated distal to mid-length; apex truncate; setae shorter than half width of cercus. Subepandrial process extending to either side of phallus. Epandrial lamella linear, longer than height; posterior margin truncate with short, up-turned dorsal margin; setae similar in length to cercal setae. Hypandrium long, with rounded apical margin; without setae. Phallus with basal half expanded beyond basal curve, not projecting beyond base of apical section; apical half sharply bent at nearly 90°, slightly sinuous; apex not emerging beyond cercus; ejaculatory apodeme less than half-length of epandrium, T-shaped, with lateral apodemes on lower third.

Female. Similar to male, except as follows: frons slightly broader; hindleg without modified setae and processes. Abdominal pleural membrane pale, without expanded region; tergites 7 and 8 pruinescent.

Geographical distribution and seasonal occurrence (Fig. 54). *Empis* (*En.*) *aerobatica* is known from eastern Oregon, Washington and Idaho. Adults have been collected from May to July.

Nuptial gift presentation. Aldrich & Turley (1899) reported that males of this species present to females relatively large balloons containing a small prey item, which may be fed on by the female (Kessel 1955). The material examined above includes balloons with prey items attached ranging from flies (ceratopogonids, cecidomyiids, chloropids) to Psyllidae and Chalcidoidea. The balloons are fragile in nature and tend to collapse a few hours after collection (Aldrich & Turley 1899; Kessel & Kessel 1951). The balloons are tubular, with a circular opening at one end and appear to be formed by small bubbles (Figs 7, 8). The prey is found attached to the outer margin of the balloon.

Remarks. One male from the type locality differs in the shape of the phallus from the common form (Fig. 52) of *E.* (*En.*) *aerobatica* accepted here. In this specimen the phallus gradually tapers before the sharp bend and the apical

section is strongly sinuous. Since the hindleg appears identical with *E. aerobatica*, this specimen is considered as conspecific.

Empis (*Enoplempis*) *bigoti* Melander

(Figs 3, 6, 9–11, 46, 47, 53, 80)

Enoplempis cinerea Bigot, 1880b: xci. Type locality: California.
Empis bigoti Melander, 1902: 319 (nom. nov. for *cinerea* Bigot).
Empis bigoti: Coquillett, 1903: 265; Melander, 1965: 458 (catalogue); Yang *et al*., 2007: 131 (catalogue).
E. (*Enoplempis*) *bigoti*: Melander, 1928: 142 (assigned to subgenus *Enoplempis*).
Empis bullifera Kessel & Kessel, 1951: 137. Type locality: Novato, California, USA. **syn. nov.**

Type material examined. *Enoplempis cinerea*: **HOLOTYPE** ♂, labelled: "Holo-/ type [red-bordered circle]"; "E. cinerea/ EX COLL. BIGOT"; "Genitalia/ removed and/ examined/ February 1979/ WJ Turner"; "E. Cinerea. ♂/ California J. Bigot [header label]" (OUMNH) [terminalia dissected; right midleg and both hindlegs broken off and glued to card beneath].

Empis bullifera: **HOLOTYPE** ♂, labelled: "Novato [38°06′N 122°34′W], Marin Co./ Cal. 4[April]-11-51"; "E.L. Kessel/ Collector" "HOLOTYPE &/ ALLOTYPE/ Empis bullifera/ Kessel & Kessel [pink label]"; "California Academy/ of Sciences/ Type no. 6413" [♂ holotype, ♀ allotype, ♂ chironomid prey on balloon on separate paper points] (CAS). **PARATYPES: USA. California:** Same data as holotype (8♂, 8♀, mounted as pairs, with Chironomidae prey on balloon, CAS); same data as holotype (14♂, 14♀, mounted as pairs, with Psocoptera prey on balloon, CAS); same data as holotype (1♂, 1♀, mounted as pair, with Araneae prey on balloon, CAS); same data except, 3.iv.1949 (1♂, 1♀, mounted as pair, with Psocoptera prey on balloon, CAS).

Additional material examined. USA. California: S. California (1♂, CUIC) [see *E. aerobatica* types]. *Alameda County*: Berkeley [37°52′N 122°16′W], 22.iv.1962, J. Doyen (2♂, EMEC); Hills back of Oakland [37°50′N 122°12′W], 13.v.1951, W.C. Bentinck (1♂, 1♀, EMEC); Strawberry Cyn [37°52′N 122°14′W], 16.v.1978, M.J. & C.A. Tauber (1♂ with Bibionidae prey, CUIC); Sunol Reg. Wilderness, along Indian Joe Ck [37°30′N 121°49′W], 29.iii.1979, DDW (1♂, CAS). *Amador County*: 0.5 mi. W Fiddletown [38°30′N 120°45′W], 12.iii.1970, E.E. Grissell & R.F. Denno (1♂, UCDC); Plymouth, 5 mi. N [38°28′N 120°50′W], 21.iii.1962, *Salix*, JAP (2♂, 1♀, EMEC). *Butte County*: Oroville [39°31′N 121°33′W], 19.iii.1928, H.H. Keifer (1♂, 1♀, CAS). *Calaveras County*: Mokelumne Hill [38°18′N 120°42′W], Apr., F.E. Blaisdell (1♂, CAS). *Contra Costa County*: Briones Dam [37°54′N 122°12′W], 22.iv.1984, JAP (1♂, mounted together with ♂ and ♀ *Rhamphomyia scutellaris* Coq., as prey item, EMEC); Fish Ranch Cyn [37°51′N 122°13′W], 21.iv.1984, JAP (1♀, EMEC); same data except, 6.v.1989 (1♂, 1♀, mounted as pair with Bibionidae prey, EMEC); Lafayette [37°53′N 122°07′W], 6.iv.1968, D.D. Munroe (1♂, 1♀, CNC); Lafayette Reservoir [37°53′N 122°08′W], 15.iv.1980, J. Leibherr (1♂, EMEC); Mitchell Cyn [37°55′N 121°56′W], 21.iv.1956, D.J. Burdick (1♂ with Psocoptera prey on balloon EMEC); same data except, J.W. Tilden (3♀, CAS; 1♂, 1♀, mounted as pair with Chironomidae prey, CAS; 6♂, 6♀, mounted as pairs, each with Psocoptera prey on balloon, CAS); Moraga [37°50′N 122°07′W], 24.iv.1966, D.G. Dennig (1♂, UCDC); same data except, 16.x.1966 (1♂, UCDC); Mt Diablo [37°52′N 121°54′W], 22.iv.1933 (1♂, UCDC); same data except, east side, 24.iii.1951, E. Schlinger (1♂, 1♀, mounted as pair with ?Psocoptera prey, UCDC); same data except, Russelmann Pk, 6.iv.1962, JAP (1♂, 1♀, EMEC); Orinda, Tilden Pk [37°53′N 122°14′W], 15.iv.1986, D. Batzer (1♂, EMEC); Redwood Regional Pk [37°48′N 122°09′W], 29.iv.1975, *Ceanothus*, P. Rude (1♂, EMEC); Russell Tree Farm [37°55′N 122°09′W], 22.iv.1984, JAP (1♂, 1♀, mounted as pair with Tipulidae prey on balloon, EMEC); San Leandro Reservoir [37°48′N 122°06′W], 5.iv.1995, JAP (1♂ with Chironomidae prey on balloon, EMEC; 2♂, 2♀, mounted as pairs, each with Chironomidae prey on balloon, EMEC). *El Dorado County*: Coloma, 4 mi. NW [38°49′N 120°56′W], 21.iii.1962, *Salix*, JAP (2♂, EMEC); El Dorado Hills [38°41′N 121°04′W], 20.iii.2001, *in copula* with balloon & prey, E.M. Fisher (1♂, 1♀, mounted as pair with Chironomidae prey on balloon, CNC); El Dorado Hills, 38°41′43″N 121°04′44″W, 222 m, 24.iii.2003, *in copula*, J. & A. Skevington (1♀, CNC; 4♂, 4♀, mounted as pairs with Aphidae, Chironomidae and Psocoptera prey on balloons, CNC); El Dorado Hills, New York Creek, 680 ft, 38°41′43″N 121°04′38″W, 29.iii.2002, E.M. Fisher (5♂, 7♀, CNC); same data except, 17.iii.2004, P.H. Kerr (2♂, CSCA); same data except, S.D. Gaimari (1♂ with Chironomidae prey on balloon, 1♂, 1♀, CSCA); same data except, 29.iii.2002, *in copula* with balloons and prey, E.M. Fisher (5♂, 5♀, mounted as pairs with Chironomidae,

Psocoptera and Homoptera prey on balloons, CNC); same data except, 1.iv.2002 (5♂, 5♀, mounted as pairs with balloons and prey as above, CNC); same data except, 17.iii.2004, P.H. Kerr (5♂, 5♀, mounted as pairs with Chironomidae and Psocoptera prey on balloons, CSCA); same data except, S.D. Gaimari (2♂, 2♀, mounted as pairs with Chironomidae prey on balloons, CSCA); N end Lk. Folsom [38°45′N 121°08′W], 29.iv.1967, G.J. & A.D. Keuter (1♀, CAS). *Humboldt County*: 2 mi. W Briceland [40°06′N 123°54′W], 21.v.1976, R. Wharton (1♂, EMEC); 5 mi. NW Briceland, 21.v.1975, solitary pair in wooded area open in sun 1230–1300 PDT, JAP (4♂, 4♀, mounted as pairs, two with Limoniidae prey on balloons, EMEC). *Kern County*: Kern Co. (1♀, USNM) [see *E. aerobatica* types]; 3 mi. W Wofford Hts [35°42′N 118°27′W], 29.iv.1964, WJT (1♂, 1♀, EMEC); same data except, R.L. Langston (1♀, EMEC); same data except, C.A. Toschi (1♂, EMEC); same data except, 4200 ft, 14.iv.1965, *Pinus sabiniana*, WJT (1♀, EMEC). *Los Angeles County*: Beverly Glen Cyn [34.10778°N 118.44472°W], Westwood Hills, 12.iv.1950 (1♂, LACM); Santa Monica Mts, Fryman Cyn [34°07′N 118°23′W], 22.iii.1993, R. Rifkind (1♂, 1♀, WFBM); Temescal Cyn [34°03′N 118°31′W], 7.iv.1977 (1♂, 1♀, LACM). *Marin County*: same data as holotype except, Umdhelannyoni, 5.v.1951 (1♀, with Psocoptera prey on balloon, CAS); Dillon Beach [38°15′N 122°57′W], 15.v.1965, B.A. McKinley (1♂, CAS); Hicks Valley, Arroyo Sausal W of Point Reyes-Petaluma Rd [38°08′N 122°42′W], 14.iv.1984, flight trap in creek bed, 1345–1700 hours, PHA (1♂, USNM); Liberty Gulch nr Alpine Lk. [37°57′N 122°37′W], 640–900 ft, 19.iv.1975, JAP (2♂, 2♀, mounted as pairs with Chironomidae prey, EMEC); Lily Lk. nr Alpine Lk. [37°57′N 122°38′W], 680–720 ft, 20.iv.1974, E. Schlinger (1♂, 1♀, mounted as pair with Psocoptera prey, EMEC); Mill Valley [37°54′N 122°32′W], 29.iii.1926 (1♂, CAS); same data except, 21.iv.1926 (1♂, CAS); Mt Tamalpais [37°55′N 122°34′W], 26.v.1974, D.G. Denning (1♂, 2♀, UCDC); Phoenix Lk. [37°57′N 122°34′W], 28.iii.1926, H.H. Keifer (1♀ with Psocoptera prey on balloon, CAS). *Mendocino County*: No. Cal. Coast Range Pres., 5 mi. N Branscomb, 24.v.1976, J. Chemsak (1♂ with *Meghyperus* prey on balloon, EMEC); same data except, 26.v.1976, JAP (1♂, EMEC); same data except, 26.v.1976, *Ceanothus incanus* (1♂, EMEC); Hopland [38°58′N 123°06′W], 3.iv.1968, D.D. Munroe (1♂, 1♀, CNC); U.C. Hopland Field Sta. [39°00′N 123°04′W], 3.iv.1968, JAP (1♂, 1♀, mounted as pair with Psocoptera prey on balloon, EMEC); Hopland Field Sta. Headquarters Lk., 900–1600 ft, 27.iv.1975 (1♂ with Psocoptera prey on balloon, 1♀, EMEC). *Monterey County*: Arroyo Seco, The Lakes [36°14′N 121°28′W], 12.iv.1997, flight trap, Collection 01737-A, PHA & M.M. Arnaud (1♂, USNM); same data except, 24.iv.1997, 880 ft, CollectionNo. 02194 (1♂, USNM); same data except, 25.iv.1997, CollectionNo. 02195 (1♂, USNM). *Napa County*: Angwin [38°34′N 122°26′W], 29.iii.1971, *Ceanothus*, T. Griswold (1♂, 1♀, LACM); Butts Cyn, 13 km NW Pope Valley [38°42’N 122°25’W], 15.iv.1981, T.W. Davies (1♂, 3♀ CAS); same data except, 17.iv.1982 (5♂, 4♀, CAS); Monticello Dam [38.5133°N 122.1042°W], 23.iii.1970, *Rhus trilobata*, E.E. Grissell, R.F. Denno (1♂, 1♀, UCDC); Putah Cyn [38°37′N 122°17′W], 1.iv.1957, C.G. Moore (1♂, 1♀, UCDC). *Plumas County*: Squirrel Ck 8 mi. E Quincy [39°56′N 120°56′W], 3900 ft, 15.v.1982, JAP (1♂, EMEC). *San Benito County*: South of Hollister [36°51′N 121°24′W], Lime Kiln Cyn, 3.iv.1979, DDW (1♂, CAS); Paicines, 22 mi. ESE [36°37′N 120°57′W], 2.iii.1965, JAP (1♀, EMEC); 5 mi. SW Paicines, Lime Kiln Rd [36°41′N 121°20′W], 24.iii.1966, R.L. Langston (1♂, 1♀, EMEC). *San Bernardino County*: San Bernardino Mts, Barton Flats [34°10′N 116°51′W], 17.vi.1955, MEL (1♂, USNM); Camp Angelus (Angelus Oaks) [34°8′N 116°58′W], 26.v.1947, ALM (1♀, USNM); same data except, white *Ceanothus* (1♂, USNM); Tetley Pk (Tetley’s Mountain Camp) [34.246°N, 117.309°W], 15.v.1937, on *Salix laevigata* and at flws of apple, P.H. Timberlake (4♂, 3♀, UCRC); Upper Santa Ana River [34°10′N 116°49′W], 8.vi.1955, ALM (1♀, USNM). *San Mateo County*: Skyline Blvd nr La Honda Rd [37°23′N 122°15′W], 20.v.1949, PHA (2♂, 1♀, USNM); Redwood City [37°28′N 122°14′W], 7.iii.1959, coll. at about 1:40 pm in sunshine nr *Quercus agrifolia* foliage, only saw balloon but netted a ♂, ♀ & balloon, PHA (1♂ with Psocoptera prey on balloon, USNM); Redwood City, 1032 Wilmington Way, 25.iii.1979, PHA (1♂, 1♀). *Santa Clara County*: Santa Cruz Mts [37°06′N 121°50′W], 8.v.1910, W.M. Mann (1♂, USNM); Stanford Univ., Campus Experimental Area [37°25′N 122°10′W], 1969–1970, A.R. Moldenke (2♂, 6♀, CAS). *Santa Cruz County*: 3 mi. N Soquel [36°59′N 121°56′W], 24.iv.1970, JAP (1♂, EMEC). *Solano County*: Cold Cyn Reserve [38°30′N 122°5′W], 17–18.iv.1982, L.G. Bezark (3♂, 3♀, mounted as pairs, three with Psocoptera prey, CNC); same data except, 9.iv.1983, H. Eichenseer, Ent 106 No 123 (1♀, UCDC); same data except, 6.iv.1985, S.M. Normington, Ent 106 No 74, 75, 139 (1♂, 2♀, UCDC); same data except, 6.iv.1985, S.E. Wonderlick, Ent 106 No 202, 203 (1♂, 1♀, UCDC); same data except, 11 km W Winters, 18.iii.1992, S.L. Heydon, G-L. Chen (1♂, UCDC); Mix Cyn [38°24′N 122°04′W], 25.iv.1968, E.E. Grissell (1♂, UCDC); 8 mi. W Winters [38°30′N 122°05′W], 14.iii.1964, F.D. Parker (3♂, 3♀, mounted as pairs, two with Tipulidae and Psocoptera prey on balloons, UCDC). *Sonoma County*: Annadel SP, 0.9 km from parking lot Richardson Tr., 38°26.11′N 122°36.67′W, 220 m, 6m MT, 18.iii–2.v.2008, P. Kerr, CSCA08L283 (2♂, 1♀, CSCA); Healdsburg [38°37N 122°51′W], 700 ft, 14.iv.1974, G.

Pereira (1♂, CAS); Sonoma [38°17′N 122°27′W], 2.iv.1961, D.Q. Cavagnaro (1♂, 1♀, mounted as pair with Psocoptera prey on balloon, UCDC). *Stanislaus County*: Adobe Ck [37°23′N 121°22′W], 17.iii.1948, P.D. Hurd (1♂, USNM); Del Puerto Cyn [37°25′N 121°22′W], 2.iv.1980, T.W. Davies (1♂, 1♀, CAS); same data except, at N Fork, 900–1200 ft, 8.iv.1978 (2♂, 2♀, mounted as pairs with balloons, EMEC); Del Puerto Cyn, 21 mi. W Patterson, 27.ii.1965, R.L. Langston (2♂, 1♀, EMEC); same data except, 12.iii.1966, with bubble (1♀, EMEC); Del Puerto Cyn, 23 mi. W Patterson, 9.iv.1967, P.A. Opler (1♂, 1♀, EMEC); same data except, 25.iii.1969, flying in shade nr crk 2:30 pm, JAP (1♂, 1♀, mounted as pair with *Rhamphomyia* sp. prey on balloon, EMEC); Frank Raines Pk, Del Puerto Cyn, 11.iv.1978, DDW (2♂, 1♀, CAS); same data except, 31.iii.1979, T.W. Davies (4♂, CAS). *Tulare County*: 0.5 mi. SE Ash Mtn Seq. NP HQ [36°29′N 118°49′W], 4.ii.1984, flume debris trap, R.D. Haines (1♂, CSCA); Johnsondale, 2 mi. E [35°58′N 118°30′W], 27.iv.1964, R.L. Langston (1♂, 1♀, EMEC); same data except, C.A. Toschi (1♀, EMEC); same data except, *Salix*, P. Rude (1♀, EMEC); same data except, JAP (2♂, EMEC); Potwisha, 3 mi. NE Ash Mtn [36°31′N 118°48′W], 4.v.1979, M. Buegler (2♂, 2♀, mounted as pairs, one with Aphidae prey on balloon, EMEC); same data except, 2000 ft, isolated pair mating in flight with small frothy balloon and tiny prey affixed in shade of woods, 10:30, JAP (1♂, 1♀, mounted as pair, EMEC); 10 mi. SE Three Rivers, S Fork Kaweah R [36°21′N 118°45′W], 2800 ft, 3.v.1979 (1♂, 1♀, mounted as pair with prey fragments on balloon, EMEC). *Ventura County*: N end of Casitas Res. [34°25′N 119°20′W], 15.iii.1967, P.A. Opler (1♂, EMEC). *Yolo County*: Rumsey [38°53′N 122°14′W], 7.iv.1971, B.K. Rolfs, Ent 105 No 152 (1♂, UCDC).

Possible additional material (unassociated females). USA. California: *Nevada County*: Truckee [39°20′N 120°12′W], 17.vi.1927, E.P. Van Duzee (1♀, CAS). *San Diego County*: El Cajon [32°47′N 116°57′W], 25.iii.1947, ALM (1♀, USNM); same data except, 23.iv.1946 (1♀, USNM). *San Luis Obispo County*: 3 mi. W Paso Robles [35°38′27″N 120°39′14″W], 13.iii.1969, JAP (2♀, EMEC). *Santa Clara County*: 3 mi. W New Almaden, Herbert Ck [37°09′N 121°51′W], 20.iv.1966, JAP (1♀, EMEC); Stanford U. [37°25′N 122°10′W], 13.ii.1951, PHA (1♀, UCDC).

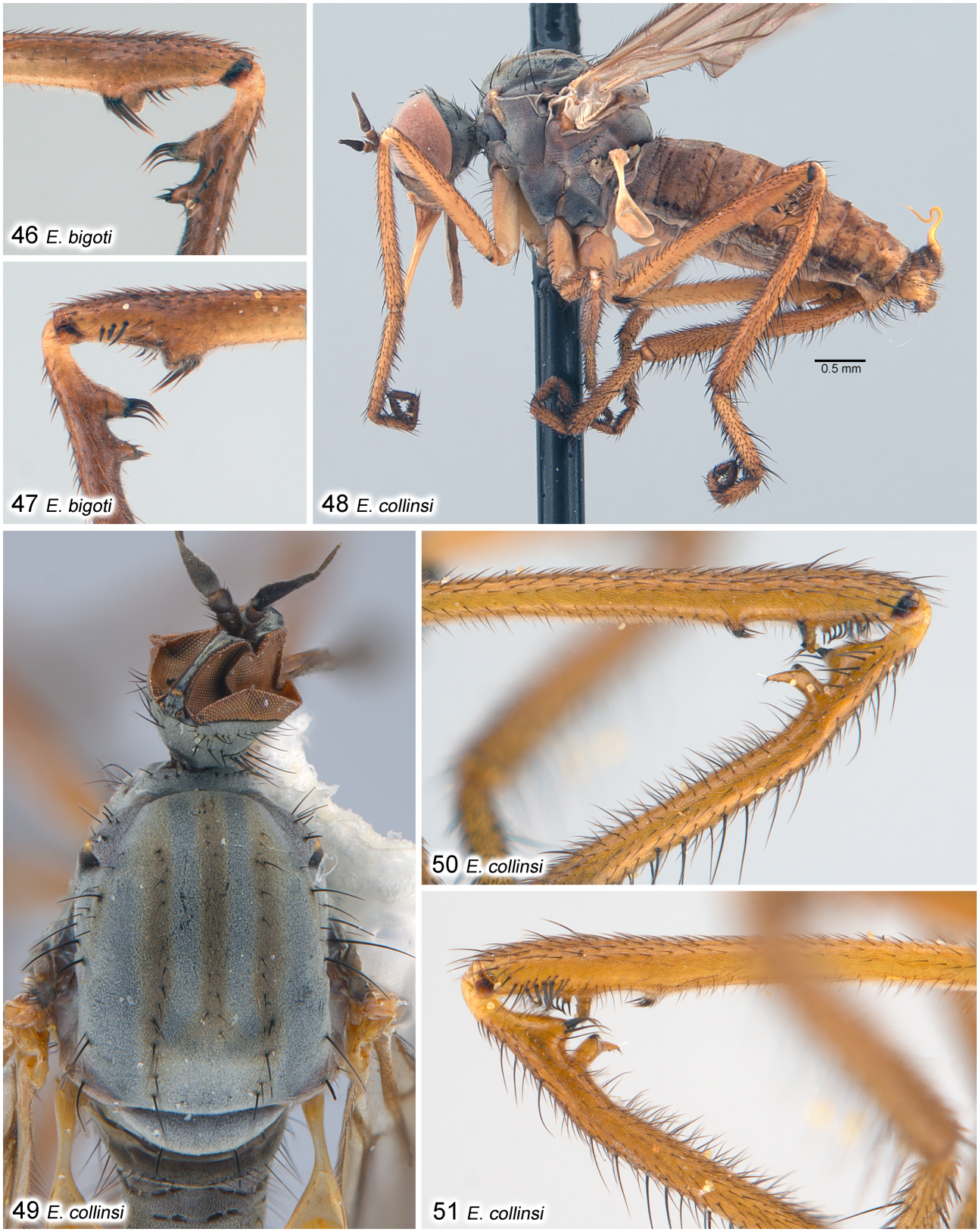
Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *bigoti* species group by the narrow, shiny anterior and posterior bands on the abdominal tergites of both sexes, male hind femur with low ventral lobe (Fig. 47), upper section of phallus strongly bent and sinuous, and apex of basal section of phallus rounded, not projecting beyond base of upper section.

Redescription. Wing length 4.9–5.9 mm. **Male.** Similar to *E.* (*En.*) *aerobatica*, except as follows: head with antenna bearing long postpedicel, gradually tapered, 4–6× longer than basal width.

Thorax similarly coloured and patterned. Postpronotum with 1 strong, short seta and several short, dark setae; 1 psut spal. Scutellum with 2–3 pairs of very short sctl setulae to stronger, short setae.

Legs slender, short, femora orange to brownish, usually darker apically, especially on hind femur; tibiae usually darker, tarsi usually brown; coxae orange in ground colour, clothed in dense greyish pruinescence, concolourous with pleura or with coxae mostly orange with thin bluish pruinescence. Fore tibia usually without distinct erect anterodorsal and posterodorsal setae. Mid tibia often with 3–4 anterodorsal and posterodorsal setae. Hind femur with short, setal tufted anteroventral process, sometimes setal tuft arising from swelling, or setae not as concentrated; medial lobe low, divided medially into variably sized lateral lobe; between tufted process and apex usually row of long narrow or thickened setae, sometimes with inner row of thicker, shorter, hooked-tipped setae; apex with preapical row of 7–8 black posterior setae, some thickened, nearly longer than width of femur; preapical anterior seta not developed (Figs 46, 47). Hind tibia with proximal half straight, anteroventral digitiform process on basal quarter, slightly proximal to process of femur (when legs folded), with black setae on inner margin, shorter than length of process; row of erect, strong anterior setae proximal to anteroventral process; posteroventrally with broad, triangular process opposite medial process of femur, with long, black lateral and apical setae, longer than process, with anterior base with dense pruinescence; usually with 3–4 strong, black anterodorsal and posterodorsal setae, shorter than width of tibia (Figs 46, 47).

Terminalia (Fig. 53): dark brown with hypandrium and phallus shiny orange brown. Cercus shorter than epandrium, subrectangular; base of cercus fused with epandrium; dorsal margin straight; apex rounded; setae shorter than half width of cercus. Subepandrial process extending to either side of phallus. Epandrial lamella linear, longer than height; posterior margin truncate with short, up-turned dorsal margin; setae similar in length to cercal setae. Hypandrium long, with truncate apical margin; without setae; base with microtrichia. Phallus with basal half expanded beyond basal curve, not projecting beyond base of apical section; apical half arising posterolaterally from basal section, creating expanded section, sharply bent at nearly 90°, sinuous; apex not emerging beyond cercus; ejaculatory apodeme less than half-length of epandrium, T-shaped, with lateral apodemes on lower third.



FIGURES 46–51. Male habitus, thorax and hindleg of the *E*. (*Enoplempis*) *bigoti* species group. **46,** *E*. (*En*.) *bigoti* Melander, hind femur tibia joint, anterior view; **47,** same, hind femur tibia joint, posterior view; **48,** *E*. (*En*.) *collinsi* **sp. nov.**, male habitus (holotype), lateral view; **49,** same, head and thorax, dorsal view; **50,** same, hind femur tibia joint, anterior view; **51,** same, hind femur tibia joint, posterior view.

Female. Similar to male, except as follows: frons slightly broader; hindleg without modified setae and processes. Abdominal pleural membrane not expanded; tergites 7 and 8 pubescent, sternite 8 shiny on anterior half.

Geographical distribution and seasonal occurrence (Fig. 80). *Empis* (*En.*) *bigoti* is known from California. Adults have been collected from February to June.

Nuptial gift presentation. The balloons of *E.* (*En*.) *bigoti* that males present to females, are of moderate size (slightly smaller than *E.* (*En*.) *aerobatica*) and contain relatively large prey items, which the female apparently consumes (Kessel & Kessel 1951, reported on as *E.* (*En*.) *bullifera*) (Figs 10, 11). The material examined above includes balloons with prey items attached ranging from flies (tipulids, limoniids, chironomids, bibionids, empidoids) to Psocoptera and Sternorrhyncha, including Aphidae. Unlike *E.* (*En*.) *aerobatica*, the balloons do not deteriorate or collapse after collection (Kessel & Kessel 1951). The balloons appear to be of similar structure to that of *E.* (*En*.) *aerobatica*, both hollow with a circular opening. In contrast, the balloon of *E.* (*En*.) *bigoti* appears more spherical in shape rather than cylindrical (Figs 3, 6, 9–11).

Remarks. Kessel & Kessel (1951) considered *E.* (*En*.) *bullifera* distinct from *E. aerobatica*, which is true, but *E.* (*En*.) *bigoti* (as *cinerea*) was inadequately recognized at the time. The variation in leg colouration and setation for *E.* (*En*.) *bullifera* falls within the concept of *E. bigoti*.

Among the material examined of this species is a male specimen mounted together with a male and female specimen of the much larger species, *Rhamphomyia scutellaris* Coquillett. Although no additional information is provided on the locality label, it is presumed that the *Rhamphomyia* specimens represent a mating pair and the male *E*. (*En*.) *bigoti* was the nuptial gift.

Two male specimens [*Mendocino County*: NCCRP, 3 mi. N Branscomb [39°42′N 123°39′W], 1400 ft, 17.v.1975, R. Bravo (1♂, EMEC); same data except, C. Pyle (1♂, EMEC)] appear very similar to *E.* (*En*.) *bigoti*, but differ by the bright yellowish legs, longer wings (6.5–7.0 mm), and base of apical section of phallus folded at top of basal section. These specimens may not be conspecific with *E.* (*En*.) *bigoti*, but additional sampling in the sampled locality is required for further assessment of this possible variability.

Empis (*Enoplempis*) *collinsi* sp. nov.

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(Figs 48–51, 59, 60, 81)

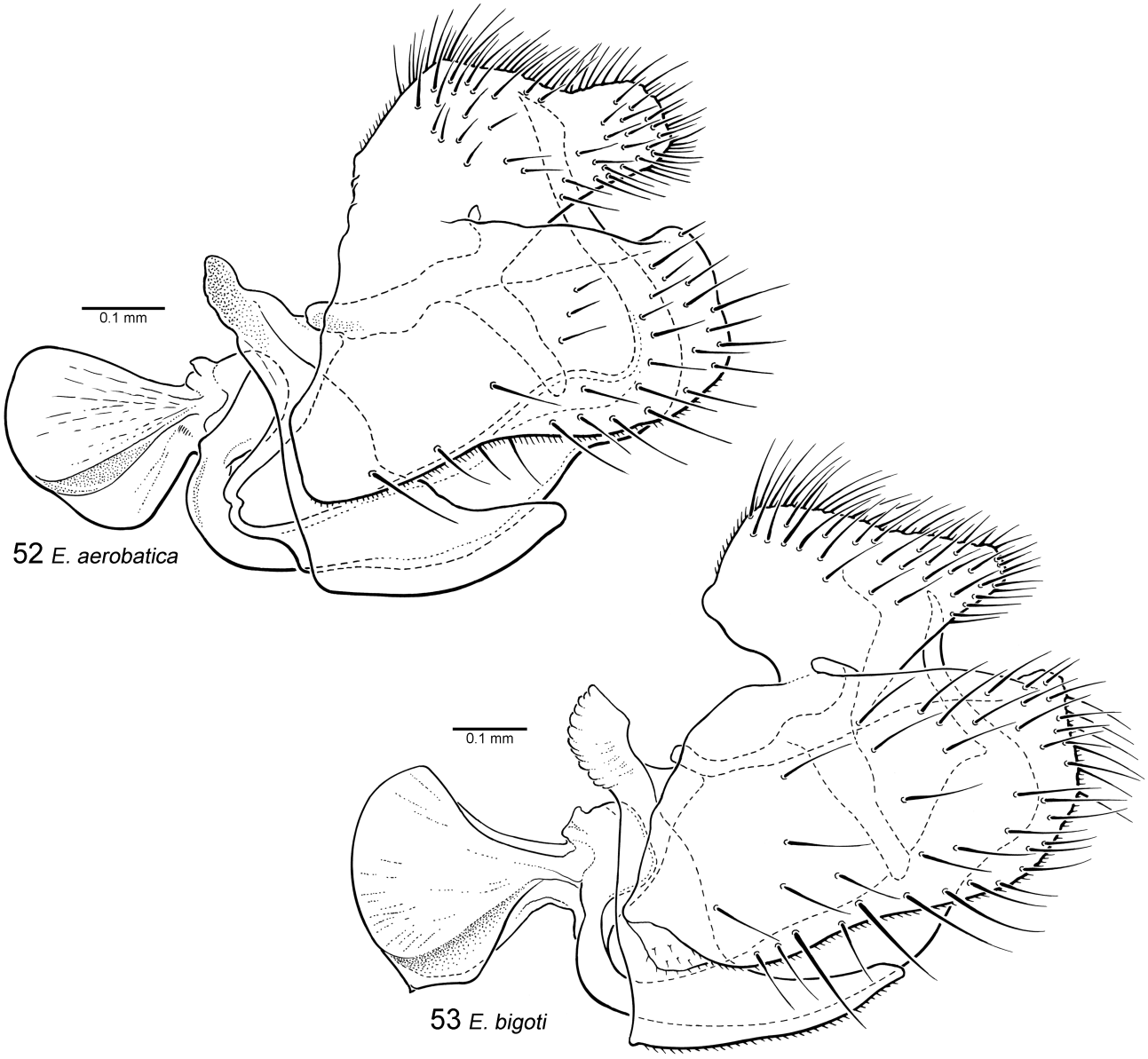
Type material. HOLOTYPE ♂ (Fig. 48), labelled: "USA:CA: Los Angeles Co. KPC/ 10-008; Angeles NF, Glendora/ Canyon Rd.; 0.5 mi from East/ Fork Rd.; 34.22634 N, 117.77544 W; 16/IV/2010/ K. Collins"; "CNC/ 1078365"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *collinsi* Sinclair,/ Brooks & Cumming [red label]" (CNC). **PARATYPES: USA. California:** Same data as holotype (5♂, 1♀, CNC). *Modoc County*: Buck Ck Ran. Sta. [41°52′N 120°17′W], 12.vi.1971, D. Veirs (1♂, EMEC). *San Bernardino County*: San Bernardino Mts, junction Hwy 38 and S Fk Santa Ana R, 34°10′02″N 116°49′06″W, 18.v.1995, RC95-19, in swarm with nuptial gifts, R.A. Cannings & H. Nadel (4♂, RBCM).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *bigoti* species group by its larger size (*ca* 6 mm wing length), male frons narrowed below ocellar triangle, three brown scutal vittae (Fig. 49), mostly pubescent abdominal tergites, male hind tibia with long, triangular digitiform anteroventral process (Figs 50, 51), and upper section of phallus strongly recurved with apex flattened with roughened lateral margin.

Description. Wing length 5.8–6.5 mm. **Male.** Head dark in ground-colour, with greyish pruinescence. Dichoptic, upper ommatidia not enlarged. Frons narrowed below ocellar triangle, narrower than width of anterior ocellus; with short setulae along inner margin of eye. Face without setae; slightly divergent ventrally, with oral margin dark and shiny. Ocellar triangle elevated, with thin greyish pruinescence, with pair of long ocellar setae, subequal to length of upper occipital setae, with several posterior setulae. Occiput with postocular row on upper half, longer and finer ventrally; occiput with irregular row of longer, stronger setae. Antenna dark; scape nearly twice length of pedicel, with short, black setae; pedicel with ring of apical setae; postpedicel long, gradually tapered, 4× longer than basal width; stylus 1.5× longer than basal width of postpedicel. Palpus brown to pale brown, with dark setulae. Proboscis reddish brown, nearly 2× longer than head height; labellum with short, dark setae.

Thorax dark brown in ground-colour, densely grey pruinescent (Fig. 49); apex of postpronotal lobe orange, shiny; postalar ridge yellowish brown. Scutum with 3 broad, brownish vittae, medial vitta ending at prescutellar

depression. Proepisternum with several black setae, similar to lower occipital setae; upper proepisternum in front of spiracle without setae. Prosternum bare. Antepronotum with row of short, black setae. Postpronotum with 1 long seta and several short, dark setae of various lengths. Scutum with slender biserial acr on anterior half; dc uniserial, subequal to acr, longer setae extending to scutellum; 2–3 strong posterior npl, with several short anterior setulae; 1–2 presut spal; 1 psut spal; 1 pal, with short setula. Scutellum with 2–3 pairs of sctl, widely separated medially; disc bare. Laterotergite with narrow patch of strong, black setae. Anterior and posterior spiracles pale.



FIGURES 52–53. Male terminalia of the *E*. (*Enoplempis*) *bigoti* species group, lateral view. **52,** *E*. (*En*.) *aerobatica* Melander; **53,** *E*. (*En*.) *bigoti* Melander.

Legs long, stocky; femora with fine, white pile beneath; yellowish brown, including coxae, tarsi darker apically, coxae without greyish pruinescence (Fig. 48). Coxae with long, dark setae. Hind trochanter with dark setae. Fore femur clothed in short, brown setae. Fore tibia with 2–4 erect anterodorsal setae and several preapical setae. Fore tarsomere 1 slightly swollen, subequal to width of tibia; tarsomeres with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur with anteroventral and posteroventral row of fine setae; preapical posteroventral setae in denser row. Mid tibia with 3–4 anterodorsal and posterodorsal setae; ventrum with dense setae, stronger apically. Mid tarsus similar to fore tarsus. Hind femur with pair of slender, knob-like anteroventral lobes on distal half, bearing short apical setae; tubular ventral process distal to anteroventral lobes, with subapical tuft of anterior setae; row of short, hooked setae distal to ventral process;

apex with preapical row of strong posterior setae; preapical anterior seta strongly developed (Figs 50, 51). Hind tibia with base slightly twisted; anteroventral triangular digitiform process on broad base on basal quarter, longer than width of tibia, tapered with several short, apical setulae, base of process with posteroventral setulae; posteroventrally with broad, triangular process with long, black apical setae, longer than process, with seta in posteroapical comb; dense, long anterodorsal and posterodorsal setae as long as twice width of tibia; proximal half with fine, erect setae ventrally, as long as width of tibia (Figs 50, 51). Hind tarsus similar to mid tarsus; tarsomere 1 slightly swollen, with several long anterodorsal and posterodorsal setae.

Wing infuscate with dark veins; veins complete, except Sc. Short basal costal seta usually present. R_5 and M_1 divergent near wing margin; R_5 ending near wing tip; radial fork broad. Halter pale, yellowish brown.

Abdomen dark, with dense greyish pruinescence, similar to scutum with pale setae laterally; anterior and posterior margins of tergites sometimes subshiny. Pregenital segments unmodified, except sclerites of segment 8 closely approximated, forming ring. Terminalia (Figs 59, 60): dark brown with hypandrium and phallus shiny orange brown. Cercus shorter than epandrium, subrectangular; base of cercus partially fused with epandrium; dorsal margin shallowly notched near mid-length; apex truncate; setae especially dense on anterodorsal margin, nearly as long as width of cercus. Subepandrial process short, extending to either side of phallus. Epandrial lamella linear, longer than height; posterior margin truncate with short, up-turned dorsal margin; setae longer than cercal setae. Hypandrium long, extending to near base of apical section of phallus, with rounded apical margin; without setae. Phallus with basal half expanding, continuous into apical section; apical half strongly recurved, before arching dorsally; apex not emerging beyond cercus, apex flattened, with roughened lateral margins (Fig. 60); ejaculatory apodeme less than half-length of epandrium, T-shaped, with lateral apodemes on lower third.

Female. Similar to male, except as follows: frons nearly as broad as ocellar triangle at narrowest point; hindleg without modified setae and processes; abdominal pleural membrane expanded between segments 4 and 5; tergites 7 and 8 not visible in single specimen.

Geographical distribution and seasonal occurrence (Fig. 81). *Empis* (*En.*) *collinsi* **sp. nov.** is known from California and has been collected from April to June.

Etymology. The species is named after the collector of the holotype, Kenneth P. Collins.

Nuptial gift presentation. Four male paratypes (above) from the South Fork of the Santa Ana River in the San Bernardino Mountains were observed swarming with nuptial gifts. Although the exact form of the nuptial gifts was not stated on each label, they were probably unwrapped prey items and not balloons, which if present would probably have been noted on each label.

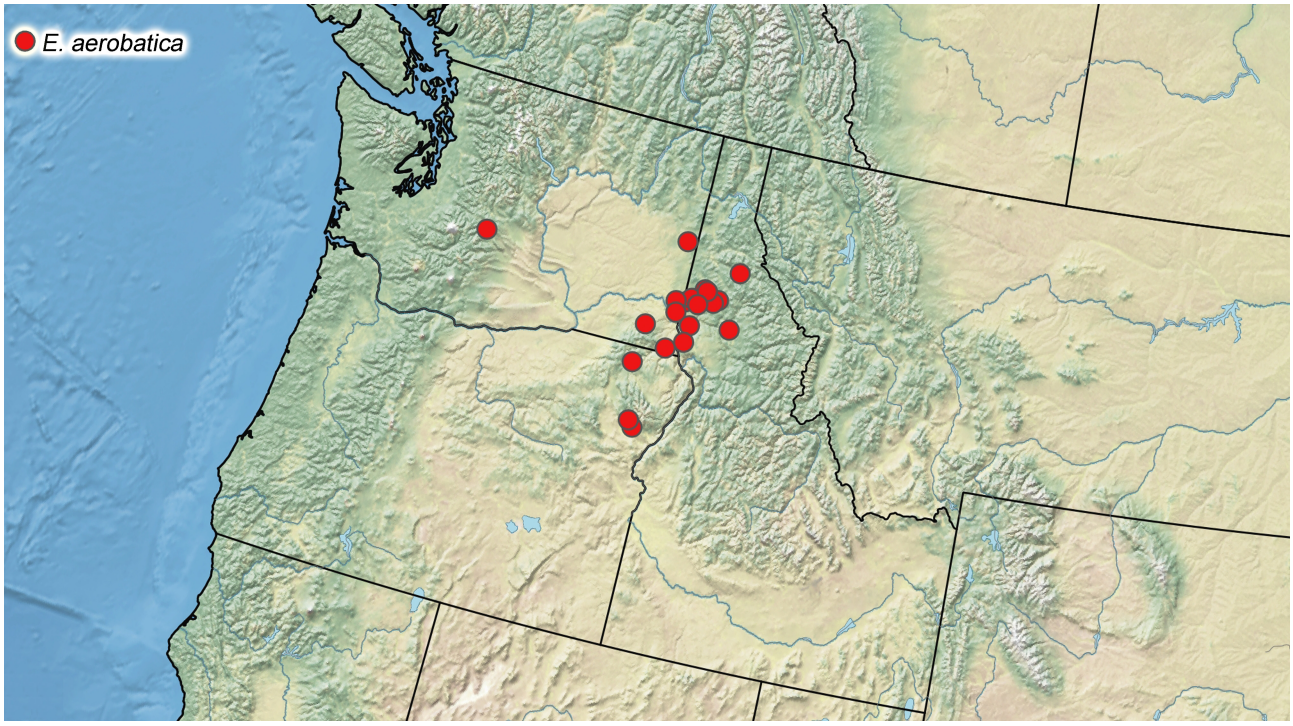


FIGURE 54. Known geographical distribution of *E*. (*Enoplempis*) *aerobatica* Melander.

***Empis* (*Enoplempis*) *montgomeryi* sp. nov.**
urn:lsid:zoobank.org:act:FC2955ED-B53D-45F7-8405-DE6E572661F0
(Figs 55–58, 61, 81)

Type material. HOLOTYPE ♂, labelled: "[USA]CA Mendocino Co./ Hopland, Univ.Calif./ Fld Stn [39°00′N 123°04′W] 20.III.1993, D.M. Wood"; "CNC/ 107836"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *montgomeryi* Sinclair,/ Brooks & Cumming [red label]" (CNC). **PARATYPES: USA. California:** Same data as holotype (2♂, CNC). *Alameda County*: Oakland [37°48′N 122°16′W], 16.ii.1908 (1♂, USNM). *Contra Costa County*: Mt Diablo [37°52′N 121°54′W], 7.ii.1947 (1♂, EMEC); Tilden Pk [37°53′N 122°14′W], Berkeley Hills, 3.ii.1964, C.A. Toschi (1♂, EMEC). *Marin County*: along Lagunitas Ck below Alpine Dam [37°56′N 122°38′W], 15.iii.1978, DDW (1♂, 1♀, CAS). *Los Angeles County*: Oak Cyn at Glendora Mt. Rd, 0.5 mi. marker, 34.227°N 117.776°W, 7.iv.2009, I.S. Winkler & K.C. Collins, E09–15 (1♂, CNC). *Madera County*: San Joaquin Ex. Sta. [37°05′N 119°43′W], 22.ii.1953, P.D. Hurd (2♂, 2♀, EMEC). *Marin County*: Woodacre [38°00′N 122°38′W], 31.iii.1949, P.D. Hurd (5♂, 2♀, USNM). *Riverside County*: Reche Cyn, 5 mi. NW Moreno [34°00′N 117°14′W], 27.ii.1982, E.M. Fisher (2♂, 2♀, mounded as pairs with Bibionidae and Bombyliidae prey, CSCA; 2♂, CSCA). *San Benito County*: Pinnacles Nat. Mon. [36°29′N 121°10′W], 21.iii.1965, *Salix*, H.V. Daly (1♂, EMEC). *San Bernardino County*: Lytle Ck, Lone Pine Cyn Rd, 34°18′49″N 117°29′49″W, 1016 m, 25–27.iii.2015, MT in live oak for., M.E. Irwin (9♂, 3♀, CNC). *San Diego County*: Santa Ysabel, 5 mi. N [33°10′N 116°41′W], 7.ii.1952, *Salix*, J.G. Rozen (1♂, EMEC). *San Mateo County*: Redwood City [37°28′N 122°14′W], 18.i.1946, PHA (1♂, USNM); same data except, 1.ii.1953 (1♂, USNM); Junipero Serra Pk [37°36′N 122°25′W], 12.ii.1967, PHA (7♂, USNM). *Santa Barbara County*: Santa Cruz Is., Cañada Cervada [34°01′N 119°52′W], 4.ii.1979, JAP (1♂, 1♀, EMEC); same data except, on *Salix* sp. (1♀, EMEC); Santa Cruz Is. [34°00′N 119°43′W], U.C. Sta. HQ, 3.ii.1979, on *Ceanothus insularis*, JAP (1♀, EMEC). *Santa Clara County*: San Antonio Val. [37.3917°N 121.4903°W], 4.iii.1969, P.A. Opler (1♂, EMEC); same data except, 28.ii.1947, *Arctostaphylos*, E.G. Linsley (3♂, 2♀, EMEC); Stanford U. [37°25′N 122°10′W], 7.ii.1906 (1♂, USNM); same data except, 13.ii.1906 (1♂, USNM); same data except, 13.ii.1910 (4♂, USNM); same data except, 19.ii.1906, R.W. Doane (5♂, 1♀, USNM); same data except 22.ii.1906 (2♀, USNM); same data except, 6.iii.1910, W.M. Mann (1♀, USNM); same data except, 29.iii.1949, PHA (1♂, 1♀, mounted as pair, USNM); same data except, 6.ii.1952 (6♀, USNM); same data except, 30.i.1953 (1♂, 1♀, USNM); same data except, 31.i.1956 (5♂, 1♀, USNM); same data except, 1.ii.1956 (1♂, USNM); same data except, 20.ii.1960 (1♂, USNM); same data except, 6.ii.1956, flr *Salix lasiolepis* (4♂, 2♀, USNM); same data except, 28.i.1953, collected at catkins of *Salix lasiolepis* Benth. (21♂, 30♀, USNM). *Santa Cruz County*: along Hwy 17 nr Glenwood [37°6′N 121°59′W], 22.iv.1977, DDW (1♂, CAS). *Sonoma County*: Boyes Springs [38°18′N 122°29′W], 25.iii.1937, N.W. Frazier (1♂, USNM); Trinity, 26.iii.1937, N.W. Frazier (1♀, EMEC). *Stanislaus County*: Del Puerto Cyn, Frank Raines Pk [37°25′N 121°22′W], 31.iii.1979, T.W. Davies (1♂, CAS). *Tulare County*: 0.5 mi. SE Ash Mtn Seq. NP HQ [36°29′N 118°49′W], 4.ii.1984, flume debris trap, R.D. Haines (1♂, CSCA); same data except, 4.ii.1984 (1♀, CSCA).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *bigoti* species group by the narrow, shiny posterior bands on the abdominal tergites in both sexes (Fig. 55), male hind tibia with long, curved, pale digitiform anteroventral process (Figs 57, 58), and upper section of the phallus sinuous with roughened lateral margin apically.

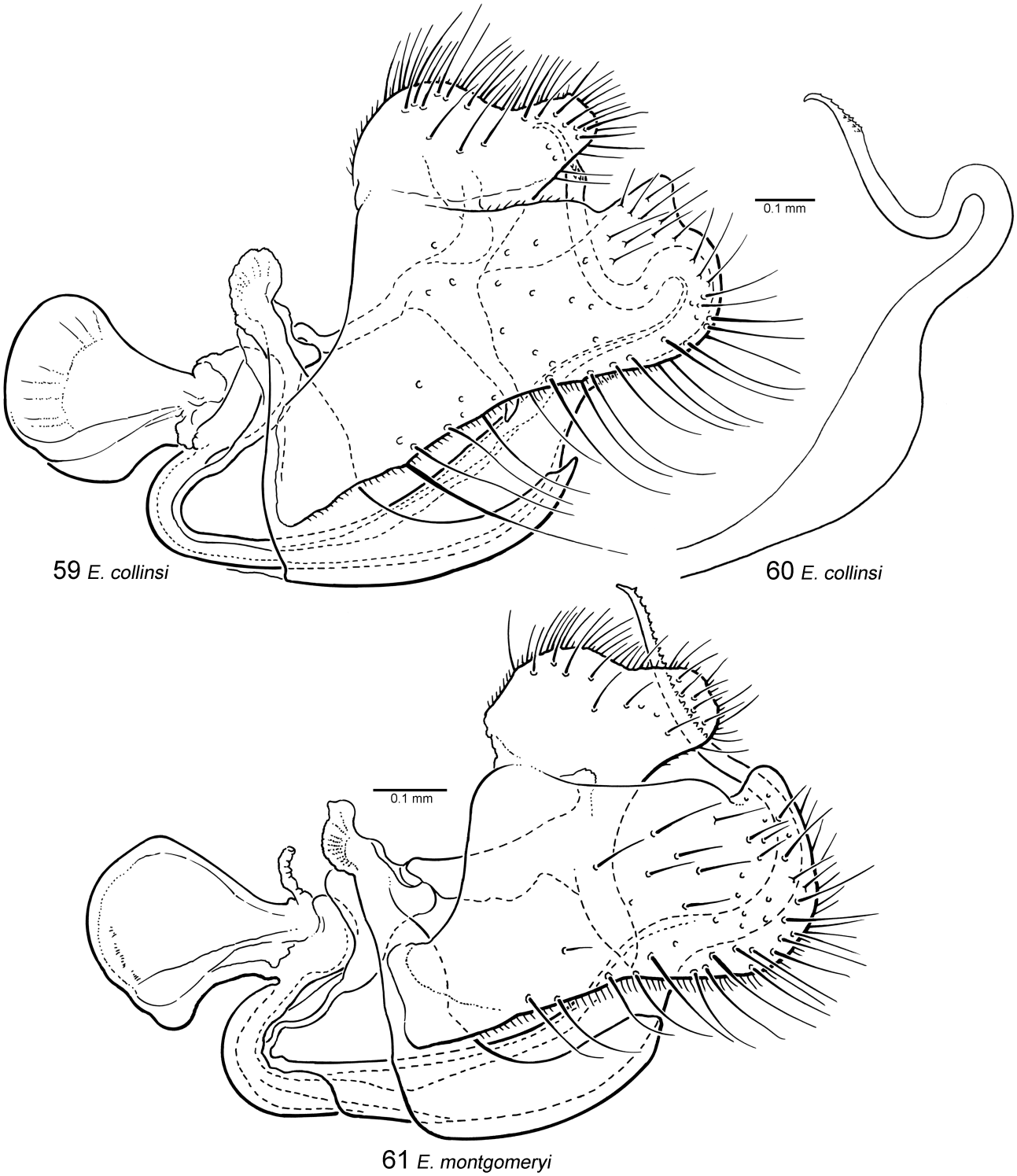
Description. Wing length 4.4–5.9 mm. **Male.** Head dark in ground-colour, with greyish pruinescence. Dichoptic, upper ommatidia not enlarged. Frons narrowed below ocellar triangle, subequal to width of anterior ocellus; with short setulae along inner margin of eye. Face without setae; slightly divergent ventrally, with oral margin dark and shiny. Ocellar triangle elevated, with thin greyish pruinescence, with pair of long ocellar setae, longer than upper occipital setae, with several pairs of posterior setae variable in length. Occiput bearing several irregular rows of strong setae, shorter than ocellar setae, longer and finer ventrally; postocular setae not differentiated; postocellar region without setae. Antenna dark; scape slightly longer than pedicel, with short, black setae; pedicel with ring of apical setae; postpedicel long, gradually tapered, 3× longer than basal width; stylus slightly longer than basal width of postpedicel. Palpus brown to orange brown, with dark setulae. Proboscis reddish brown, nearly 2× longer than head height; labellum with short, dark setae.



FIGURES 55–58. Abdomen and hindleg of *E*. (*Enoplempis*) *montgomeryi* **sp. nov. 55,** male abdomen, dorsal view; **56,** hindleg, anterior view; **57,** hind femur tibia joint, anterior view; **58,** hind femur tibia joint, posterior view.

Thorax dark brown in ground-colour, densely grey pruinescent; apex of postpronotal lobe orange, shiny. Scutum with 2 pairs of broad, brownish vittae, medial pair fading on prescutellar depression (Fig. 55). Proepisternum with several short, black setae, similar to lower occipital setae; upper proepisternum in front of spiracle without setae. Prosternum bare. Antepronotum with row of strong, short, black setae. Postpronotum with 1 long seta and several short, dark setae of various lengths. Scutum with short, slender biserial acr on anterior half; dc uniserial, subequal to acr, extending to scutellum; 2–3 strong posterior npl, with several shorter anterior setae; 1 presut spal; 1 psut spal; 1 pal. Scutellum with 2–4 pairs of sctl, widely separated medially; disc bare. Laterotergite with patch of strong, black setae. Anterior and posterior spiracles pale.

Legs slender, short, shiny; femora with fine, white pile beneath; orange to reddish brown, darker apically, especially on hind femur; tibiae darker, tarsi brown (Fig. 56); coxae dark in ground colour, clothed in dense greyish pruinescence, concolourous with pleura. Coxae with fine setae. Hind trochanter with short setulae. Fore femur clothed in short, brown setae. Fore tibia with 2–4 erect anterodorsal and posterodorsal setae and several preapical setae. Fore tarsomeres with fine, white pile beneath; tarsomere 1 slender, not swollen with slender ventral setae; tarsomeres 2–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur clothed in short, brown setae. Mid tibia slightly broader than fore tibia, with 3–4 anterodorsal and posterodorsal setae; several preapical setae. Mid tarsus similar to fore tarsus; tarsomere 1 with spine-like ventral setae. Hind femur with pair of slender, knob-like anteroventral lobes on distal half, bearing short apical setae; tubular ventral process distal to anteroventral lobes, with tuft of anterior setae; swelling distal to ventral process with short, hooked setae; apex without preapical row of strong posterior setae; preapical anterior seta strongly developed (Figs 56–58). Hind tibia with base slightly twisted; anteroventral arched digitiform process on basal quarter, twice width of tibia, distinctly paler than tibia, tapered with several short, apical setulae, base of process with posteroventral setose swelling; posteroventrally with broad, triangular process with long, black apical setae, longer than process, with anterior base with dense pruinescence; with seta in posteroapical comb; 4–5 strong, black anterodorsal and posterodorsal setae, subequal to width of tibia (Figs 56–58). Hind tarsomere 1 slender; tarsus similar in chaetotaxy to mid tarsus.



FIGURES 59–61. Male terminalia of the *E*. (*Enoplempis*) *bigoti* species group, lateral view. **59,** *E*. (*En*.) *collinsi* **sp. nov.**; **60,** same, phallus; **61,** *E*. (*En*.) *montgomeryi* **sp. nov.**

Wing infuscate with dark veins; veins complete, except Sc and CuA+CuP. Basal costal seta absent. R_5 and M_1 divergent near wing margin; R_5 ending at anterior to wing tip; radial fork broad. Halter pale, yellowish brown.

Abdomen dark, with dense greyish pruinescence, similar to thorax with pale setae laterally; anterior and posterior margins of tergites distinctly glossy, variable in width (often anterior margin retracted within preceding segment). Pregenital segments unmodified, except sclerites of segment 8 fused, forming ring. Terminalia (Fig. 61): dark brown with hypandrium and phallus shiny orange brown; epandrium partially shiny. Cercus shorter than

epandrium, subrectangular; base of cercus fused with epandrium; dorsal margin shallowly notched near mid-length; apex truncate; setae shorter than half width of cercus. Subepandrial process short, extending to either side of phallus. Epandrial lamella linear, longer than height; posterior margin truncate with short, up-turned dorsal margin; setae longer along ventral margin. Hypandrium long, extending to near base of apical section of phallus, with rounded apical margin; without setae. Phallus with basal half slightly expanded beyond basal curve, not projecting beyond base of apical section; apical half gently arched from basal section, curved nearly 90°, sinuous; apex emerging beyond cercus, apically somewhat flattened, with roughened lateral margin; ejaculatory apodeme less than half-length of epandrium, T-shaped, with lateral apodemes on lower quarter.

Female. Similar to male, except as follows: frons nearly as broad as ocellar triangle at narrowest point; hindleg without modified setae and processes. Abdominal pleural membrane pale, without expanded region; tergites 7 and 8 pruinescent.

Geographical distribution and seasonal occurrence (Fig. 81). *Empis* (*En.*) *montgomeryi* **sp. nov.** is known from California, including Santa Cruz Island in Santa Barbara County. Adults have been collected from January to April.

Etymology. This species is named after our colleague and friend, the late Donald Montgomery (Monty) Wood (CNC), who collected the holotype.

Nuptial gift presentation. Among the paratypes examined (above) are male and female pairs mounted together, each with an unwrapped fly prey item (Bibionidae, Bombyliidae) without a balloon. This almost certainly indicates that males of this species present unwrapped prey to females as nuptial gifts.

Remarks. This species appears to fly during the cooler months from January to April.

Empis (*Enoplempis*) *multifaria* sp. nov.

urn:lsid:zoobank.org:act:C50181D6-7FD7-4C5C-A58A-B54EF37368E5
(Figs 2, 62–70, 76, 77, 81)

Type material. HOLOTYPE ♂, labelled: "[USA] WA: Fields' Spr./ St. Prk. [46°4′N 117°10′W] Asotin Co./ June 6-7, 1971"; "W.J. Turner/ collector"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *multifaria* Sinclair,/ Brooks & Cumming [red label]" (WSU). **PARATYPES: USA. Washington:** Same data as holotype (2♂, 2♀, WSU). *Asotin County*: 4 mi. S Anatone [46°4′N 117°10′W], 3600 ft, 10.vi.1977, MT, WJT (1♂, WSU); same data except, Fields Spring SP, 3500–4000 ft, 7.vi.1973 (1♂, 1♀, WSU); same data except, 26.v.1974, Dry Ice MT (1♂, WSU); same data except, 12–13.vi.1974 (2♂, WSU). *Columbia County*: Tucannon Fish Hatchery, 20 mi. E Dayton [46°19′N117°39′W], 15.v.1979, sweeping, WJT (1♂, WSU). *San Juan County*: Friday Harbor [48°32′N 123°1′5W], 25.vi.1909 (1♂, USNM). *Whitman County*: Wawawai [46°38′N 117°22′W], R.W. Doane (1♂, USNM). *Yakima County*: 35 mi. S Toppenish [45°56′N 120°40′W], 14.v.1948, H.B. Leech (1♂, 1♀, CAS).

Additional material examined. CANADA. British Columbia: Nanaimo [49°09′N 123°56′W], 25.v.1925, G.J. Spencer (1♂, UBCZ). **USA. California:** *Butte County*: Yankee Hill [39°42′N 121°31′W], 20.iii.1928, H.H. Keifer (2♂, CAS). *Marin County*: Alpine Lk. [37°56′N 122°38′W], 23.iii.1956, A.M. Barnes (4♂, 5♀, EMEC); Lily Lk. nr Alpine Lk., 750 ft, 13.iii.1970, WJT (1♂, 3♀, WFBM); Lily Pond, Alpine Lk., 1500 ft, 18.v–9.vi.1978, D.D. Munroe (1♂, CNC). *Plumas County*: Butterfly Valley, 14.5 km N Quincy, 39.9939°N 120.9918°W, 1200 m, 2.v.2013, G.W. Forister (1♂, UCDC); Graeagle [39°45′N 120°37′W], 17.vi.1949, E.I. Schlinger (1♂, UCDC). *San Mateo County*: Skyline Blvd nr La Honda Rd [37°23′N 122°15′W], 20.v.1949, PHA (1♂, 1♀, USNM). *Santa Clara County*: 3 mi. W New Almaden, Herbert Ck [37°09′N 121°51′W], 18.iv.1966, JAP (1♂, EMEC); Santa Cruz Mts [37°06′N 121°50′W], 21.iii.1973, in flight, D. Whitman (1♂, EMEC). *Santa Cruz County*: Santa Cruz [36°58′19″N 122°1′35″W], 1.i.1919, E.P. Van Duzee (1♂, CAS). *Sierra County*: Sierraville [39°35′N 120°22′W], 28.vi.1966, R.L. Brumley (1♂, 1♀, UCDC). *Shasta County*: Viola, 4 mi. W [40°31′N 121°45′W], 19.v.1941, C.D. Michener (1♂, WSU); same data except, *Taraxacum vulgare* (1♀, EMEC). *Tehama County*: 35 mi. W Orland, Mud Flap Camp [39°49′N 122°39′W], 13.v.1961, D.R. Miller (1♂, UCDC). *Tuolumne County*: Ackerson Meadows, 4 mi. S Mather [37°50′N 119°50′W], 5000 ft, 14.vi.1975, N.J. Smith (1♂, UCDC). **Idaho:** *Latah County*: Moscow Mtn [46°48′N 116°52′W], 6.vii.1912 (1♂, USNM); same data except, 7.vii.1918, ALM (1♂, USNM). *Shoshone County*: St Joe NF, FR 301 at logging rd, 46.993°N 116.141°W, 1225 m, 10.vi.2009, I.S. Winkler, E09-67a (1♂, CNC). **Oregon:** *Benton County*: Corvallis, Lewisburg Saddle Rd 580 at NW Sulfur Spr. Rd, *ca* 44.636959°N

123.296457°W, 13.v.2014, SJF (2♂, CNC); 5 mi. up Woods Ck Rd jct. Hwy 20, *ca* 44.544022°N 123.503047°W, 15.v.2014, mixed woods & creek banks, SJF (1♀, CNC). *Coos County*: *ca* 3 mi. SE Remote, Rock Ck, 42°59′27″N 123°51′41″W, 28.v.2009, SEB (2♂, 1♀, CNC). *Douglas County*: Riddle [42°57′N 123°21′W], 14.iii.1936, G. Ferguson (1♂, CUIC); Roseburg [43°13′N 123°21′W], 6.iv.1938, J. Wilcox (1♂, USNM). *Hood River County*: Hood River [45°42′N 121°31′W], 24.vi.1917, F.R. Cole (1♂, USNM). *Jackson County*: Pacific Crest Trail nr Hyatt Lk. [42°10′N 122°26′W], 24.vi.1994, SJF (1♂, CSUC). *Lane County*: Eugene [44°3′N 123°5′W], 8.viii.1965, blk light trap, K. Goeden (1♂, ODAC). *Umatilla County*: Milton [45°56′N 118°23′W], 22.vi.1938, K. Gray, J. Schuh (1♂, WSU). *Union County*: U. Lick Ck, 28 mi. SE Union [45°12′N 117°52′W], 4920 ft, 19–22.vi.1977, MT baited with CO_2, E.J. Davis (1♂, WSU). *Wallowa County*: Hell's Cyn Nat. Rec. Area, Lick Crk Cpgd, 18 mi. S Joseph [45°09′N 117°01′W], 5400 ft, 5–7.vii.1992, S.D. Gaimari (1♂, CNC).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *bigoti* species group by frons narrowed below ocellar triangle, four brown scutal vittae (Fig. 66), both sexes with largely shiny abdomen, not separated into bands to largely pubescent with narrow shiny bands, male hind tibia with long, triangular digitiform anteroventral process (Figs 69, 70), and upper section of phallus broadly to strongly recurved with apex flattened with roughened lateral margin.

Description. Wing length 5.5–7.1 mm. **Male.** Similar to *E.* (*En.*) *collinsi* **sp. nov.**, except as follows: thorax with scutum with 4 broad, brownish vittae, medial vittae ending at prescutellar depression (Figs 2, 66). Proepisternum with several pale to dark setae, similar to lower occipital setae. Postpronotum with 1–2 long setae and several short, dark setae of various lengths. Scutum with 2–4 strong posterior npl, with several short anterior setulae; 1–2 presut spal; 1 psut spal; 1 pal, with short setula. Scutellum with 2–4 pairs of sctl, widely separated medially; disc bare.

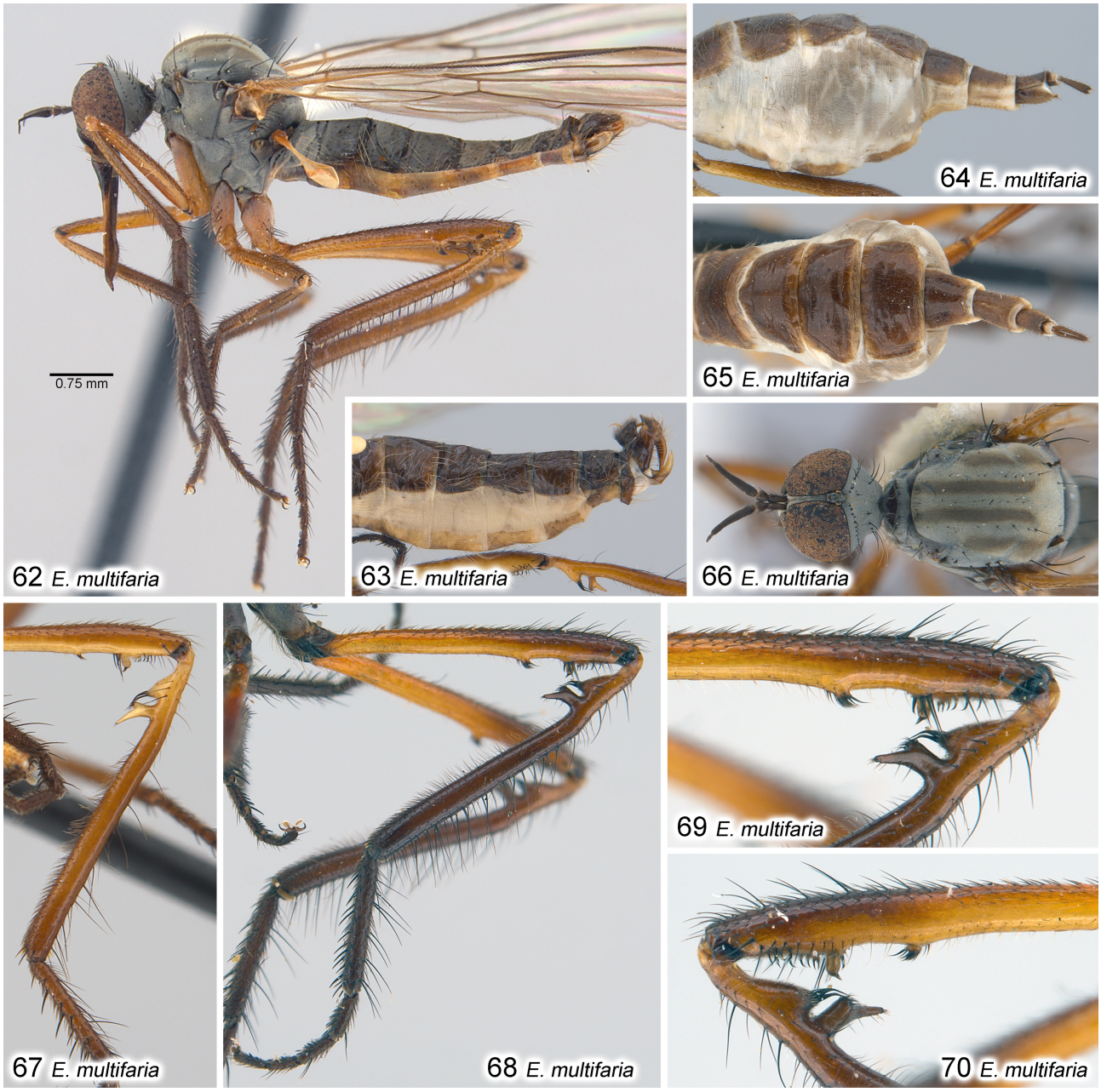
Legs long, stocky; femora without pile beneath; yellowish brown, including coxae, tarsi darker apically, coxae without greyish pruinescence to coxae with bluish pruinescence and base of femora yellowish brown, remaining segments progressively darker (Figs 2, 62). Fore tarsomere 1 usually slightly to distinctly swollen, narrower to slightly broader than width of tibia. Hind femur usually with pair of slender, knob-like anteroventral lobes on distal half, bearing short apical setae, or sometimes knobs greatly reduced to setose swelling; tubular ventral process distal to anteroventral lobes, usually apex expanded laterally with laterally-directed tuft of setae; transverse row of thickened setae proximal ventral process; row of short, hooked setae distal to ventral process; apex with preapical row of strong, twisted posteroventral setae and longer, straight posterior setae; preapical anterior seta strongly developed (Figs 67–70). Hind tibia with base slightly twisted; anteroventral triangular digitiform process on broad base on basal quarter, longer than width of tibia, tapered with several short, apical setulae, base of process with posteroventral setulae; posteroventrally with broad, triangular process with long, black apical setae, longer than process, with seta in posteroapical comb; sparse to dense rows of anterodorsal and posterodorsal setae, subequal to or twice width of tibia; proximal half with fine, erect setae ventrally, as long as width of tibia (Figs 67, 68). Hind tarsus similar to mid tarsus; tarsomere 1 slightly swollen, with several long anterodorsal and posterodorsal setae.

Abdomen dark, shiny, except tergite 1 and tergite 7 pruinescent; or abdomen mostly greyish pruinescent, with narrow shiny bands on anterior and posterior margins of tergites. Terminalia (Figs 63, 76, 77): dark brown with hypandrium and phallus shiny orange brown. Cercus shorter than epandrium, subrectangular; base of cercus partially fused with epandrium; dorsal margin straight or with slight notch near mid-length; apex rounded; setae especially dense on anterodorsal margin, nearly as long as width of cercus. Subepandrial process short, extending to either side of phallus. Epandrial lamella linear, longer than height; posterior margin truncate with short, up-turned dorsal margin; setae longer than cercal setae. Hypandrium long, extending to near base of apical section of phallus, with rounded apical margin; without setae. Phallus with basal half slightly expanded, continuous into apical section; apical half gently curved and sinuous (Fig. 77) or strongly recurved (Fig. 76), before arching dorsally; apex slightly emerging beyond cercus, apex flattened, with roughened lateral margins; ejaculatory apodeme small, nearly one-third length of epandrium, T-shaped, with lateral apodemes on lower third.

Female. Similar to male, except as follows: frons nearly as broad as ocellar triangle at narrowest point; hindleg without modified setae and processes; abdominal pleural membrane expanded between segments 4 and 5; tergites 7 and 8 pruinescent (Figs 64, 65).

Geographical distribution and seasonal occurrence (Fig. 81). *Empis* (*En.*) *multifaria* **sp. nov.** is known from British Columbia, Washington, Oregon, Idaho and California. Adults have been collected from January to August.

Etymology. From the Latin for multifarious or various, in recognition of the variability of the male legs and phallus of this species.



FIGURES 62–70. Habitus, head, thorax, abdomen and hindleg of *E.* (*Enoplempis*) *multifaria* **sp. nov. 62,** male habitus, lateral view; **63,** male abdomen and terminalia, lateral view; **64,** female abdomen, lateral view; **65,** female abdomen, dorsal view; **66,** male head and thorax, dorsal view; **67,** apex of male hind femur and hind tibia, anterior view; **68,** male hindleg, anterior view; **69,** hind femur tibia joint, anterior view; **70,** hind femur tibia joint, posterior view.

Nuptial gift presentation. Form unknown.

Remarks. This species has great variability in the density and length of dorsal setae of the hind tibia, curvature of the phallus, inflation of fore tarsomere 1 and size of knob-like lobes on the hind femur. No clear separation among the variation could be discerned and we assume this is a variable species. It is possible the variation in the shape of the phallus and even fore tarsomere 1 is dependent on the sexual maturity of the specimen.

Empis (*Enoplempis*) *paraerobatica* sp. nov.

urn:lsid:zoobank.org:act:79E3D7B8-D43C-4301-B255-4428FEEBD63A
(Figs 71, 72, 78, 79, 80)

Type material. HOLOTYPE ♂, labelled: "USA: OR: Benton Co., Corvallis,/ Lewisburg Saddle, below Old/ Growth Trail, 44°38′32.28″N/ 123°17′20.76″W, Malaise trap,/ over creek, 23.iv-6.v.2013, S./ Fitzgerald, CNC350391"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *paraerobatica* Sinclair,/ Brooks & Cumming [red label]" (CNC). **PARATYPES: USA. California:** *Butte County*: Madrone Lk. [39°38′N 121°24′W], 5.vi.1977, R.O. Schuster, E.C. Toftner (1♂, UCDC). *Calaveras County*: 8 km NE Dorrington [38°20′N 120°12′W], 24.vi.1963, PHA (1♂, 1♀, CAS). *El Dorado County*: Blodgett Forest, 13 mi. E Georgetown [38°54′N 120°39′W], 4000–4500 ft, 29.v.1971, El Ali (2♂, EMEC); same data except, 30.v.1975, E. Schlinger (1♂, EMEC); same data except, 1.vi.1975, L. Greene (2♀, EMEC); Blodgett Forest Res. Sta., 15 mi. E Georgetown, 26.v.1973, *Ceanothus*, R.W. Thorp (1♂, UCDC); Ice House [38°49′N 120°21′W], 26.v.1985 (1♂, CNC). *Lassen County*: Laufman Sta., 3 mi. SE Milford, [40°08′N 120°20′W], 5100 ft, 17.v.1982, JAP (1♂, EMEC). *Mariposa County*: Yosemite [37°44′N 119°32′W], 10.vi.1935, ALM (1♂, USNM); same data except, 14.vi.1935 (1♀, USNM); same data except, 16.vi.1935 (2♀, USNM). *Placer County*: Dutch Flat [39°12′N 120°50′W], 20.v.1952, E.I. Schlinger (1♂, UCDC). *Nevada County*: Sagehen Ck [39°25′N 120°14′W], 5.vii.1978, L.R. Bronson (1♂, UCDC); same data except, 1920 m, 16–20.vii.1982, P. Timper, #64 (1♂, UCDC); Sagehen Ck nr Hobart Mills [39°26′N 120°12′W], 24.vi.1964, A. Gillogly (1♂, UCRC). *Plumas County*: Humbug Ck, 3 mi. NW Portola [39°50′N 120°29′W], 5100 ft, 18.v.1982, JAP (1♂, EMEC); Quincy [39°56′N 120°56′W], 28.vi.1964, M.E. Irwin (1♂, UCRC). *Trinity County*: Hayfork Bally [40°39′N 123°13′W], 5000–6200 ft, 22.v.1973, on fls *Prunus emarginata*, J. Doyen (1♂, EMEC). *Tuolumne County*: Strawberry, 11 mi. N [38°17′N 119°58′W], 24.vi.1951, R.W. Morgan (1♂, EMEC); Pinecrest [38°11′N 119°59′W], 22.vii.1948, PHA (1♂, 2♀, USNM); same data except, 24.vi.1948 (1♂, 1♀, USNM); same data except, 407-3, 1.vii.1948 (1♂, USNM). **Oregon:** *Coos County*: Rogue R/Siskiyou NF, Coquille R Falls Tr. #1257, *ca* 42.713657°N 124.022767, 24.v.2014, SJF (1♂, CNC).

Diagnosis. This species is only distinguishable from *E.* (*En.*) *aerobatica* on the basis of the male terminalia, where the phallic shaft projects beyond base of apical section of the phallus and the apical phallic section is not tapered, with apex expanded with teeth-like roughened outer margin.

Description. Wing length 4.5–5.7 mm. **Male.** Similar to *E.* (*En.*) *aerobatica*, except as follows: hind tibia with anteroventral digitiform process usually broader, with setae nearly as long or longer than length of process (Fig. 72).

Terminalia (Figs 71, 78, 79): cercus slightly longer than half length of epandrium; apex slightly truncate; dorsal margin somewhat concave near mid-length; setae shorter than width of cercus. Epandrial lamella with weakly upturned dorsal margin; posterior margin rounded. Hypandrium long, with tapered, pointed apical margin; without setae. Phallus gradually expanded beyond base, arched with smoothly rounded projection beyond mid-length; apical half not tapered, broad, gently curved, apex expanded with teeth-like roughened outer surface (Fig. 79). Ejaculatory apodeme with lateral apodemes projecting perpendicular at mid-length.

Female. Similar to female of *E.* (*En.*) *aerobatica*.

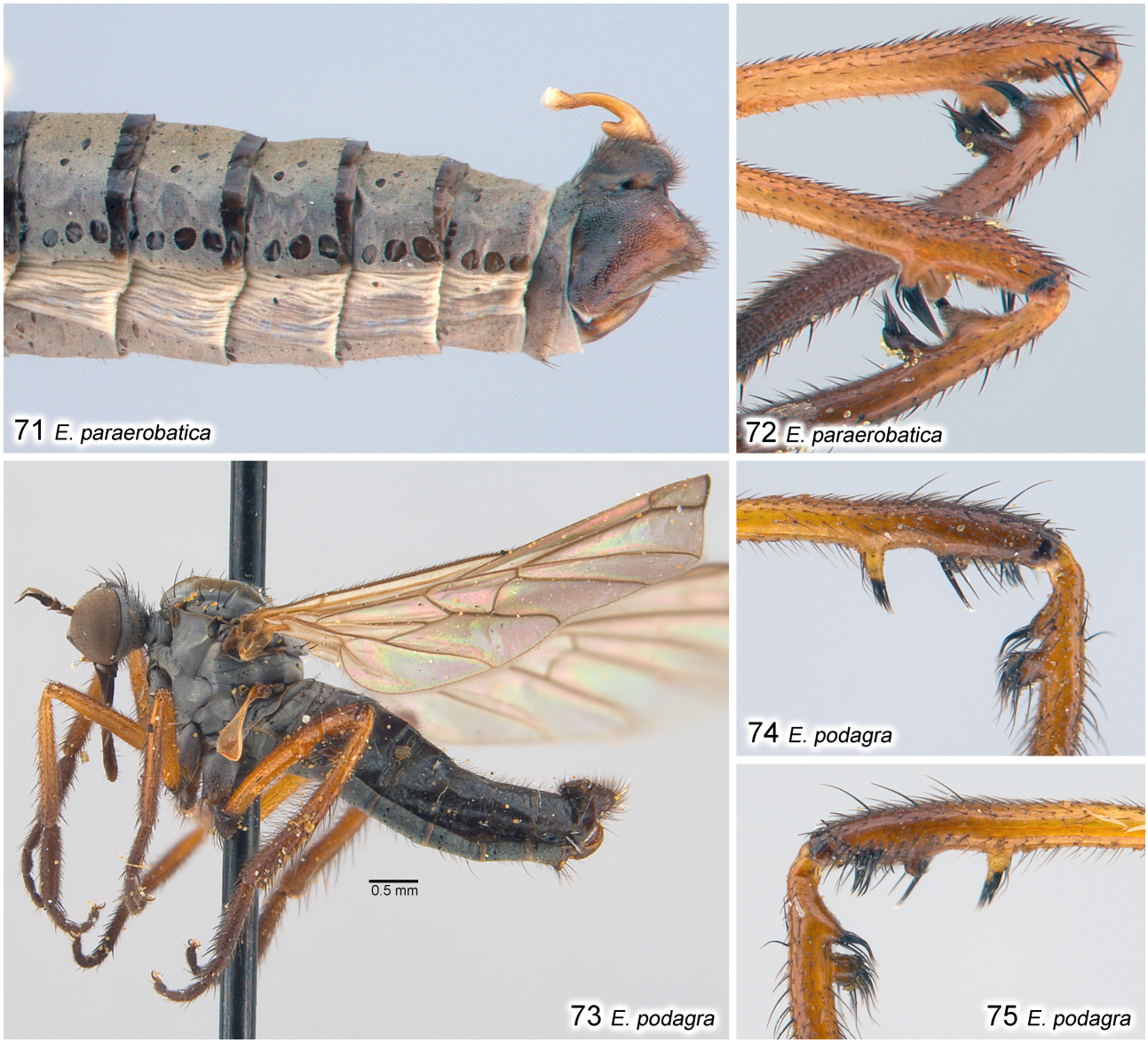
Geographical distribution and seasonal occurrence (Fig. 80). *Empis* (*En.*) *paraerobatica* **sp. nov.** is known from Oregon and California. Adults have been collected from April to July.

Etymology. The specific name is derived from the Greek *para* meaning near and *aerobatica*, in reference to the similarity with *E.* (*En.*) *aerobatica*.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *podagra* Melander
(Figs 73–75, 80, 91, 92)

Empis podagra Melander, 1902: 318. Type locality: Juliaetta, Idaho, USA.
E. (*Enoplempis*) *podagra*: Melander, 1928: 142 (assigned to subgenus *Enoplempis*).
Empis podagra: Melander, 1965: 460 (catalogue); Yang *et al*. (2007): 139 (catalogue).



FIGURES 71–75. Male habitus, abdomen, terminalia and hindleg of the *E.* (*Enoplempis*) *bigoti* species group. **71,** *E.* (*En.*) *paraerobatica* **sp. nov.**, male abdomen and terminalia (holotype), lateral view; **72,** same, hind femur tibia joint, anterior and posterior views; **73,** *E.* (*En.*) *podagra* Melander, male habitus, lateral view; **74,** same, hind femur tibia joint, anterior view; **75,** same, hind femur tibia joint, posterior view.

Type material examined. LECTOTYPE (here designated in order to fix identity of the species) ♂, labelled: "Juliaetta [46°34′N 116°42′W]/ Idaho"; "W.M. Wheeler,/ Collection."; "TYPE/ No. A.M.N.H. [red label]"; "Am. Mus. Nat. Hist./ Dept. Invert. Zool./ No. 982"; "LECTOTYPE/ *Empis podagra* Melander/ des. Sinclair, Brooks &/ Cumming 2025 [red label]" (AMNH). **PARALECTOTYPES: USA. Idaho:** Same data as lectotype (1♂, 1♀, AMNH; 1♂, USNM). *Nez Perce County*: Peck [46°28′N 116°25′W], 8.iv.1900 (1♀, USNM).

Notes on type specimens. The syntype series includes three males and two females from Juliaetta and Peck, Idaho (Melander 1902). All specimens were identified.

Additional material examined. USA. Idaho: *Latah County*: 3 mi. S Helmer [46°48′N 116°28′W], along Meadow Ck, 2800 ft, 20.v.1975, *Lomatium orogenoides*, N.E. Woodley (1♀, WSU); Juliaetta [46°34′N 116°42′W] (1♂, USNM); Kendrick [46°36′N 116°39′W] (1♂, USNM); Moscow [46°48′N 116°52′W], 17.iv.1990, R.J. Sawby (1♂, 1♀, WFBM); Moscow Mtn [46°48′N 116°52′W], 7.vii.1918, ALM (1♀, USNM); Strychnine Ck nr Laird Pk [46°56′N 116°38′W], 15 mi. ENE Potlatch, 2900 ft, 22.vi.1979, WJT (1♂ with Plecoptera prey, WSU); Troy [46°44′N 116°46′W], 4.v.1899 (1♂, USNM). *Nez Perce County*: Craig Mts [46°09′N 116°44′W], 8.vi.1918, ALM

(1♀, USNM); Lenore [46.508°N 116.551°W], 1000 ft, 7.v.1958, H.L. Harris (1♀, WFBM); Lewiston [46.41°N 117.02°W], 730–800 ft, 25.iii.1979, R.S. Bekey (1♂, WSU). **Oregon:** *Union County*: Lk. Lick Ck, 26 mi. SE Union [45°12′N 117°52′W], 4280 ft, 15–21.vi.1975, MT baited with CO_2, E.J. Davis (1♀, WSU). **Washington:** *Whitman County*: Almota [46°42′N 117°28′W], 25.vi.1913 (1♀, USNM); same data except, 28.iv.1973, WJT (6♀, WFBM); same data except, 27.iv.1972, dry ice MT (1♀, WSU); Almota, 900 ft, 17–18.iv.1981, sweeping *Salix* fls, WJT (1♂, 1♀, USNM); Almota, Almota Ck, 650 ft, 28.iv.1975, conspecific swarms, WJT (1♂, 1♀ mounted as pair with *Hilara* prey WSU); Pullman [46°43′N 117°10′W], April (1♀, USNM); same data except, 30.iv.1907 (1♀, USNM); same data except, 14.v.1901 (5♀, USNM); same data except, 20.v.1917, ALM (1♀, USNM); same data except, 13.vi.1915, M.A. Yothers (1♀, USNM); same data except, J.V. Piper (1♂, USNM); Kamiak Butte Co. Pk, 10 mi. NE Pullman [46°51′N 117°09′W], 2800 ft, 24.iv.1989, Y. Ming (1♂, WSU); Wawawai [46°38′N 117°22′W], 15.v.1921, ALM (5♀, USNM); Palouse [46.73°N 117.16°W], 12.v.1964, R.W. Dawson (1♂, WSU).

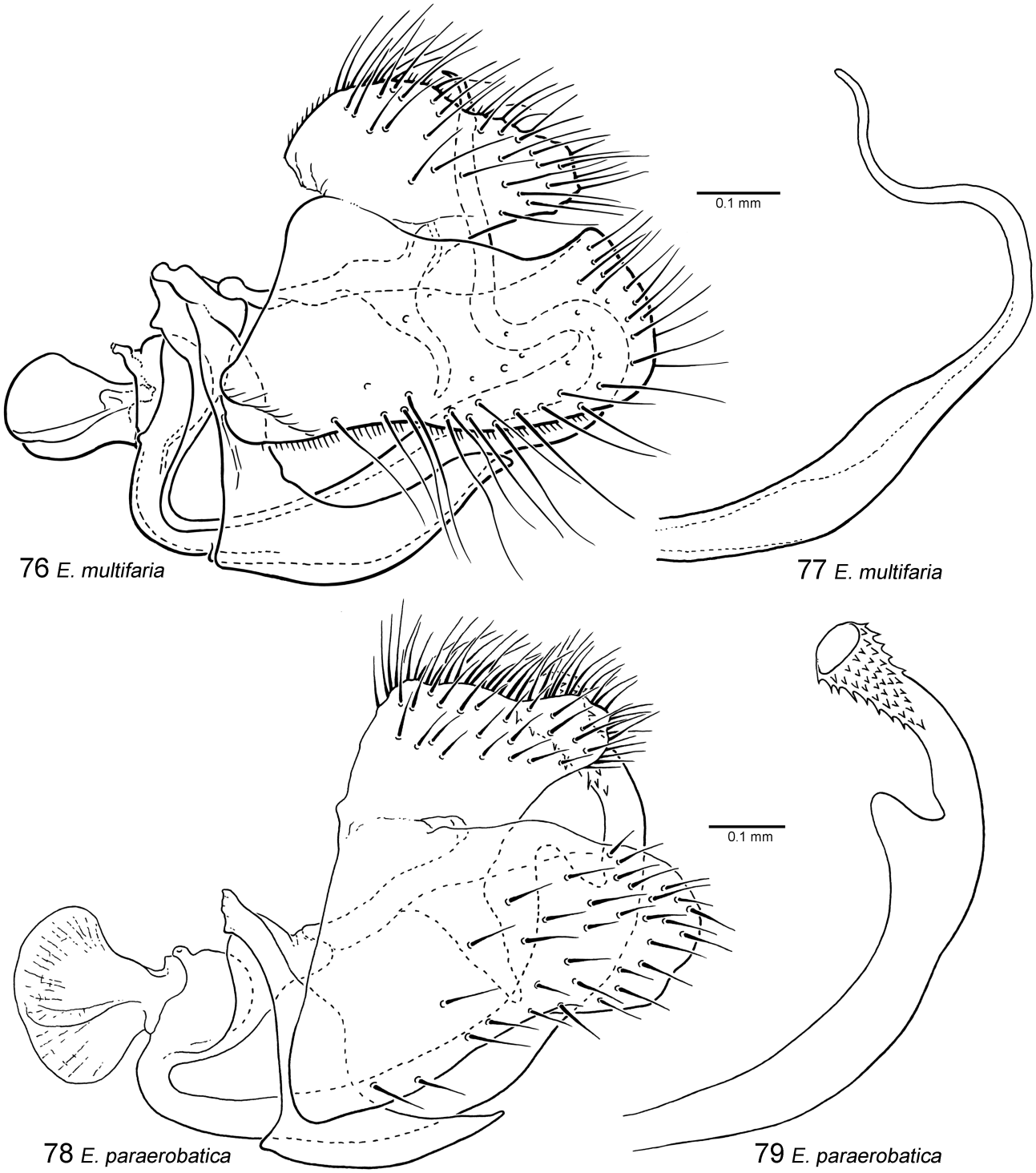
Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *bigoti* species group by the largely shiny abdomen, not separated into bands in males (Fig. 73), female abdomen with very broad shiny posterior bands, male hind femur with digitiform anteroventral process with forked distal setal tufts, well proximal to anvil-shaped anteroventral lobe of male hind tibia (Figs 74, 75), and male cercus with broad dorsal notch.

Redescription. Wing length 5.9–6.1 mm. **Male.** Head dark in ground-colour, with greyish pruinescence (Fig. 73). Dichoptic, upper ommatidia not enlarged. Frons parallel-sided, subequal to width of ocellar triangle; with short setulae along inner margin of eye. Face without setae; parallel-sided, with oral margin dark and shiny. Ocellar triangle slightly elevated, with thin greyish pruinescence, with pair of ocellar setae, subequal to or longer than upper occipital setae, with several shorter posterior setulae. Occiput bearing two rows of strong setae, longer and finer ventrally; postocular setae not differentiated; postocellar region without setae. Antenna dark; scape more than 1.5× longer than pedicel, with short, black setae; pedicel with ring of apical setae; postpedicel long, gradually tapered, more than 2× longer than basal width; stylus slightly longer than basal width of postpedicel. Palpus brownish to pale, orange brown, with dark setulae. Proboscis reddish brown, nearly twice longer than head height; labellum with short, dark setae.

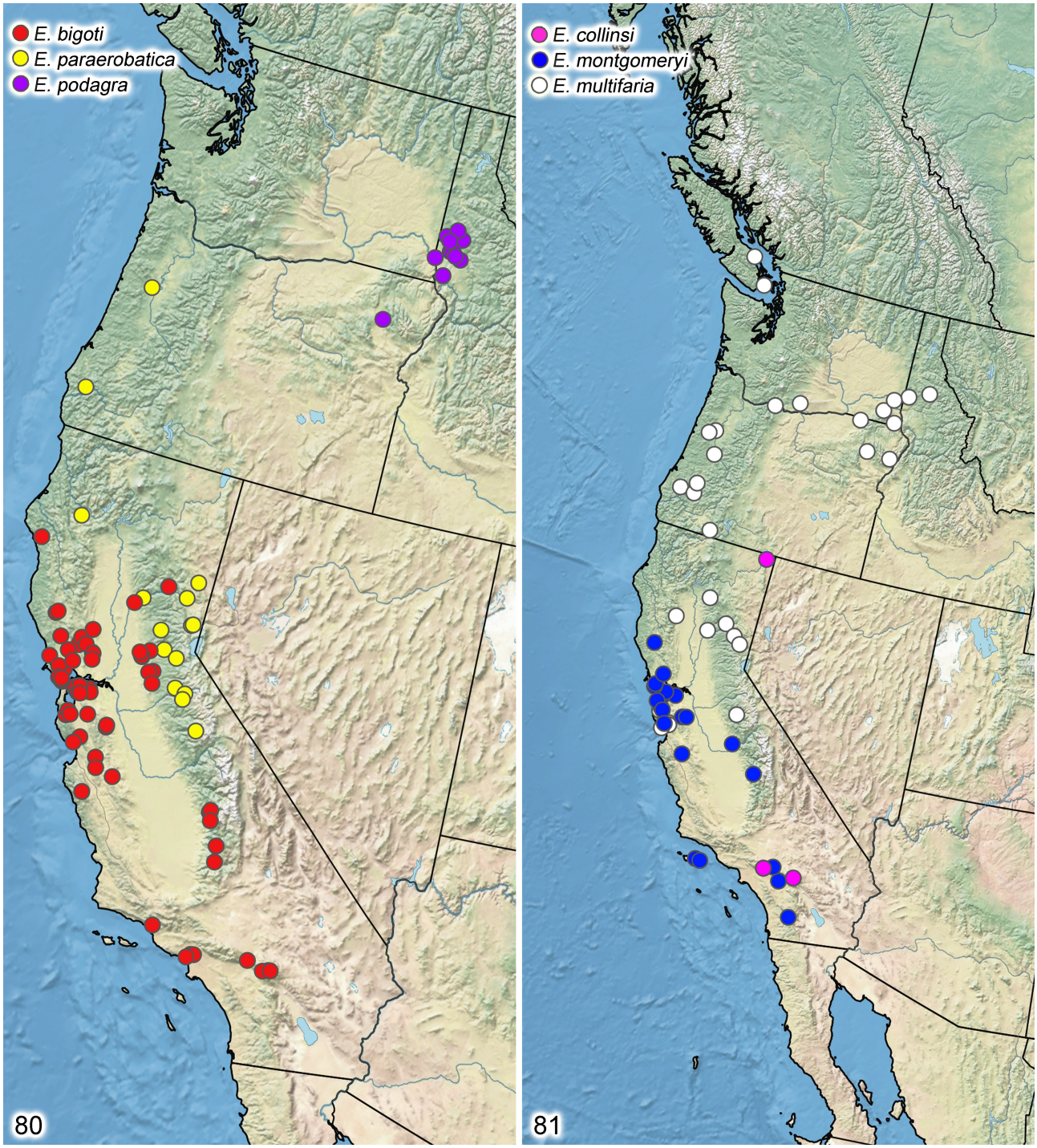
Thorax dark brown in ground-colour, densely grey pruinescent (Fig. 73). Scutum with 2 pairs of broad, brownish vittae, medial pair ending at prescutellar depression. Proepisternum with several short, black setae, similar to occipital setae; upper proepisternum in front of spiracle without setae. Prosternum bare. Antepronotum with row of short, black setae, longer laterally. Postpronotum with 1 long seta and several short, dark setae. Scutum with very short uniserial or weakly biserial acr on anterior half; dc uniserial, slightly longer than acr, extending to scutellum; 2–3 strong npl; 1 presut spal seta; 1 psut spal; 1–2 pal setae. Scutellum with 2 pairs of setae, medial pair separated by less than length of seta; disc bare. Laterotergite with patch of several strong, black setae. Anterior and posterior spiracles pale.

Legs slender, short, femora orange to brown, usually darker dorsally and apically, especially hind femur; tibiae darker, tarsi brown; coxae orange in ground colour, usually clothed in dense greyish pruinescence, concolourous with pleura (Fig. 73). Coxae with stiff, black setae. Hind trochanter with short setulae. Fore femur clothed in short, black setae. Fore tibia with several erect anterodorsal and posterodorsal setae, with ring of preapical setae. Fore tarsomere 1 swollen, slightly broader than tibia; all tarsomeres with biserial row of spine-like ventral setae; tarsomeres 2–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur clothed in short, black setae. Mid tibia often with 3–4 anterodorsal and posterodorsal setae; several preapical setae. Mid tarsus similar to fore tarsus. Hind femur with digitiform anteroventral process with forked distal setal tufts just beyond mid-length; distal third with short tubercle with long brush-like tuft of posteriorly directed setae; knob-like medial lobe, longer than wide opposite tufted tubercle, with black setulae on proximal margin; apex with preapical row of 5–6 strong, black posterior setae, with surrounding setae, longer than width of femur; preapical anterior seta sometimes weakly developed (Figs 74, 75). Hind tibia with anteroventral anvil-shaped process on basal quarter, flattened medially with long, black marginal setae, some longer than length of process; posteroventrally with broad, triangular process, with long, black lateral and apical setae, longer than process; with seta in posteroapical comb; long dorsal setae, longer distally, some nearly twice width of tibia; ventral setae shorter and thinner than dorsal setae (Figs 74, 75). Hind tarsomere 1 slightly narrower than fore tarsus, with stronger setae; tarsus otherwise similar to fore tarsus in chaetotaxy.

Wing infuscate with dark veins; veins complete, except Sc. Basal costal seta absent. R_5 and M_1 parallel near wing margin; R_5 ending at wing tip; radial fork broad. Halter pale, yellowish brown.



FIGURES 76–79. Male terminalia of the *E*. (*Enoplempis*) *bigoti* species group, lateral view. **76,** *E*. (*En*.) *multifaria* **sp. nov.**; **77,** same, phallus; **78,** *E*. (*En*.) *paraerobatica* **sp. nov.**; **79,** same, phallus.



FIGURES 80–81. Known geographical distribution of the *E.* (*Enoplempis*) *bigoti* species group. **80,** *E.* (*En.*) *bigoti* Melander, *E.* (*En.*) *paraerobatica* **sp. nov.** and *E.* (*En.*) *podagra* Melander; **81,** *E.* (*En.*) *collinsi* **sp. nov.**, *E.* (*En.*) *montgomeryi* **sp. nov.** and *E.* (*En.*) *multifaria* **sp. nov.**

Abdomen dark, mostly shiny, with anterior portion of tergites 3–7 with sparse pruinescence, tergites 1 and 2 mostly pruinescent. Pregenital segments unmodified, except sclerites of segment 8 weakly separated. Terminalia (Figs 91, 92): dark brown with epandrium shiny; hypandrium and phallus shiny brown to orange brown. Cercus shorter than epandrium, subrectangular; base of cercus fused with epandrium; dorsal margin broadly notched at mid-length; apex rounded; setae variable in length, basal setae as long as width of cercus. Subepandrial process extending to either side of phallus. Epandrial lamella linear, longer than height; posterior margin truncate with

short, up-turned dorsal margin; setae generally longer than cercal setae. Hypandrium long, extending nearly to apex of basal section of phallus; apical margin rounded; without setae. Phallus with basal half expanded beyond basal curve, usually not projecting beyond base of apical section; apical half arising apically to posterolaterally, strongly arched at nearly 90° or sharply bent at less than 90°, slender beyond curve, with sinuous apex (Fig. 92); apex not emerging beyond cercus; ejaculatory apodeme less than half-length of epandrium, T-shaped, with lateral apodemes on lower third.

Female. Similar to male, except as follows: frons slightly broader; hind femur slightly expanded subapically with ventral setae longer than proximal and distal setae; abdominal tergites either shiny or with basal portion of tergites with greyish pruinescence and broad, shiny apical bands; tergites 7 and 8 pruinescent.

Geographical distribution and seasonal occurrence (Fig. 80). *Empis* (*En.*) *podagra* is known from eastern Washington, eastern Oregon and Idaho. Adults have been collected from March to July.

Nuptial gift presentation. Among the material examined (above) is a male and female specimen mounted together with an unwrapped prey item (*Hilara* sp.) without a balloon, as well as another male with an unwrapped Plecoptera prey item. This almost certainly indicates that males of this species present unwrapped prey to females as nuptial gifts.

Empis (*Enoplempis*) *canaster* species group

(Figs 4, 82–130)

Ten species and one undescribed species are included in this group, *E*. (*En.*) *arizonensis* **sp. nov.**, *E.* (*En.*) *canaster* Melander, *E*. (*En.*) *chillcotti* **sp. nov.**, *E*. (*En.*) *contrasta* **sp. nov.**, *E.* (*En.*) *falcata* Melander, *E*. (*En.*) *fitzgeraldi* **sp. nov.**, *E*. (*En.*) *safra* **sp. nov.**, *E*. (*En.*) *sagehenensis* **sp. nov.**, *E*. (*En.*) *spokanensis* **sp. nov.** and *E*. (*En.*) *subcanaster* **sp. nov.**, which are distinguished by the subepandrium with inner setae only (without process, *e.g.,* Fig. 100), hind femur without horizontal row of strong posterior setae (*e.g.*, Fig. 87, except *E. subcanaster*, Fig. 123), and hind femur with one or two paint brush-like ventral lobes (*e.g.*, Figs 86, 98). The eastern species, *E*. (*En*.) *montywoodi* Brooks is also assigned to this species group (Appendix 2).

Empis (*Enoplempis*) *arizonensis* sp. nov.

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(Figs 82–84, 93, 129)

Type material. HOLOTYPE ♂, labelled: "w295"; "U.S.A.: ARIZONA: WHITE/ Mountains [33°54′N 109°33′W], subalpine/ meadow, A. R. Moldenke/ # refers to host & date/ CALIFORNIA ACADEMY OF/ SCIENCES COLLECTIONS"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *arizonensis* Sinclair,/ Brooks & Cumming [red label]" (CAS). **PARATYPES: USA. Arizona:** Same as holotype except, w1969 (1♂, CAS); same data except, w294 (1♂, CAS).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *canaster* species group by single paint brush-like cluster of setae and inner, unmounted narrow cluster of setae on the male hind femur, paired digitiform basal processes of the male hind tibia, and length of dorsal setae of the male hind tibia subequal to width of tibia (Figs 82–84).

Description. Wing length 7.3–7.5 mm. **Male.** Similar to *E.* (*En.*) *spokanensis* **sp. nov.**, except as follows: legs slender, yellowish brown, tarsi darker; coxae yellowish brown, partially clothed in thin greyish pruinescence (Fig. 82). Fore tarsomere 1 not inflated. Hind femur with anteroventral digitiform process, with paint brush-like setae in tight cluster; medially with unmounted narrow cluster of setae; 3 triangular posteroventral processes without setae; anterior process longest; preapical anterior seta strong, shorter than width of femur (Figs 83, 84). Hind tibia with pair of narrow digitiform processes on basal quarter; posteroventral process slightly twisted, with black setae along margins, with crown of tightly clustered, tapered setae, with knob-like, inner basal setose lobe; anteroventral process quadrate, with apex divided into 3 setal clusters, posteroventral cluster longer than length of process; posteroapical comb with seta; 4–6 strong anterodorsal and posterodorsal setae, not longer than width of tibia; ventral margin without dense, fine erect setae (Figs 83, 84). Hind tarsomere 1 not inflated, with long dorsal setae, similar to tibia.

Abdomen dark, with dense greyish pruinescence, concolourous with scutum; long, pale lateral setae on pregenital segments. Pregenital segments unmodified, except sclerites of segment 8 narrowly separated, weakly fused. Terminalia (Fig. 93): orange brown. Cercus short, rectangular; dorsal margin with broad notch at mid-length; apex with base produced posteriorly, rounded; setae longer than width of cercus; weakly fused anteriorly to epandrium. Subepandrium without process; with row of medium-length setae. Epandrial lamella oval, higher than long; posterior margin truncate, without projection, bearing long, slender setae along posterior margin. Hypandrium short, truncate; numerous strong setae of various lengths present. Phallus very narrow and tubular basally; expanded on basal half, tapered, slightly sinuous apically; apex emerging beyond cercus; apex not expanded; ejaculatory apodeme nearly as long as length of epandrium, Y-shaped, with ventrally positioned lateral apodemes.

Female. Unknown.

Geographical distribution and seasonal occurrence (Fig. 129). *Empis* (*En.*) *arizonensis* **sp. nov.** is only known from the type locality in the White Mountains of Arizona.

Etymology. This species is named after Arizona, the state in which the type locality occurs.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *canaster* Melander

(Figs 85–88, 100, 129)

Empis canaster Melander, 1902: 326. Type locality: Moscow, Idaho (USA), by lectotype designation.
Empis (*Enoplempis*) *canaster*: Melander, 1928: 142 (assigned to subgenus *Enoplempis*).
Empis canaster: Melander, 1965: 459 (catalogue); Yang *et al*., 2007: 132 (catalogue).

Type material examined. LECTOTYPE (here designated in order to fix identity of the species) ♂, labelled: "Moscow [46°48′N 116°52′W]/ Idaho"; "W.M. Wheeler,/ Collection."; "TYPE/ No. A.M.N.H. [red label]"; "Am. Mus. Nat. Hist./ Dept. Invert. Zool./ No. 977"; "LECTOTYPE/ *Empis canaster* Melander/ des. Sinclair, Brooks &/ Cumming 2025 [red label]" (AMNH). **PARALECTOTYPES: USA: Idaho:** Same data as lectotype (1♂, 1♀, AMNH; 2♂, USNM).

Notes on type specimens. This species was based on seven males and one female specimen from Idaho and Oregon (Melander 1902). Four male syntypes and one female syntype from Idaho were identified.

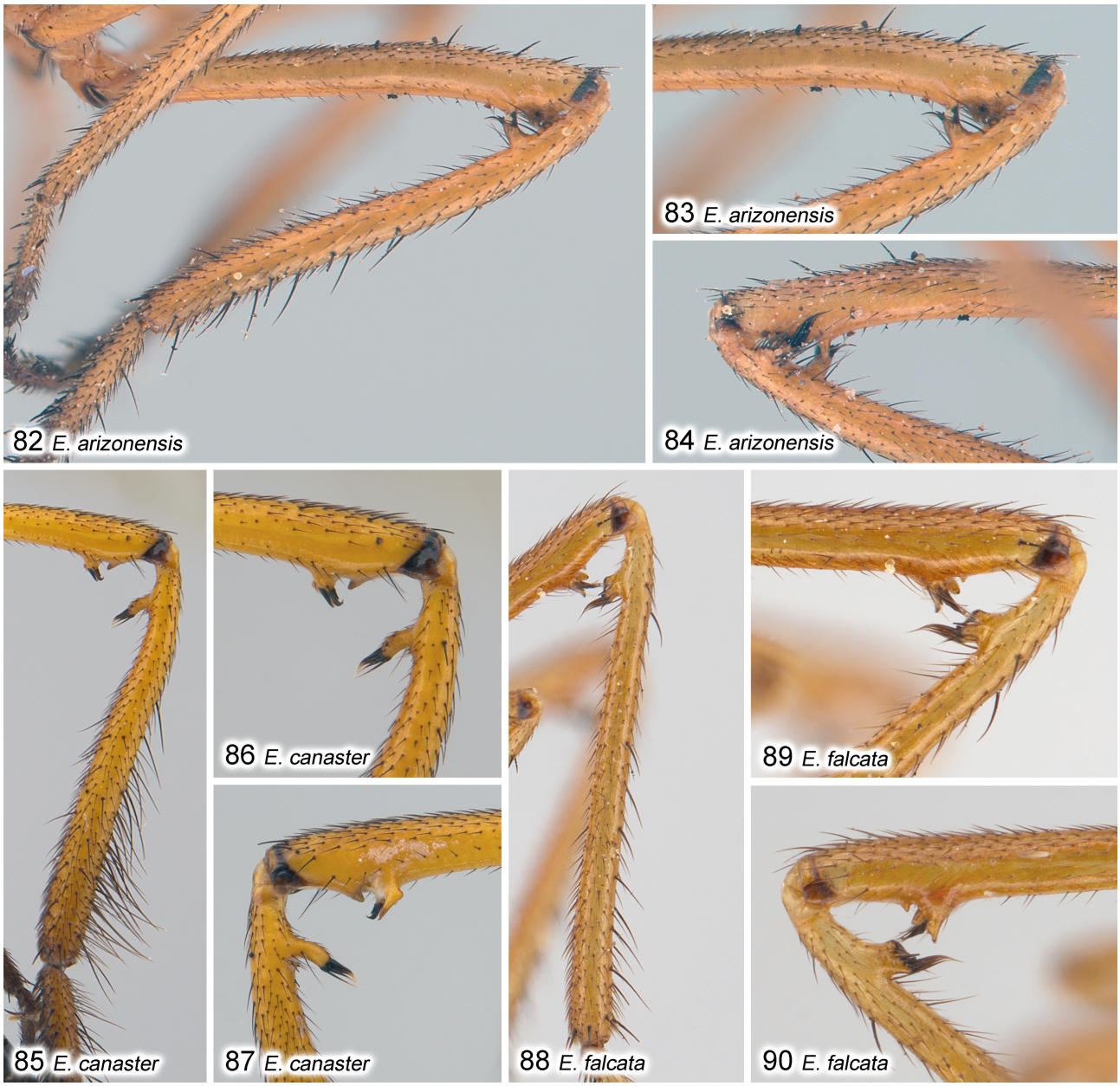
Additional material examined. USA. Idaho: *Latah County*: Laird Pk, 1.3 mi. E, 14.v.1962, WFB (1♂, WFBM); Moose Ck Rd nr Bovill, 46.868°N, 116.406°W, 870 m, 9.vi.2009, I.S. Winkler, E09-63a, EPL-13 (1♂, CNC); Paradise Ridge, 46°39′36.7″N 117°22′19.3″W, 31.v.2022, A. Hawse, *ex Lomatium multiflorum* (2♂, CNC); Potlach [46°55′N 116°53′W], 28.v.193?, J.M. Aldrich (1♂, USNM).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *canaster* species group by two paint brush-like preapical ventral lobes on the male hind femur, single digitiform basal process on the male hind tibia, and length of dorsal setae of the male hind tibia twice width of tibia (Figs 85–87).

Redescription. Wing length 6.2–7.5 mm. **Male.** Head dark in ground-colour, with greyish pruinescence. Dichoptic, upper ommatidia not enlarged. Frons divergent towards antennae; narrowest section of frons equal to width of anterior ocellus; with short setulae along inner margin of eye. Face without setae; slightly divergent towards mouthparts, with oral margin dark and shiny. Ocellar triangle elevated, with thin greyish pruinescence, with pair of parallel ocellar setae, posterior pair half length of anterior setae and several short setulae. Occiput with single median row of strong, stiff setae, shorter than ocellar setae, longer and finer ventrally; postocular setae with upper 2–3 setae strongly curved, shorter than ocellar setae, with lower postocular setae straight, half length of upper setae; postocellar region without setae. Antenna dark; scape slightly more than 2× longer than pedicel, with short, black setae; pedicel with ring of apical setae; postpedicel long and tapered, 4× longer than basal width; stylus slightly more than 1.5× longer than basal width of postpedicel. Palpus pale, yellowish brown, with dark setulae. Proboscis reddish brown, length less than 2× head height; labellum with short, dark setae.

Thorax dark brown in ground-colour, densely grey pruinescent. Scutum with 2 pairs of broad brownish vittae running between setal rows; lateral pair extending onto prescutellar depression; apex of postpronotal lobe shiny yellowish brown; postalar ridge pale brown. Proepisternum with short, dark setae on lower section; upper proepisternum in front of spiracle without setae. Prosternum bare. Antepronotum with row of 4–5 pairs of dark, stiff setae, longer laterally. Postpronotum with 1 long seta and 4–5 short, dark stiff setae. Scutum with short, fine uniserial acr; dc uniserial, slightly longer, stronger than acr, increasing in length posteriorly; 1–2 posterior npl, with

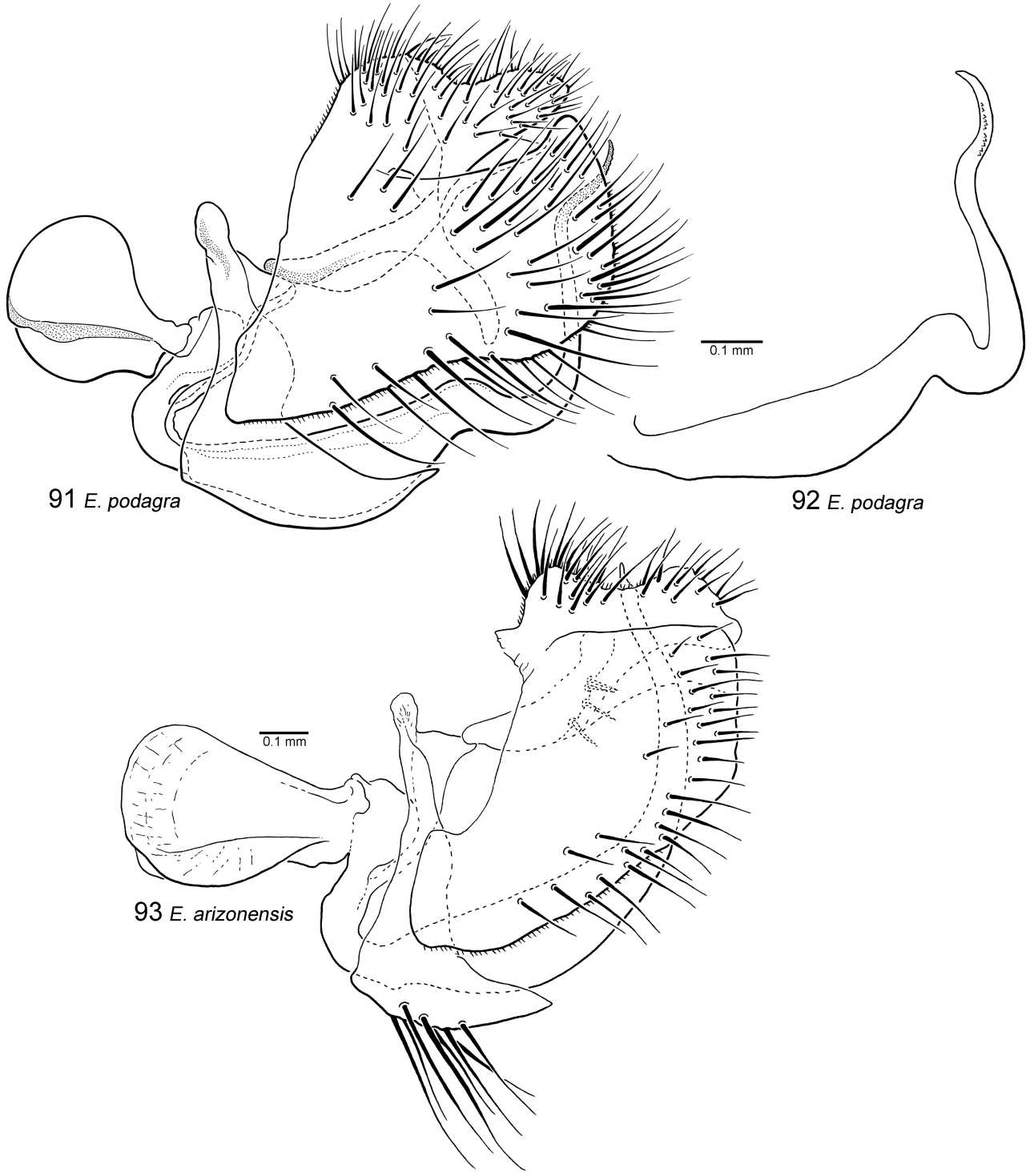
1–3 shorter anterior npl; 0 presut spal, with several setulae; 1 psut spal; 1 pal. Scutellum with 1 widely separated pair of long sctl, aligned with dc row, with 1 outer, shorter pair of marginal setulae; disc bare. Laterotergite with narrow patch of 4–5 strong, dark setae. Anterior and posterior spiracles pale.



FIGURES 82–90. Male hindleg of the *E.* (*Enoplempis*) *canaster* species group. **82,** *E.* (*En.*) *arizonensis* **sp. nov.**, hindleg, anterior view; **83,** same, hind femur tibia joint, anterior view; **84,** same, hind femur tibia joint, posterior view; **85,** *E.* (*En.*) *canaster* Melander, hind tibia, anterior view; **86,** same, hind femur tibia joint, anterior view; **87,** same, hind femur tibia joint, posterior view; **88,** *E.* (*En.*) *falcata* Melander, hind femur tibia joint (holotype), anterior view; **89,** same, hind femur tibia joint (holotype), anterior view; **90,** same, hind femur tibia joint (holotype), posterior view.

Legs slender, yellowish brown, apex of tibiae and tarsi darker; coxae yellowish brown, often mostly clothed in dense greyish pruinescence, concolourous with pleura. Coxae with stiff, black setae. Hind trochanter with short setulae. Fore femur clothed in short, black setae. Fore tibia with 3–4 long anterodorsal and posterodorsal setae on apical third, longer than width of tibia; apical half with long posterior setae; ring of outstanding preapical setae; anterior face clothed in dense short setulae. Fore tarsomere 1 swollen, as broad as basal width of tibia, with dense setulae and long setae on all faces, longer than width of tarsomere; tarsomeres 2–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur

clothed in short, black setae. Mid tibia with 3–4 posterior and posteroventral setae, subequal to width of tibia; several preapical setae surrounding apex; 3–4 anterodorsal and posterodorsal setae, subequal to width of femur. Mid tarsus similar to fore tarsus. Hind femur with 2 preapical, paint brush-like ventral processes and outer elbowed posteroventral digitiform process without setae; medial paint brush-like process broader than outer paint brush-like process; short knob-like process or ridge posterior to paint brush-like processes; apex of femur without preapical row of posterior setae; preapical anterior seta strong, shorter than width of femur (Figs 86, 87). Hind tibia with single, narrow posteroventral digitiform process on basal quarter, with crown of black setae; without seta in posteroapical comb; apical two-thirds with long dorsal setae, longer apically, less than twice width of tibia (Figs 85–87). Hind tarsomere 1 somewhat inflated, with long dorsal setae, similar to tibia; tarsomeres 2–5 similar to mid tarsus.



FIGURES 91–93. Male terminalia of the *E*. (*Enoplempis*) *bigoti* and *E*. (*En.*) *canaster* species groups, lateral view. **91,** *E*. (*En*.) *podagra* Melander; **92,** same, phallus; **93,** *E*. (*En*.) *arizonensis* **sp. nov.**

Wing slightly infuscate with dark veins, darker about node of radial fork; all veins complete (except Sc), well sclerotized; CuA+CuP distinctly reaching wing margin. Basal costal seta absent. R_5 and M_1 parallel near wing margin; R_5 ending slightly posterior to wing tip; radial fork acute. Halter pale, yellowish brown.

Abdomen dark, with dense greyish pruinescence, concolourous with scutum; long, pale lateral setae on pregenital segments. Pregenital segments unmodified; sclerites of segment 8 narrowly separated, weakly narrowly fused anteriorly. Terminalia (Fig. 100): orange brown, shiny with cercus dark brown. Cercus short, rectangular; dorsal margin slightly expanded basally; apex rounded; setae longer than width of cercus; weakly fused anteriorly to epandrium. Subepandrium without process; with row of medium-length setae. Epandrial lamella oval, higher than long; posterior margin without projection, bearing longest setae along posterior margin; some setae as long as epandrium. Hypandrium short, truncate, slightly projected laterally with arched apical margin; numerous setae of variable lengths present. Phallus very narrow and tubular basally; strongly expanded on basal half, tapered, mostly straight apically; apex not emerging beyond cercus; apex not expanded; ejaculatory apodeme longer than length of epandrium, T-shaped, with ventrally positioned lateral apodemes.

Female. Similar to male, except as follows: frons broader, nearly as wide as ocellar triangle; hindleg without modified setae and processes; abdominal pleural membrane not visible; tergite 8 shiny.

Geographical distribution and seasonal occurrence (Fig. 129). *Empis* (*En.*) *canaster* is known from Latah County in Idaho collected in May and June. Melander (1902, p. 327) also mentions additional syntype(s) from Oregon.

Nuptial gift presentation. Form unknown.

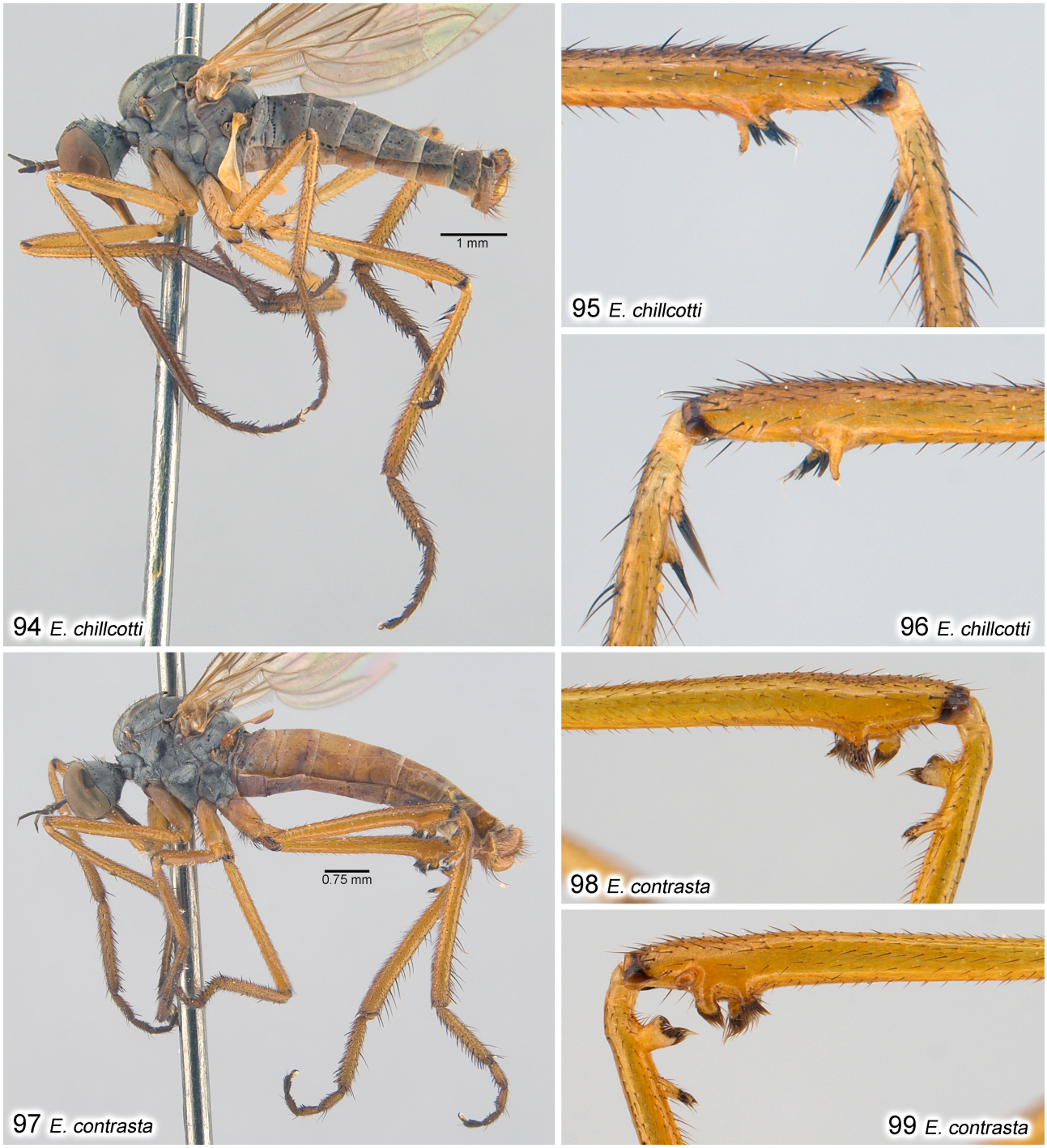
Empis (*Enoplempis*) *chillcotti* sp. nov.

urn:lsid:zoobank.org:act:AAF4CB1C-F93A-46FF-9B6E-C0FC68AAA73A
(Figs 94–96, 101, 129)

Type material. HOLOTYPE ♂ (Fig. 94), labelled: "Lakelse L. [54°23′N 128°31′W] bog/ nr. Terrace, B.C./ 14.VI 1960/ J.G. Chillcott"; "on Ledum/ blossoms"; "CNC/ 1078367"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *chillcotti* Sinclair,/ Brooks & Cumming [red label]" (CNC). **PARATYPES: CANADA. British Columbia:** Same data as holotype (2♂, 10♀, CNC); same data as holotype except, S of Terrace, 27.vi.1960, B. Heming (1♀, CNC); Haida Gwaii, Graham Is., Lepus Bay [54.166°N 133.033°W], intertidal, 15.vii.1988, S.A. Marshall (1♀, DEBU); Kleanza Ck, 14 mi. E Terrace [54°35′N 128°24′W], 250 ft, 17.vi.1960, B. Heming (2♂, CNC); same data except, CHM (1♂, CNC); same data except, wet scrub in cut over forest, JGC (1♂, CNC); same data except, 29.vi,1960, wet scrubby clearing, (2♂, CNC); same data except, on liliaceous undergrowth hemlock forest (1♂, 1♀, CNC); Hot Springs Area, Lakelse L. [54°21′N 128°32′W], 14.vi.1960, G.E. Shewell (2♂, CNC); Lakelse L. nr Terrace [54°23′N 128°31′W], 300 ft, 14.vi.1960, W.W. Moss (3♂, 4♀, CNC); same data except, R. Pilfrey (1♀, CNC); 9 mi. W Terrace [54°27′N 128°47′W], 3.vi.1960, B.S. Herring [sic] (4♂, 1♀, CNC); same data except 10 mi. W Terrace, 9.vi.1960, JGC (1♂, CNC); Prince Rupert [54°18′N 130°19′W], 4.vi.1960, B. Heming (2♂, 1♀, CNC); Victoria, Mt Douglas [48.4933°N 123.3453°W], 3.vi.1959, E.E. MacDougall (1♀, CNC); Zymoetz R, 6 mi. E Terrace [54°32′N 128°28′W], 3.vi.1960, JGC (3♂, 1♀, CNC). **USA. Alaska:** *Kenai Peninsula Borough*: Seward [60°07′N 149°26′W], 26.vii.1921 (2♂, USNM). **Washington:** *Clallum County*: Olympic NP, meadow below Sunrise Ridge, Mt Angeles [47°59′N 123°28′W], 1550 m, 24.vii.1978, DDW (1♂, CAS). *Mason County*: Lk. Cushman [47°25′N 123°13′W], 27.vi.1917, H.G. Dyar (1♂, USNM). *San Juan County*: Mt Constitution [48°40′N 122°49′W], 17.v.1910 (3♂, 1♀, USNM). *Yakima County*: 8 mi. SW Tieton RS, Snoqualmie NF, Bear Ck [46°42′N 120°45′W], 11–12.vi.1973, D. Corredor (1♂, WSU); same data except, MT with dry ice, WJT (1♂, WSU); same data except, 24–25.vi.1973 (1♀, WSU).

Possible additional material (unassociated female). USA. Alaska: Thane [58°15′N 134°19′W], 1.vii.1952 (1♀, USNM).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *canaster* species group by two paint brush-like preapical ventral lobes on the male hind femur, two digitiform basal processes on the male hind tibia (Figs 95, 96), hypandrium with long setae, and the length of the dorsal setae of the male hind tibia less than twice width of tibia (Fig. 94).



FIGURES 94–99. Male habitus and hindleg of the *E.* (*Enoplempis*) *canaster* species group. **94,** *E.* (*En.*) *chillcotti* **sp. nov.**, habitus (holotype), lateral view; **95,** same, hind femur tibia joint, anterior view; **96,** same, hind femur tibia joint, posterior view; **97,** *E.* (*En.*) *contrasta* **sp. nov.**, habitus (holotype), lateral view; **98,** same, hind femur tibia joint, anterior view; **99,** same, hind femur tibia joint, posterior view.

Description. Wing length 6.5–7.6 mm. **Male.** Similar to *E.* (*En.*) *canaster*, except as follows: head with ocellar triangle with pair of short, parallel ocellar setae, nearly subequal to length of triangle. Postpedicel and stylus dark; inner base of postpedicel, pedicel and scape yellowish brown.

Thorax with postpronotum with 1–2 short setae and several short setulae. Scutum with short, fine uniserial acr; dc uniserial, slightly longer, stronger than acr, increasing in length posteriorly; 1 long posterior npl, with several short anterior npl; 1 short presut spal; 0–1 psut spal; 1 short pal. Scutellum with 1 widely separated pair of long sctl,

aligned with dc row, with 1 outer, shorter pair of marginal setulae; disc bare. Laterotergite with narrow patch of 2–3 strong, dark setae.

Legs slender, yellow, apex of tibiae and tarsi darker; coxae yellowish, thinly clothed in greyish pruinescence (Fig. 94). Fore femur clothed in short, black setae. Fore tibia with 3–4 long anterodorsal and posterodorsal setae on apical third, longer than width of tibia; apical half with long posterior setae; ring of outstanding preapical setae; anterior face clothed in dense short setulae. Fore tarsomere 1 swollen, as broad as basal width of tibia, with long, strong ventral setae, nearly as long as width of tarsomere; tarsomeres 2–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur clothed in short, black setae, with anteroventral row of short, slender setae. Mid tibia with 3–4 posterior and posteroventral setae, subequal to width of femur; several preapical setae surrounding apex; 3–4 anterodorsal and posterodorsal setae, subequal to width of femur. Mid tarsus similar to fore tarsus. Hind femur with 2 preapical, paint brush-like ventral processes and outer curved posteroventral digitiform process without setae; outer paint brush-like process broader than inner paint brush-like process; without knob-like process or ridge posterior to paint brush-like processes; apex of femur without preapical row of posterior setae; preapical anterior seta strong, shorter than width of femur (Figs 95, 96). Hind tibia with narrow posteroventral digitiform process on basal quarter, with black setae along margin and apex, longer than process; anteroventral digitiform process similar to posteroventral process with long setae confined to apex, with knob-like swelling at base; with seta in posteroapical comb; apical two-thirds with long dorsal setae, longer apically, slightly longer than width of tibia (Figs 95, 96). Hind tarsomere 1 somewhat inflated, with 2 pairs of long dorsal setae, similar to tibia; tarsomeres 2–5 similar to mid tarsus.

Abdomen with sclerites of segment 8 narrowly separated, fused anteriorly. Terminalia (Fig. 101): orange brown, shiny with cercus dark brown. Cercus rectangular, subequal to length of epandrium; dorsal margin depression medially; apex truncate, strongly sclerotized; setae longer than width of cercus; weakly fused anteriorly to epandrium. Subepandrium without process; with row of medium-length setae. Epandrial lamella subtriangular, higher than long; posterior margin rounded without projection, with setae concentrated along posterior margin; setae shorter than epandrium. Hypandrium short, truncate, slightly projected laterally; numerous setae of variable lengths present, some twice length of hypandrium. Phallus very narrow and tubular basally; strongly expanded on basal half, tapered, mostly straight apically; apex not emerging beyond cercus; apex not expanded; ejaculatory apodeme longer than length of epandrium, T-shaped, with ventrally positioned lateral apodemes.

Female. Similar to male, except as follows: frons broader, nearly as wide as ocellar triangle; hindleg without modified setae and processes. Abdominal pleural membrane apparently not expanded; tergite 8 subshiny, with thin pruinescence.

Geographical distribution and seasonal occurrence (Fig. 129). *Empis* (*En.*) *chillcotti* **sp. nov.** is known from Alaska, British Columbia and Washington. Adults have been collected from May to July.

Etymology. This species is named in honour of the late James (Jim) G. Chillcott (CNC), who collected the holotype and many other valuable empidoid specimens.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *contrasta* sp. nov.

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(Figs 97–99, 102, 129)

Type material. HOLOTYPE ♂ (Fig. 97), labelled: "CAL: Tulare Co./ Potwisha [36°31′N 118°48′W], 3 mi./ NE Ash. Mt. V-4-1979 M. Buegler"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *contrasta* Sinclair,/ Brooks & Cumming [red label]" (EMEC). **PARATYPES: USA. California:** *El Dorado County*: Blodgett Forest, 13 mi. E Georgetown [38°54′N 120°39′W], 4000–4500 ft, 2.vi.1973, E. Schlinger (1♀, EMEC); Emerald Bay, Eagle Falls [38°57′N 120°06′W], 27.vi.1971, *ca* 1880 m, PHA & M.M. Arnaud (1♂, USNM); 10 mi. N Ice House Rd [38.875°N 120.373°W], 5500 ft, 31.v.1975, R.M. Brook (1♀, UCDC). *Marin County*: Lily Lk. nr Alpine Lk. [37°57′N 122°38′W], 680–720 ft, 22.iv.1973, S. Swezey (1♀, EMEC). *Mariposa County*: Yosemite Val. [37°43′N 119°38′W], 16.vi.1921, E.C. Van Dyke (4♂, 4♀, CAS). *Mono County*: 4 mi. E Monitor Pass [38°39′N 119°35′W], 24.vi.1962, JAP (1♀, EMEC). *Nevada County*: Sagehen Ck [39°24′N 120°11′W], 22.v.1972, M.L. Kok (1♀, UCDC). *San Bernardino County*: Crestline [34°14′N 117°17′W], 19.vi.1944, ALM (1♂, USNM). *Sierra County*: Yuba Pass [39.617°N 120.490°W],

29.v.1966, C.R. Kovacic (1♀, UCDC). *Shasta County*: 15 mi. S McCloud, McCloud R Preserve [41.094°N 122.114°W], vi.1975, A.E. Hajek (1♀, EMEC). *Tehama County*: Deer Creek [39°55′N 122°04′W], 6.vi.1949, R.M. Bohart (1♂, UCDC); same data except, 23.v.1955 (2♀, UCDC). *Tulare County*: same data as holotype (1♀, EMEC); Johnsondale [35°58′29″N 118°32′27″W], 10–20.vi.1985, J.F. Macdonald (3♂, CNC).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *canaster* species group by the distinctly yellow or orange-brown legs and abdomen, contrasting with the grey thorax (Fig. 97), and male hind tibia with deeply forked anteroventral lobe (Figs 98, 99).

Description. Wing length 7.0–7.8 mm. **Male.** Similar to *E.* (*En.*) *fitzgeraldi* **sp. nov.** except as follows: head with frons slightly wider than anterior ocellus. Ocellar triangle with very short, divergent ocellar setae, as long as ocellar triangle. Postocular setae short, finer than occipital setae.

Thorax with scutum with short, fine biserial acr.

Legs long, slender, with coxae and femora yellow to yellowish brown and apical tarsomeres darker; coxae sometimes with thin greyish pruinescence (Fig. 97). Fore tarsomere 1 somewhat inflated, slightly thinner than apical width of tibia. Hind femur with stout anteroventral paint brush-like process, apical setae longer on outer margin; pair of setose posteroventral processes similar to paint brush-like anteroventral process; apex of femur with distally arched posterior lobe, without setae; without preapical row of posterior setae; preapical anterior seta strong, shorter than width of femur (Figs 98, 99). Hind tibia with deeply forked anteroventral lobe, bearing crown of short, black apical setae; posteroventral process broad, with shallow inner groove, dividing apex into two setose lobes; anterodorsal and posterodorsal setae long and denser apically, slightly longer than width of tibia (Figs 98, 99). Hind tarsomere 1 somewhat inflated, with distinct dorsal setae.

Abdomen orange brown, contrasting with grey thorax. Terminalia (Fig. 102): orange, with apical dorsal margin of cercus dark. Cercus short, rectangular; dorsal margin concave near mid-length; apex rounded and somewhat expanded; setae shorter than width of cercus; weakly fused anteriorly to epandrium. Subepandrium without process; with row of medium-length setae. Epandrial lamella subtriangular, higher than long; posterior margin without projection, broadly rounded; posterior margin with short setae. Hypandrium long, apical margin rounded with medial cleft, not projected laterally; base with pair of closely approximated, strong setae nearly as long as hypandrium. Phallus very narrow and tubular basally; strongly expanded on basal half, greatly narrowed, curved apically; apex emerging beyond cercus; apex narrow, tapered; ejaculatory apodeme shorter than length of epandrium, Y-shaped, with ventrally positioned lateral apodemes.

Female. Similar to male, except as follows: frons broader, nearly as wide as ocellar triangle; hindleg without modified setae and processes; abdominal pleural membrane not visible; sternite 4 with long pale setae, as long as length of sclerite; tergites 7 and 8 shiny.

Geographical distribution and seasonal occurrence (Fig. 129). *Empis* (*En.*) *contrasta* **sp. nov.** is known from California. Adults have been collected from April to June.

Etymology. This species is named for the contrasting colouration of the thorax with the legs and abdomen.

Nuptial gift presentation. Form unknown.

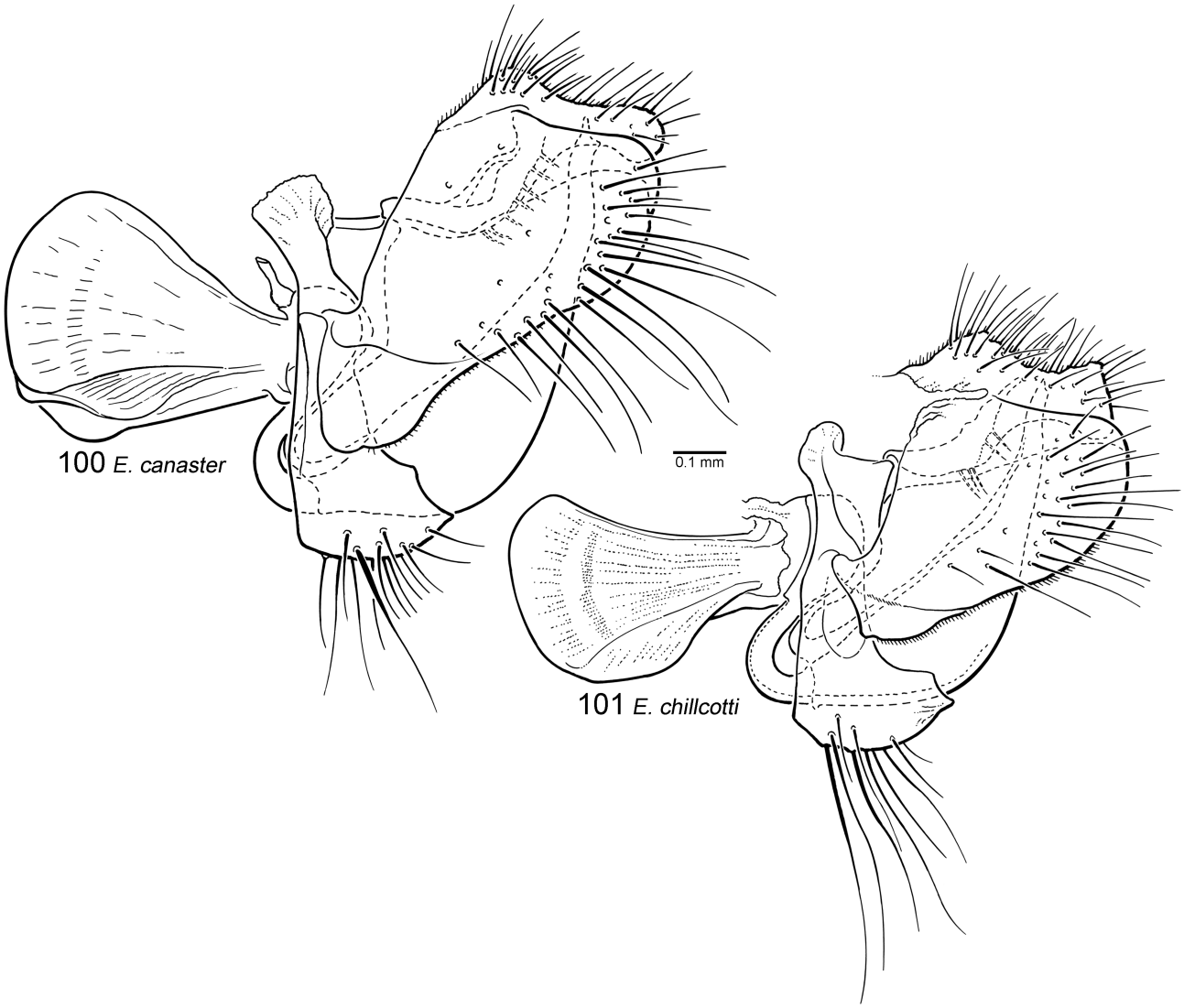
Empis (*Enoplempis*) *falcata* Melander

(Figs 88–90, 103, 129)

Empis falcata Melander, 1902: 326. Type locality: Juliaetta, Idaho (USA), by lectotype designation.
Empis (*Enoplempis*) *falcata*: Melander, 1928: 142 (assigned to *Enoplempis*).
Empis falcata: Melander, 1965: 459 (catalogue); Yang *et al*., 2007: 134 (catalogue).

Type material examined. LECTOTYPE (here designated in order to fix identity of the species) ♂, labelled: "Juliaetta [46°34′N 116°42′W]/ Idaho"; "E. falcata/ TYPE Mel."; "ALMelander/ Collection/ 1965"; "LECTOTYPE/ *Empis falcata* Melander/ des. Sinclair, Brooks &/ Cumming 2025 [red label]" [dissected] (USNM).

Notes on type specimens. This species was based on a single male from Berkely [sic], California (AMNH) and a male and female from Juliaetta, Idaho. Only a single male from Juliaetta has been found. It is suspected that the California specimen is not conspecific, given the distribution based on the additional material and the observation that many species in the Pacific Northwest at most only extend as far south as northern California.



FIGURES 100–101. Male terminalia of the *E*. (*Enoplempis*) *canaster* species group, lateral view. **100,** *E*. (*En*.) *canaster* Melander; **101,** *E*. (*En*.) *chillcotti* **sp. nov.**

Additional material examined. USA. Idaho: *Idaho County*: same data as holotype except, J.M. Aldrich (1♂, USNM); Clearwater NF, Hwy 12, Three Devils Picnic Area, 2–3 km W Lowell, 13.vi.2014, 450 m, 46°08.155′N 115°38.681′W, small str., BJS (1♂, CNC).

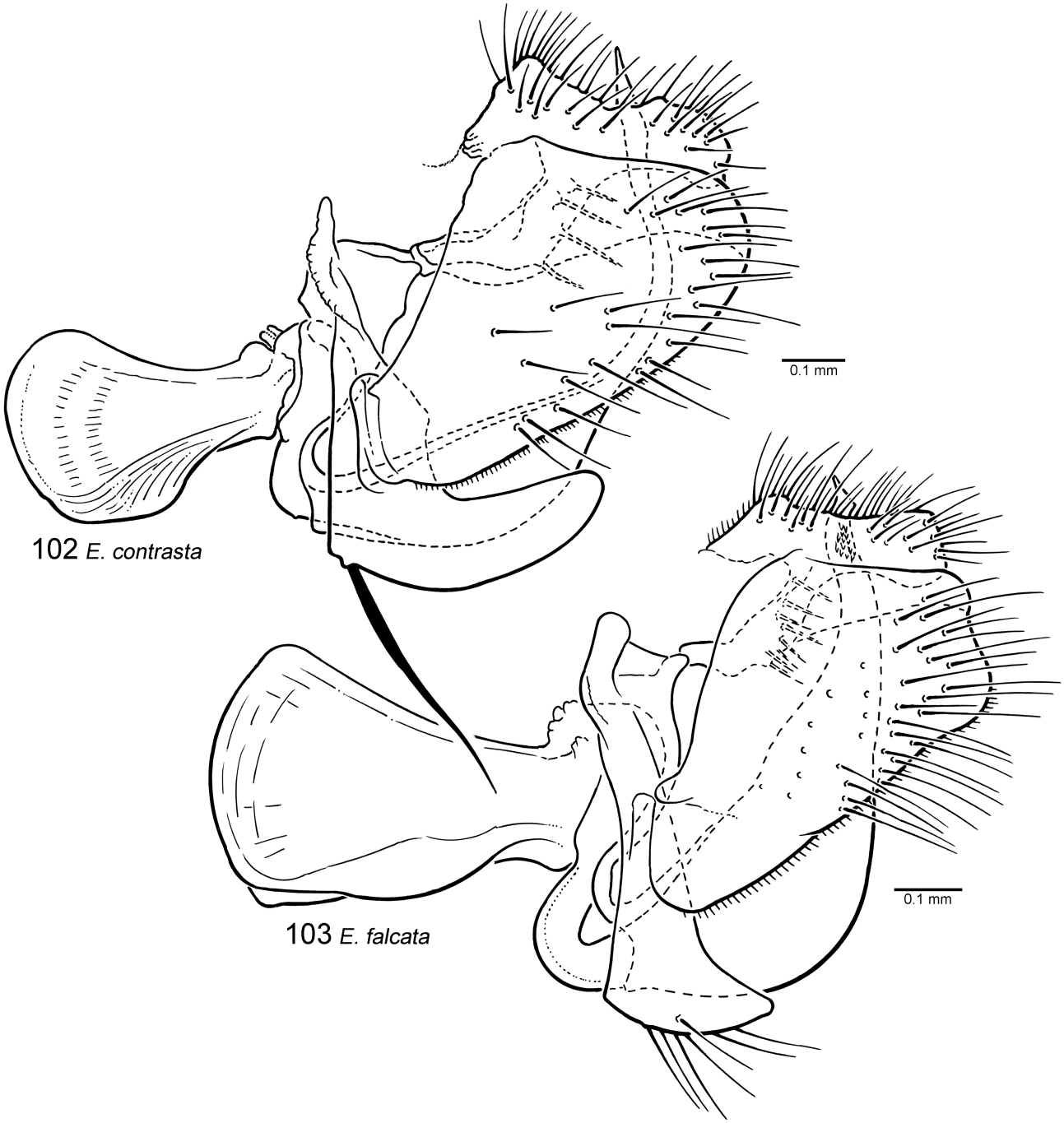
Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *canaster* species group by the short, broad, triad posteroventral process on the male hind tibia, digitiform posteroventral process of the male hind tibia comprising three closely appressed tufted lobes, and length of the dorsal setae on the male hind tibia only slightly longer than width of tibia (Figs 88–90).

Redescription. Wing length 6.8–7.5 mm. **Male.** Similar to *E.* (*En.*) *canaster*, except as follows: head with ocellar setae short, subequal to length of ocellar triangle. Occiput with single median row of short, stiff setae, shorter than ocellar setae, longer and finer ventrally; postocular setae with upper 2–3 setae slightly curved, short than ocellar setae, with lower postocular setae straight, half length of upper setae. Postpedicel and scape dark brown; scape and pedicel pale brown.

Thorax similarly patterned; margin of scutellum yellowish brown. Antepronotum with row of 4–5 pairs of short, dark setae. Postpronotum with 1 short seta and 4–5 short setae. Scutum with 1 posterior npl, with 1–2 short anterior npl setae; 0 presut spal, with several setulae; 1 very short psut spal; 1 pal. Scutellum with 1 pair of short sctl, separated by twice length of setae, with 1 outer, shorter pair of marginal setulae. Laterotergite with 1–2 setae.

Legs slender, yellowish, apical tarsi darker; coxae yellowish, without greyish pruinescence. Fore tibia without

long posterior setae. Fore tarsomere 1 narrow; tarsomeres 1–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Hind femur with 2 preapical, paint brush-like ventral processes and outer, forked digitiform posteroventral process without setae; medial paint brush-like process arising directly from swelling on femur; outer paint brush-like process, short, with strong outer setae, outer setae of brush longer; short slender process posterior to paint brush-like processes; apex of femur without preapical row of posterior setae; preapical anterior seta strong, shorter than width of femur (Figs 89, 90). Hind tibia with posteroventral process comprising 3 closely appressed tufted lobes; outer lobe with apical setae longer than length of lobe; with seta in posteroapical comb; apical two-thirds with dorsal setae subequal to width of tibia (Figs 88–90). Hind tarsomere 1 not swollen, with dorsal setae, similar to tibia.



FIGURES 102–103. Male terminalia of the *E*. (*Enoplempis*) *canaster* species group, lateral view. **102,** *E*. (*En*.) *contrasta* **sp. nov.**; **103,** *E*. (*En*.) *falcata* Melander.

Wing with R_5 and M_1 slightly divergent near wing margin.

Abdomen with sternites yellowish; tergites greyish, paler than thorax; sparely clothed in pale setae. Sclerites of segment 8 narrowly separated. Terminalia (Fig. 103): orange brown, shiny with cercus dark brown. Cercus short, rectangular; dorsal margin slightly expanded basally; apex truncate; setae slightly longer than width of cercus. Subepandrium without process; with row of medium-length setae. Epandrial lamella subtriangular, higher than long; posterior margin somewhat truncate, without projection, bearing longer setae along posterior margin. Hypandrium short, truncate, with shallowly concave margin; numerous short setae present. Phallus very narrow and tubular basally; strongly expanded on basal half, tapered, mostly straight with apex partially curved; apex emerging beyond cercus; apex not expanded; ejaculatory apodeme longer than length of epandrium, T-shaped, with ventrally positioned lateral apodemes.

Female. Unknown.

Geographical distribution and seasonal occurrence (Fig. 129). *Empis* (*En.*) *falcata* is known from Idaho County in Idaho collected in June. Melander (1902, p. 326) mentioned an additional male from Berkeley, California (not located) that is probably not conspecific.

Nuptial gift presentation. Form unknown.

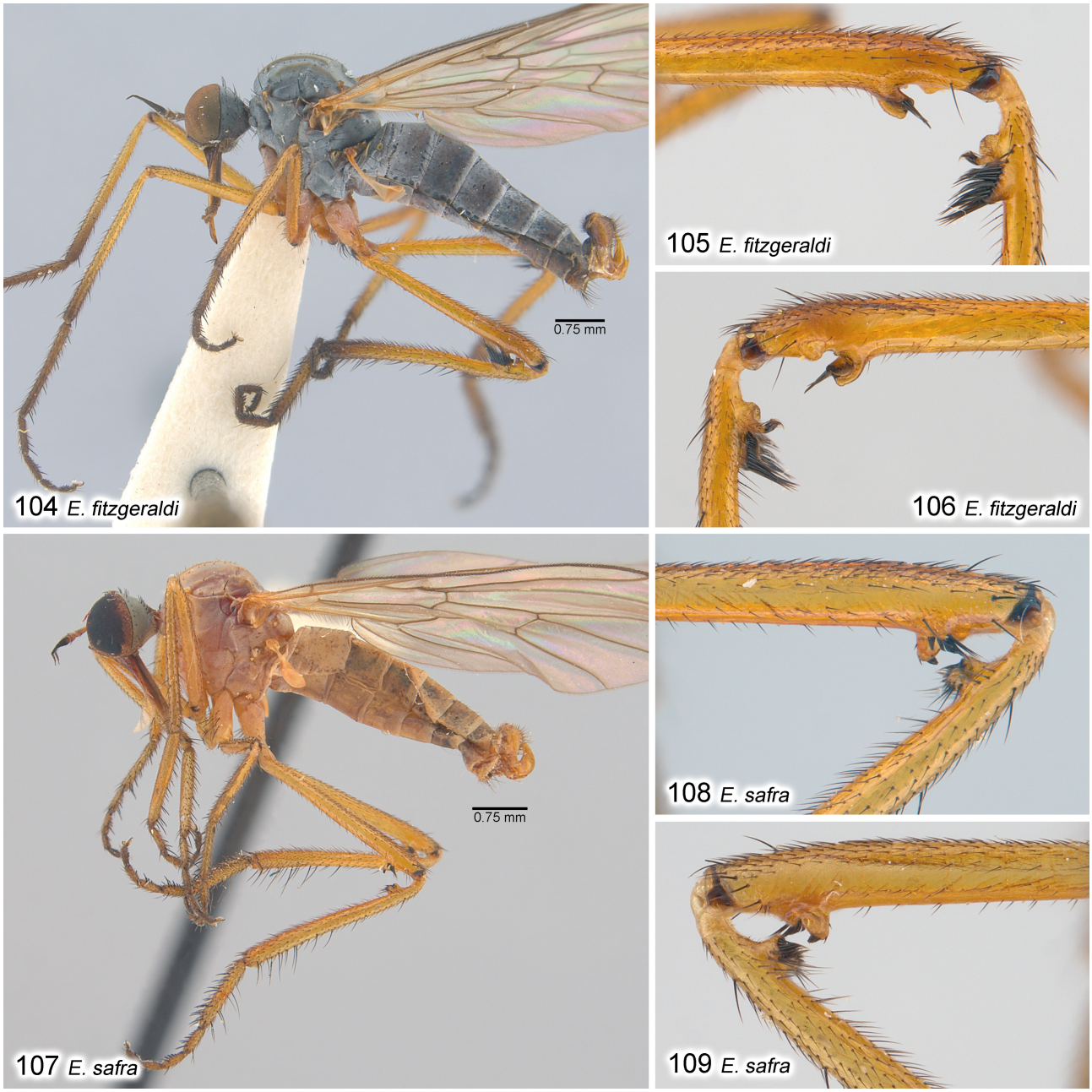
***Empis* (*Enoplempis*) *fitzgeraldi* sp. nov.**

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(Figs 4, 104–106, 110, 130)

Type material. HOLOTYPE ♂, labelled: "USA: OR: Benton Co./ Corvallis, Lewisburg Saddle, below Old/ Growth Trail, 44°38′32.28″N/ 123°17′20.76″W, Malaise trap,/ over creek, 23.iv.-6.v.2013, S./ Fitzgerald CNC350419"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *fitzgeraldi* Sinclair,/ Brooks & Cumming [red label]" (CNC). **PARATYPES: CANADA. British Columbia:** Agassiz [49°14′N 121°46′W], 22.v.1922, R. Glendenning (1♂, USNM); same data except, 1.v.1924 (1♂, USNM); Bowser [49°26′N 124°40′W], 31.v.1955, R. Coyles (1♂, CNC); same data except, 7.vi.1955 (1♀, CNC). **USA. California:** *Marin County*: Lk. Lagunitas [37°56′51″N 122°35′46″W], 30.iii.1961, D.Q. Cavagnaro (1♂, UCDC); Lagunitas [38°0′N 122°42′W], 20.iii.1952, K.W Tucker (1♂, UCDC); Lily Pond, Alpine Lk. [37°56′N 122°38′W], 1500 ft, 18.iii–1.iv.1971, MT, D.D. Munroe (1♀, CNC); same data except, 11.iv–9.v.1970 (1♂, 4♀, CNC); same data except, 15–25.v.1971 (1♂, CNC); Lily Lk. [37°56′N 122°38′W], Mt Tamalpais, 10.iv.1978, DDW (1♂, CAS); Mill Valley [37°54′N 122°33′W], 10.iv.1926 (1♂, CAS); same data except, 11.iv.1926 (1♂, CAS); same data except, 10.iii.1926, E.P. Van Duzee (1♂, CAS); same data except, 19.iv.1950, at light, H.B. Leech (1♂, CAS); Mt Tamalpais [37°55′N 122°34′W] along Cataract and Kent Trails, 12.iv.1979, DDW (1♂, CAS); Tocaloma [38°03′N 122°45′W], 14.iv.1962, C.W. O'Brian (1♂, EMEC). *Mendocino County*: UC Hopland Field Sta. [39°00′N 123°04′W], 1.v.1969, MT with dry ice, WJT (2♂, WSU); same data except, nr H.Q., 20.iv.1969 (1♂, 1♀, WSU); No. Cal. Coast Range Pres., 5 mi. N Branscomb, 26.v.1976, JAP (1♂, EMEC); same data except, 1400 ft, 12–14.v.1978, JAP (1♂, EMEC); NCCRP, 3 mi. N Branscomb [39°42′N 123°39′W], 1400 ft, 30.iv.1977, K. Yagi (1♂, EMEC); same data except, C. Nawalinski (1♂, EMEC); same data except, 18–20.iv.1980, J.R. Wilson (1♂, EMEC); same data except, 30–31.v.1980, E. Waits (1♂, EMEC). *San Mateo County*: Sky Londa [37°23′N 122°15′W], 25.iii.1943, PHA (1♂, 1♀, USNM); Woodside [37°25′N 122°15′W], 4.iv.1906 (1♂, LACM); same data except, R.W. Doane (1♂, LACM; 1♀, USNM). *Santa Clara County*: Alum Rock Pk [37.3977°N 121.7996°W], San Jose, 5.iv.1906 (1♂, USNM); KPC 11-06, Monte Bello Open Space Pres., Stevens Ck Tr., 37.32575°N 122.1792°W, 16.iv.2011, K. Collins *et al.* (3♂, CNC); Stanford U. [37°25′N 122°10′W], 9.iii.1906 (1♂, USNM). *Santa Cruz County*: 2 mi. N Ben Lomond [37°4′N 122°5′W], 19.iii.1961, D.F. Veirs (1♂, LACM). *Solano County*: Cold Cyn Reserve [38°30′N 122°5′W], 17–18.iv.1982, L.G. Bezark (1♂ with Tipuloidea prey); Green Valley [38°15′N 122°9′W], 20.iii.1936 (1♂, CAS); same data except, 2.iv.1952, R.M. Bohart (16♂, 1♀, UCDC). *Sonoma County*: Big Sulfur Ck [38°44′N 122°42′W], 18.iv.1990, E. Bergly (1♂, CSUC). **Oregon:** *Benton County*: same data as holotype except, CNC350415 (1♂, CNC); same data as holotype except, 23.iv–6.v.2013, CNC351182 (1♀, CNC); 0.5 mi. W Adair A.F. Sta. [44°40′N 123°13′W], 15.v.1969, E.M. Fisher (1♂, CNC); Corvallis, 3430 NW Deer Run St., 44°36′6″N 123°18′51″W, 20.iv–6.vi.2018, MT, SJF (1♂, CNC); 4 mi. up Woods Ck Rd jct. Hwy 20, [44.5440°N 123.5030°W], sweep banks of Woods Ck, 22.iv.2013, SJF (2♂, CNC); 5 mi. up Woods Ck Rd jct. Hwy 20, *ca* 44.544022°N 123.503047°W, 15.v.2014, mixed woods & creek banks, SJF (1♂, CNC); 6.4 mi. up Woods Ck Rd

from jct. Hwy 20 [44°32′N 123°31′W], MT across old road, fir/alder/maple, 12.iv–5.vi.2015, SJF (1♂, CNC); Sulfur Springs, 6 mi. N Corvallis [44°38′N 123°18′W], 8.v.1956, W.J. Hogg (1♂, RBCM). *Coos County*: *ca* 3 mi. SE Remote, Rock Ck, 42°59′27″N 123°51′41″W, 28.v.2009, SEB (1♂, CNC); same data except, J.M. Cumming (1♀, CNC); Rogue R/Siskiyou NF, Coquille R Falls Tr. #1257, *ca* 42.713657°N 124.022767, 24.v.2014, SJF (1♂, CNC). *Lane County*: Oakridge, 18 mi. NW [43°52′N 122°42′W], 12.v.1969, E.M. & J.L. Fisher (11♂, 12♀, CSCA; 1♂, 1♀, CAS). **Washington:** *King County*: L. Sammamish SP [47°33′N 122°03′W], 6.v.1969 (1♂, ODAC). *San Juan County*: Mt Constitution [48°40′N 122°49′W], 17.v.1910 (1♂, USNM). *Whatcom County*: Bellingham [48°45′N 122°29′W], 15.v.1910 (1♂, USNM).



FIGURES 104–109. Male habitus and hindleg of the *E.* (*Enoplempis*) *canaster* species group. **104,** *E.* (*En.*) *fitzgeraldi* **sp. nov.**, habitus, lateral view; **105,** same, hind femur tibia joint, anterior view; **106,** same, hind femur tibia joint, posterior view; **107,** *E.* (*En.*) *safra* **sp. nov.**, habitus (holotype), lateral view; **108,** same, hind femur tibia joint, anterior view; **109,** same, hind femur tibia joint, posterior view.

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *canaster* species group by the distinctly yellow coxae contrasting with the grey pleura, and male hind tibia with large, concave anteroventral lobe with apical border fringed with long, appressed black setae (Figs 4, 104–106).

Description. Wing length 6.0–8.4 mm. **Male.** Head dark in ground-colour, with greyish pruinescence. Dichoptic, upper ommatidia not enlarged. Frons divergent towards antennae; narrowest section of frons equal to width of anterior ocellus; with short setulae along inner margin of eye. Face without setae; slightly divergent towards mouthparts, with oral margin dark and shiny. Ocellar triangle elevated, with thin greyish pruinescence, with divergent ocellar setae, shorter than upper postocular setae; several short posterior setulae. Occiput with single median row of strong, stiff setae, shorter than upper postocular setae, longer and finer ventrally; postocular setae with upper 2–3 setae strong with upper portion strong arched, with lower postocular setae straight, half length of upper setae; postocellar region without setae. Antenna dark; scape slightly more than 2× longer than pedicel, with short, black setae; pedicel with ring of apical setae; postpedicel long and tapered, more than 3× longer than basal width; stylus slightly more than 1.5× longer than basal width of postpedicel. Palpus pale, yellowish brown, with dark setulae. Proboscis yellowish to reddish brown, with apex and base darker, length less than 2× head height; labellum with short, dark setae.

Thorax dark in ground-colour, densely grey pruinescent. Scutum with 2 pairs of broad brownish vittae running between setal rows; lateral pair extending beyond prescutellar depression; apex of postpronotal lobe shiny yellowish brown; postalar ridge pale brown. Proepisternum with short, dark setae on lower section; upper proepisternum in front of spiracle without setae. Prosternum bare. Antepronotum with row of 4–5 setae divided into two lateral groups. Postpronotum with 1 long seta and several short, dark stiff setae. Scutum with short, fine uniserial acr; dc uniserial, slightly longer, stronger than acr, increasing in length posteriorly; 1 strong posterior npl, with 1–3 short anterior npl; 1 very short presut spal; 1 psut spal; 1 pal. Scutellum with 1 widely separated pair of sctl, aligned with dc row, slightly longer than pprn; 2 outer, shorter pairs of marginal setulae; disc bare. Laterotergite with row of 3–5 strong, dark setae. Anterior and posterior spiracles pale.

Legs long, slender, with coxae and femora yellow to yellowish brown and apex of tibiae and tarsi darker; coxae sometimes with thin greyish pruinescence (Fig. 104). Coxae with stiff, black setae. Hind trochanter with short black setae. Fore femur clothed in short, black setae. Fore tibia with 1–2 short anterodorsal setae, shorter than width of tibia; several outstanding preapical setae; anterior face clothed in dense short setulae. Fore tarsomere 1 slender; tarsomeres 1–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur clothed in short, black setae. Mid tibia with 3–4 posterior and posteroventral setae, subequal to width of tibia; several preapical setae surrounding apex; 3–4 anterodorsal and posterodorsal setae, subequal to width of femur. Mid tarsus similar to fore tarsus. Hind femur with short anteroventral process with long crown of laterally projecting appressed setae, nearly twice length of process; narrow hooked lobe medial to anteroventral process; apex of femur with rounded posterior lobe; without preapical row of posterior setae; preapical anterior seta strong, shorter than width of femur (Figs 105, 106). Hind tibia with large, concave anteroventral lobe with apical border fringed with long, appressed black setae; posteroventral lobe with broad, flattened base, with narrow distal branch bearing tuft of obliquely directed setae; with seta in posteroapical comb; anterodorsal and posterodorsal setae long and denser apically, slightly longer than width of tibia (Figs 104–106). Hind tarsomere 1 somewhat inflated, with distinct dorsal setae; tarsomeres 2–5 similar to mid tarsus.

Wing infuscate with dark veins, darker about node of radial fork; all veins complete (except Sc), well sclerotized. Basal costal seta absent. R_5 and M_1 parallel near wing margin; R_5 ending posterior to wing tip; radial fork acute. Halter pale, yellowish brown.

Abdomen dark, with dense greyish pruinescence, concolourous with scutum. Pregenital segments unmodified, except sclerites of segment 8 narrowly separated, weakly narrowly fused anteriorly. Terminalia (Fig. 110): brown. Cercus short, rectangular; dorsal margin concave near mid-length; apex rounded and somewhat expanded; setae shorter than width of cercus; weakly fused anteriorly to epandrium. Subepandrium without process; with row of medium-length setae. Epandrial lamella oval, longer than height; posterior margin without projection, broadly rounded; posterior margin with short setae. Hypandrium short, truncate, not projected laterally; without setae. Phallus very narrow and tubular basally; expanded on basal half, tapered, strongly curved apically; apex emerging beyond cercus; apex narrow, tapered; ejaculatory apodeme slightly shorter than length of epandrium, T-shaped, with ventrally positioned lateral apodemes.

Female. Similar to male, except as follows: frons broader, nearly as wide as ocellar triangle; hindleg without modified setae and processes; abdominal pleural membrane not visible; tergite 8 shiny.

Geographical distribution and seasonal occurrence (Fig. 130). *Empis* (*En.*) *fitzgeraldi* **sp. nov.** is known from southern British Columbia, Washington, Oregon, and northern and central California. Adults have been collected from March to June.

Etymology. This species is named after fellow dipterist Scott J. Fitzgerald, who collected the holotype.

Nuptial gift presentation. A male specimen was examined with an unwrapped crane fly (Tipuloidea) prey item pinned below the specimen. This may indicate that males of this species present unwrapped prey to females as nuptial gifts.

Empis (*Enoplempis*) *safra* sp. nov.

urn:lsid:zoobank.org:act:A9004A4A-AFFD-4365-8B17-F85BE652A371
(Figs 107–109, 111, 130)

Type material. HOLOTYPE ♂ (Fig. 107), labelled: "OREGON: Big Creek [44°57′N 117°41′W], 26/ mi. SE Union, 4200 ft./ Baker Co., E. J. Davis/ VI-(12-14)-1977/ Malaise baited with CO_2"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *safra* Sinclair,/ Brooks & Cumming [red label]" (WSU). **PARATYPES: USA. Oregon:** *Baker County*: Same data as holotype except, 27–30.vi.1976 (1♂, WSU); U. Goose Ck, 34 mi. SE Union [44°56′N 117°25′W], 4160 ft, 12–14.vi.1977, MT baited with CO_2, E.G. Davis (1♀, WSU); same data except, 19–22.vi.1977 (2♂, 3♀, WSU); same data except, 29.vi–5.vii.1975 (1♀, WSU); Velvet Ck [45°1′N 117°31′W], 28 mi. SE Union, 4720 ft, Wallowa-Whitman NF, 17.vi.1977, sweeping, WJT (3♂, 1♀, CNC); same data except, 20–22.vi.1976, E.J. Davis (1♀, WSU).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *canaster* species group by the yellow body colour, scutum with pair of yellowish-brown vittae, two paint brush-like preapical ventral lobes on the male hind femur, pair of digitiform basal processes on the male hind tibia, and the length of the distal dorsal setae of the male hind tibia is longer than width of tibia (Figs 107–109).

Description. Wing length 7.1–7.5 mm. **Male.** Similar to *E.* (*En.*) *canaster*, except as follows: head grey in ground-colour, with pale greyish pruinescence. Ocellar triangle elevated, with thin greyish pruinescence, with very short, parallel ocellar setae, shorter than triangle and several short setulae. Occiput with single median row of strong, stiff setae, subequal in length to ocellar setae; postocular setae with upper 2–3 setae stronger and slightly longer than ocellar setae, with shorter, thinner lower postocular setae. Postpedicel and stylus dark; scape and pedicel distinctly yellowish-brown; scape slightly more than 2× longer than pedicel; postpedicel long, tapered, 4× longer than basal width; stylus slightly more than 1.5× longer than basal width of postpedicel. Palpus pale, yellowish brown, with dark setulae.

Thorax yellow in ground-colour, densely grey pruinescent (Fig. 107). Scutum with pair of yellowish brown vittae running between setal rows; apex of postpronotal lobe shiny yellow. Postpronotum with 1 short seta and several dark, stiff setulae. Scutum with short, fine uniserial acr; dc uniserial, slightly longer, stronger than acr; 1 posterior npl, with 1–2 very short anterior npl; 1 presut spal; 1 psut spal; 1 pal. Scutellum with 1 widely separated pair of short sctl, aligned with dc row, shorter than half length of scutellum; 1 outer, shorter pair of marginal setulae. Laterotergite with narrow patch of 2–4 strong, dark setae.

Legs slender, yellow, tarsi slightly darker; coxae yellow, often with thin pruinescence (Fig. 107). Fore femur clothed in short, black setae. Fore tarsomere 1 swollen, slightly broader than apex of tibia, without dense setulae; long ventral setae, longer than width of tarsomere; tarsomeres 2–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Hind femur with 2 preapical, paint brush-like ventral processes and outer, broad, laterally flattened posteroventral process with tuft of black setae; small knob-like posteroventral process distal to broad process; medial paint brush-like process narrow without base; outer paint brush-like process broad with setae longer laterally, directed obliquely; apex of femur without preapical row of posterior setae; preapical anterior seta strong, shorter than width of femur (Figs 108, 109). Hind tibia with pair of processes on basal quarter; posteroventral process short, broad with crown of apicolateral black setae; anteroventral process short, expanded laterally with short, strong setae along apical face and longer, thinner apical setae; setae in posteroapical comb; apical half with long dorsal setae, longer apically, slightly longer than width of tibia; ventral face with fine, erect setae (Figs 107–109). Hind tarsomere 1 somewhat inflated, with several long dorsal setae, similar to tibia; tarsomeres 2–5 similar to mid tarsus.

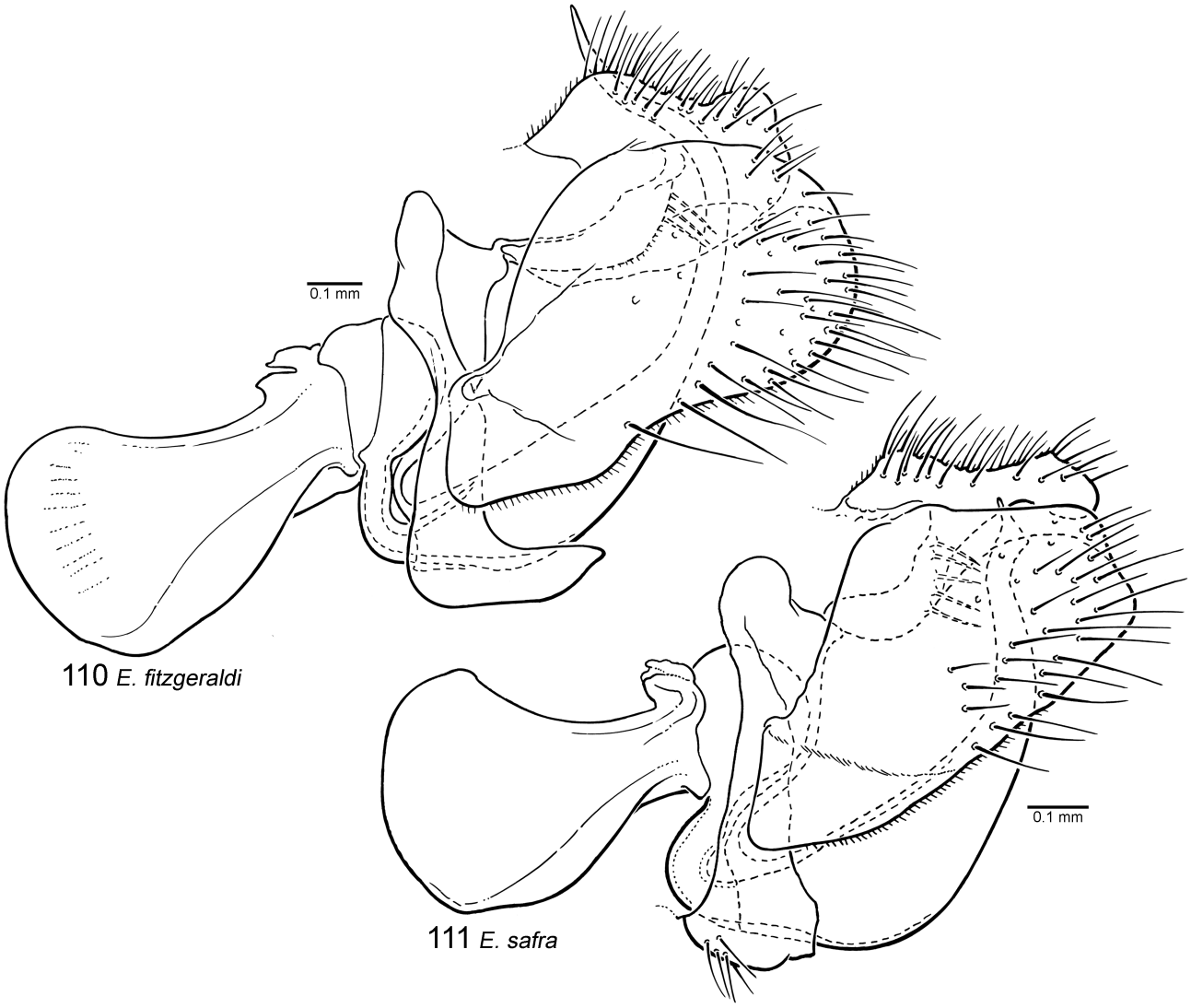
Abdomen yellow, with thin pruinescence, concolourous with scutum; long, pale lateral setae on pregenital segments. Pregenital segments unmodified, except sclerites of segment 8 narrowly separated, fused anteriorly. Terminalia (Fig. 111): yellow, shiny with cercus dark brown. Cercus, rectangular; dorsal margin slightly sinuous; apex rounded, downcurved; setae longer than width of cercus; weakly fused anteriorly to epandrium. Subepandrium without process; with row of medium-length setae. Epandrial lamella subtriangular, higher than long; posterior margin without projection, bearing longest setae along posterior margin; setae shorter than half length of epandrium. Hypandrium short, truncate, slightly projected laterally with straight apical margin; several thin setae, shorter than length of hypandrium. Phallus very narrow and tubular basally; strongly expanded on basal half, tapered, sinuous apically; apex not emerging beyond cercus; apex not expanded; ejaculatory apodeme longer than length of epandrium, T-shaped, with ventrally positioned lateral apodemes.

Female. Similar to male, except as follows: frons broader, nearly as wide as ocellar triangle; hindleg without modified setae and processes; abdominal pleural membrane not expanded; tergite 8 subshiny; cercus brown.

Geographical distribution and seasonal occurrence (Fig. 130). *Empis* (*En.*) *safra* **sp. nov.** is only known from Baker County, Oregon. Adults have been collected in June and July.

Etymology. This species is named after *safra* (Arabic) in reference to its yellowish body colouration.

Nuptial gift presentation. Form unknown.



FIGURES 110–111. Male terminalia of the *E.* (*Enoplempis*) *canaster* species group, lateral view. **110,** *E.* (*En.*) *fitzgeraldi* **sp. nov.**; **111,** *E.* (*En.*) *safra* **sp. nov.**

***Empis* (*Enoplempis*) *sagehenensis* sp. nov.**
urn:lsid:zoobank.org:act:741D7BD8-7709-4D4A-8B10-4C3B6A0D8189
(Figs 112–114, 119, 130)

Type material. HOLOTYPE ♂, labelled: "Sagehen Creek/ nr. Hobart Mills [39°24′N 120°11′W]/ Nevada Co. Cal./ VII-1-1964"; "M. E. Irwin/ Collector"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *sagehenensis* Sinclair,/ Brooks & Cumming [red label]" (UCRC). **PARATYPES: USA. California:** Same data as holotype except, 15.vii.1964 (1♀, UCRC); same data except, 17.vi.1964, R.M. Bohart (1♂, UCDC); same data except, 7.vii.1964, MT in meadow (1♂, UCRC).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *canaster* species group by two paint brush-like preapical ventral lobes on the male hind femur and posteroventral process with posterior forked lobe, three digitiform basal processes of the male hind tibia, including a short lobe with long, wavy cluster of setae, and length of the dorsal setae on the male hind tibia less than twice width of tibia (Figs 112–114).

Description. Wing length 5.6–7.0 mm. **Male.** Similar to *E.* (*En.*) *canaster*, except as follows: head with ocellar setae parallel, shorter than ocellar triangle; postocular setae with upper 2–3 setae strong, subequal in length to ocellar setae, with lower postocular setae thinner.

Thorax with postpronotum with 1–2 short setae and several shorter, dark stiff setulae. Scutum with short, fine uniserial acr; dc uniserial; 1 posterior npl, with 1 shorter anterior npl; 1 presut spal; 1 psut spal; 1–2 pal. Scutellum with 1 widely separated pair of very short sctl, aligned with dc row, with 1 outer, shorter pair of marginal setulae. Laterotergite with 2 stiff, dark setae.

Legs slender, yellow, tarsi darker; coxae yellowish, thinly clothed in greyish pruinescence. Fore tarsomere 1 somewhat swollen, slightly narrower than apex of tibia. Hind femur with 2 preapical, paint brush-like ventral processes and outer posteroventral digitiform process without setae, divided into inner finger-like lobe and broad outer forked lobe; medial paint brush-like process narrow, without base; outer paint brush-like process with setae grouped into finger-like, divergent clusters; short knob-like posteroventral process distal to forked lobe; apex of femur without preapical row of posterior setae; preapical anterior seta strong, shorter than width of femur (Figs 113, 114). Hind tibia with three posteroventral digitiform processes on basal quarter; anteroventral lobe digitiform with long, black inner and outer marginal setae, with few apical setae; posteroventrally with upper hooked lobe with short, strong apical setae; lower posteroventral lobe short with long, wavy cluster of black setae extending beyond upper lobe; seta in posteroapical comb; apical half with long dorsal setae, longer apically, less than twice width of tibia (Figs 112–114). Hind tarsomere 1 weakly inflated, with long dorsal setae, similar to tibia; tarsomeres 2–5 similar to mid tarsus.

Halter yellowish.

Terminalia (Fig. 119): orange brown, shiny with cercus dark brown. Cercus short, rectangular; dorsal margin slightly sinuous; apex rounded with lower corner distinctly prolonged; setae longer than width of cercus; weakly fused anteriorly to epandrium. Subepandrium without process; with row of medium-length setae. Epandrial lamella oval, higher than long; posterior margin without projection, setae shorter than half length of epandrium. Hypandrium long, projecting, with arched apical margin; without setae. Phallus very narrow and tubular basally; gradually expanded on basal half, tapered, gradually arched apically; apex emerging beyond cercus; apex not expanded; ejaculatory apodeme longer than length of epandrium, T-shaped, with ventrally positioned lateral apodemes.

Female. Similar to male, except as follows: frons broader, nearly as wide as ocellar triangle; hindleg without modified setae and processes; abdomen yellow, with pleural membrane enlarged; tergites 7 and 8 shiny.

Geographical distribution and seasonal occurrence (Fig. 130). *Empis* (*En.*) *sagehenensis* **sp. nov.** is only known from Sagehen Creek in Nevada County, California. Adults have been collected in June and July.

Etymology. This species is named after the type locality, Sagehen Creek in Nevada County, California.

Nuptial gift presentation. Form unknown.



FIGURES 112–118. Male habitus and hindleg of the *E.* (*Enoplempis*) *canaster* species group. **112,** *E.* (*En.*) *sagehenensis* **sp. nov.**, hind tibia (holotype), lateral view; **113,** same, hind femur tibia joint (holotype), anterior view; **114,** same, hind femur tibia joint (holotype), posterior view; **115,** *E.* (*En.*) *spokanensis* **sp. nov.**, hind tibia, lateral view; **116,** habitus (holotype), lateral view; **117,** same, hind femur tibia joint, anterior view; **118,** same, hind femur tibia joint, posterior view.

***Empis* (*Enoplempis*) *spokanensis* sp. nov.**

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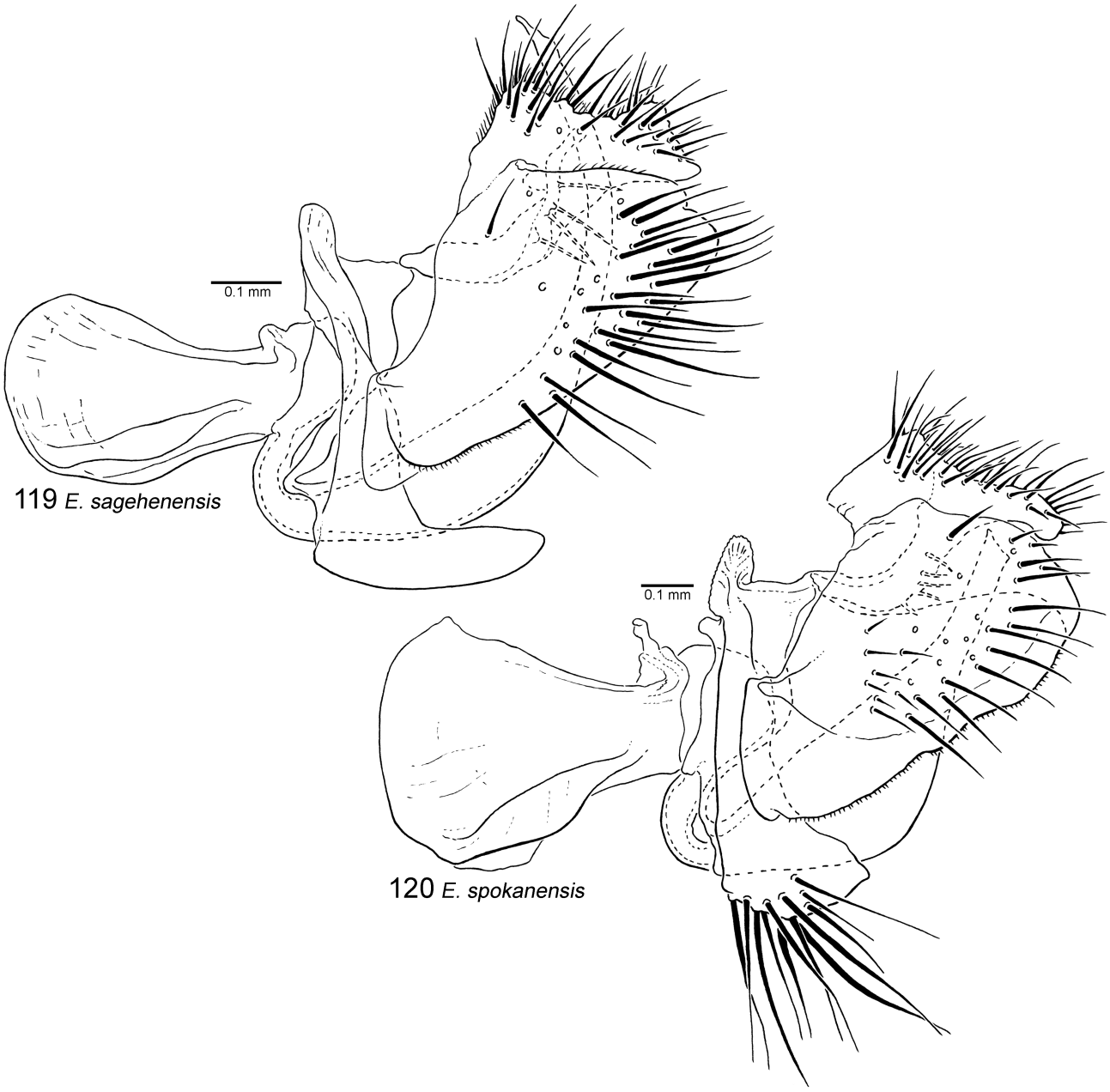
(Figs 115–118, 120, 130)

Type material. HOLOTYPE ♂ (Fig. 116), labelled: "WASHINGTON: Mt. Spokane/ SP, nr Bald Knob Cmpgr. [47°54′N 117°06′W]/ Spokane Co., 5200 ft./ W. J. Turner 28-VI-1977/ Malaise trap"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *spokanensis* Sinclair,/ Brooks & Cumming [red label]" (WSU). **PARATYPES: USA. Washington:** *Spokane County*: Same data as holotype (10♂, 11♀, WSU; 8♂, 10♀, CNC); same data as holotype except, 5500 ft, 10.vii.1984 (11♂, 3♀, WSU); same data as holotype except, 4800–5200 ft, 25.vi.1979, sweeping (22♂, 11♀,

WSU); same data except, 6.vii.1978 (1♂, WSU); same data as holotype except, 6.vii.1978, MT baited w/ CO_2 (16♂, 7♀, WSU); Bald Knob Cpgd, Mt Spokane SP [47°54′N 117°06′W], 4800–5200 ft, 6.vii.1978, MT, WJT (4♂, 2♀, WSU); same data except, 21–22.vii.1975, MT with dry ice bait (4♂, 4♀, WSU); same data except, 9–10.vii.1975 (7♂, 7♀, WFBM); Mt Spokane, 22.vi.1930 (1♂, USNM); Mt Spokane, 5500 ft, 10.vii.1984, J. Jenkins (3♂, 3♀, WSU).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *canaster* species group by an obliquely projecting process with paint brush-like cluster of setae on the male hind femur, often separated into several groups, paired digitiform basal processes on the male hind tibia, and dense dorsal setae on the apical two-thirds of the male hind tibia longer than width of tibia (Figs 115, 117, 118).

Description. Wing length 6.5–8.0 mm. **Male.** Similar to *E.* (*En.*) *canaster*, except as follows: head with ocellar triangle with pair of short, parallel ocellar setae, shorter than ocellar triangle. Antenna dark; postpedicel long and tapered, 3× longer than basal width; stylus slightly longer than basal width of postpedicel. Palpus yellowish brown, with dark setulae.



FIGURES 119–120. Male terminalia of the *E.* (*Enoplempis*) *canaster* species group, lateral view. **119,** *E.* (*En.*) *sagehenensis* **sp. nov.**; **120,** *E.* (*En.*) *spokanensis* **sp. nov.**

Thorax with antepronotum with row at least 7 pairs of short, dark, stiff setae. Postpronotum with 1 short seta and 4–5 short, dark stiff setae. Scutum with short, fine uniserial acr; dc uniserial, similar to acr; 1 strong posterior npl, with 1–3 shorter anterior npl; 1 short presut spal; 1 short psut spal; 1 short pal. Scutellum with 1 widely separated pair of long sctl, aligned with dc row, with 1 outer, shorter pair of marginal setulae. Laterotergite with narrow patch of 3–4 strong, dark setae.

Legs slender, yellowish brown, apex of tibiae and tarsi darker; coxae yellowish brown, partially clothed in dense greyish pruinescence, concolourous with pleura (Fig. 116). Hind femur with oblique, slender anteroventral digitiform process, with paint brush-like setae, separated into several clusters; 3 narrow posteroventral processes without setae: anterior process slender, arched; middle process forked; posterior process triangular; preapical anterior seta strong, shorter than width of femur (Figs 115–118). Hind tibia with pair of narrow digitiform processes on basal quarter; posteroventral process slightly twisted, with black setae on outer margin, longest apically, with knob-like, inner basal setose lobe; anteroventral process strongly tapered, with appressed crown of black setae; posteroapical comb with seta; apical two-thirds with long dorsal setae, longer apically, less than twice width of tibia; ventral margin with dense, fine erect setae (Figs 115, 117, 118). Hind tarsomere 1 somewhat inflated, with long dorsal setae, similar to tibia; tarsomeres 2–5 similar to mid tarsus.

Abdomen dark, with dense greyish pruinescence, concolourous with scutum; long, pale lateral setae on pregenital segments. Pregenital segments unmodified, except sclerites of segment 8 narrowly separated, weakly narrowly fused anteriorly. Terminalia (Fig. 120): phallus orange brown. Cercus short, rectangular; dorsal margin expanded basally; apex rounded; setae longer than width of cercus; weakly fused anteriorly to epandrium. Subepandrium without process; with row of medium-length setae. Epandrial lamella oval, higher than long; posterior margin without projection, bearing longest setae along posterior margin; some setae as long as epandrium. Hypandrium short, truncate, slightly projected laterally with arched apical margin; numerous strong setae of various lengths present. Phallus very narrow and tubular basally; strongly expanded on basal half, tapered, mostly straight apically; apex not emerging beyond cercus; apex not expanded; ejaculatory apodeme longer than length of epandrium, T-shaped, with ventrally positioned lateral apodemes.

Female. Similar to male, except as follows: frons broader, nearly as wide as ocellar triangle; hindleg without modified setae and processes; abdominal pleural membrane not visible; sternite 4 with long, wavy, golden lateral setae; tergite 8 shiny, without pruinescence.

Geographical distribution and seasonal occurrence (Fig. 130). *Empis* (*En.*) *spokanensis* **sp. nov.** is only known from Mt Spokane State Park in Spokane County, Washington. Adults have been collected in June and July.

Etymology. This species is named after the type locality, Mt Spokane State Park, where all known specimens have been collected.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *subcanaster* sp. nov.

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(Figs 121–123, 128, 130)

Type material. HOLOTYPE ♂, labelled: "USA: ID: Shoshone Co./ Hobo Cedar Grove Bot. Area/ St. Joe NF, 21.vi.2014, 1360 m/ N47°05.150′ W116°06.776′/ ex. streams/for. B.J. Sinclair"; "CNC/ 1078368"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *subcanaster* Sinclair,/ Brooks & Cumming [red label]" (CNC). **PARATYPES: USA. Idaho:** Same data as holotype (4♂, 4♀, CNC).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *canaster* species group by the following male characters: a posterior row of preapical setae on the hind femur, one paint brush-like preapical ventral lobe on the hind femur, swollen foreleg basitarsus, pair of digitiform basal processes on the hind tibia, and the length of the dorsal setae on the hind tibia less than twice width of tibia (Figs 121–123).

Description. Wing length 6.6–7.4 mm. **Male.** Similar to *E.* (*En.*) *canaster*, except as follows: head with ocellar setae short, slightly longer than ocellar triangle, posterior pair less than half-length of anterior setae, similar to short setulae. Postocular setae with upper 2–3 setae subequal to ocellar setae. Antenna dark; scape slightly more than 2× longer than pedicel, with short, black setae; postpedicel long and tapered, 5× longer than basal width; stylus more than 2× longer than basal width of postpedicel.



FIGURES 121–126. Male habitus and hindleg of the *E.* (*Enoplempis*) *canaster* species group. **121,** *E.* (*En.*) *subcanaster* **sp. nov.**, habitus, lateral view; **122,** same, hind femur tibia joint, anterior view; **123,** same, hind femur tibia joint, posterior view; **124,** *E.* (*En.*) sp. A, hindleg, anterior view; **125,** same, hind femur tibia joint, anterior view; **126,** same, hind femur tibia joint, posterior view.

Thorax with scutum with all setae very short, except long, strong posterior npl; apex of postpronotal lobe with small shiny brown area; postalar ridge brown. Postpronotum with 1 short seta and several short setulae. Scutum with short, fine uniserial acr; dc uniserial, slightly longer, stronger than acr, increasing in length posteriorly; 1 posterior npl, with 1–3 short anterior npl; 0 presut spal, with several setulae; 0 psut spal, with several setulae; 1 short pal. Scutellum with 1 widely separated pair of short sctl, with 1 outer, shorter pair of marginal setulae. Laterotergite with narrow patch of 3–4 strong, dark setae.

Legs slender, yellowish brown, apex of fore tibia and tarsus dark brown; coxae yellowish brown, extreme base with greyish pruinescence; mid and hindlegs with apical tarsomeres darker (Fig. 121). Coxae with stiff, black setae. Hind trochanter with short setulae. Fore femur clothed in short, black setae, with longer preapical posteroventral seta. Fore tibia with 3–4 long anterodorsal setae on apical half, longer than width of tibia; apical half with long posterior setae; ring of outstanding preapical setae; anterior face clothed in dense short setulae. Fore tarsomere 1 distinctly swollen, broader than basal width of tibia, clothed with dense setulae, long strong ventral setae, longer than width of tarsomere; tarsomeres 2–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur clothed in short, black setae, with longer preapical anteroventral and posteroventral setae. Mid tibia with 3–4 posterior and posteroventral setae, shorter than width of femur; several preapical setae surrounding apex; 2–3 anterodorsal and posterodorsal setae, subequal to width of femur. Mid tarsus slender, tarsomeres 2–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Hind femur with 1 preapical, paint brush-like ventral process and forked, outer posteroventral digitiform process with apical setulae on outer fork; without process or ridge posterior to paint brush-like process; apex of femur with preapical row of 6–8, thin posterior setae, shorter than width of femur; preapical anterior seta strong, shorter than width of femur (Figs 122, 123). Hind tibia with forked posteroventral digitiform process on basal quarter, outer fork with crown of long, black setae, inner fork with setulae; rounded, knob-like anteroventral lobe distal to posteroventral process; seta present in posteroapical comb; row of anterodorsal and posterodorsal setae, increasing in length apically, slightly longer than width of tibia (Figs 121–123). Hind tarsomere 1 with several anterodorsal and posterodorsal erect setae, similar to tibia; tarsomeres 2–5 similar to mid tarsus.

Wing with R_5 and M_1 divergent near wing margin; R_5 ending slightly anterior to or at wing tip.

Abdomen dark, with dense greyish pruinescence, concolourous with scutum; long, pale lateral setae on pregenital segments. Pregenital segments unmodified, except sclerites of segment 8 narrowly separated, weakly narrowly fused anteriorly. Terminalia (Fig. 128): phallus orange brown, epandrium subshiny; apex of cercus darkly pigmented. Cercus short, rectangular; dorsal margin slightly expanded basally; apex truncated, with fewer setae than basally; setae longer than width of cercus; weakly fused anteriorly to epandrium. Subepandrium without process; with row of medium-length setae. Epandrial lamella elongate, higher than long, with truncate posterior margin, slightly projected ventrally; longest setae on posterior half; setae shorter than length of epandrium. Hypandrium short, apical margin rounded, slightly pointed medially; numerous setae of variable lengths present. Phallus very narrow and tubular basally; strongly expanded on basal half, tapered, mostly straight apically; apex emerging beyond cercus; apex not expanded; ejaculatory apodeme longer than length of epandrium, T-shaped, with ventrally positioned lateral apodemes.

Female. Similar to male, except as follows: frons broader, nearly as wide as ocellar triangle; hindleg without modified setae and processes. Abdominal pleural membrane not expanded; apex of tergite 6 and tergites 7 and 8 shiny.

Geographical distribution and seasonal occurrence (Fig. 130). This species is known only from a single collecting event in June at a Cedar reserve in Shoshone County, Idaho.

Etymology. The species name is in reference to the similarity of this species with *E*. (*En.*) *canaster*.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) sp. A

(Figs 124–127, 130)

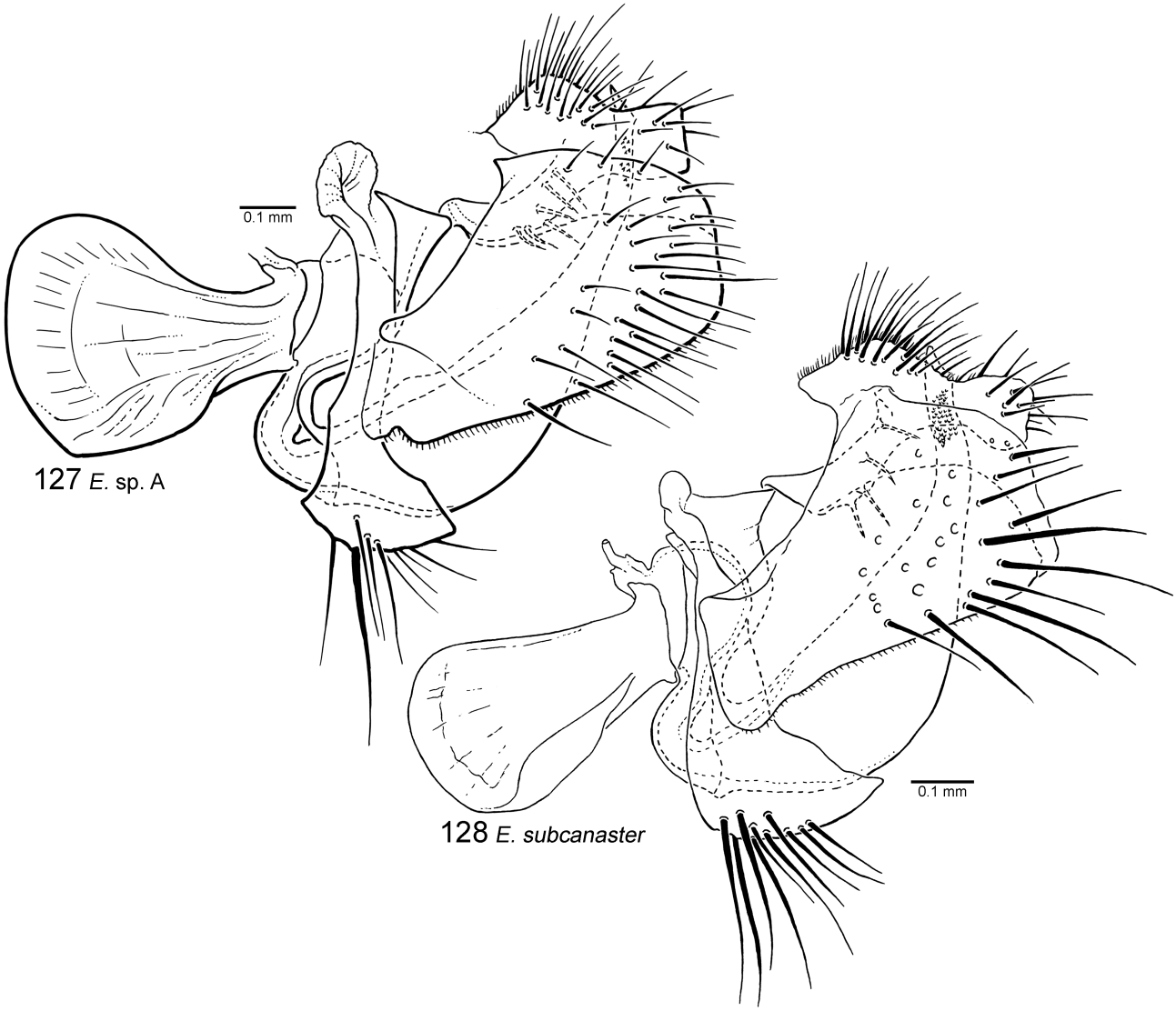
Material examined. CANADA. British Columbia: Marysville [49°38′N 115°57′W], 14.vii., C. Garrett (1♂ CNC1078523, 1♀ CNC1078524, 1♀ CNC1078525, USNM).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *canaster* species group by a single paint brush-like preapical ventral lobe on the male hind femur, single digitiform basal process on the male hind tibia, and length of the dorsal setae on the male hind tibia slightly longer than width of tibia (Figs 124–126).

Geographical distribution and seasonal occurrence (Fig. 130). This species is only known from a single damaged male and two females collected in Marysville, British Columbia in July.

Nuptial gift presentation. Form unknown.

Remarks. This species was left undescribed because only a single male specimen is known, which is missing the left hindleg and the right hindleg is strongly contracted, obscuring clear view of the ventral processes. It appears to be a unique species in the *E*. *canaster* group based on the hindleg, but the male terminalia (Fig. 127) is rather similar to *E*. *chillcotti* **sp. nov.** This un-named species is included in the identification key to males of the species of *E*. (*Enoplempis*) from the Rocky Mountains westward.

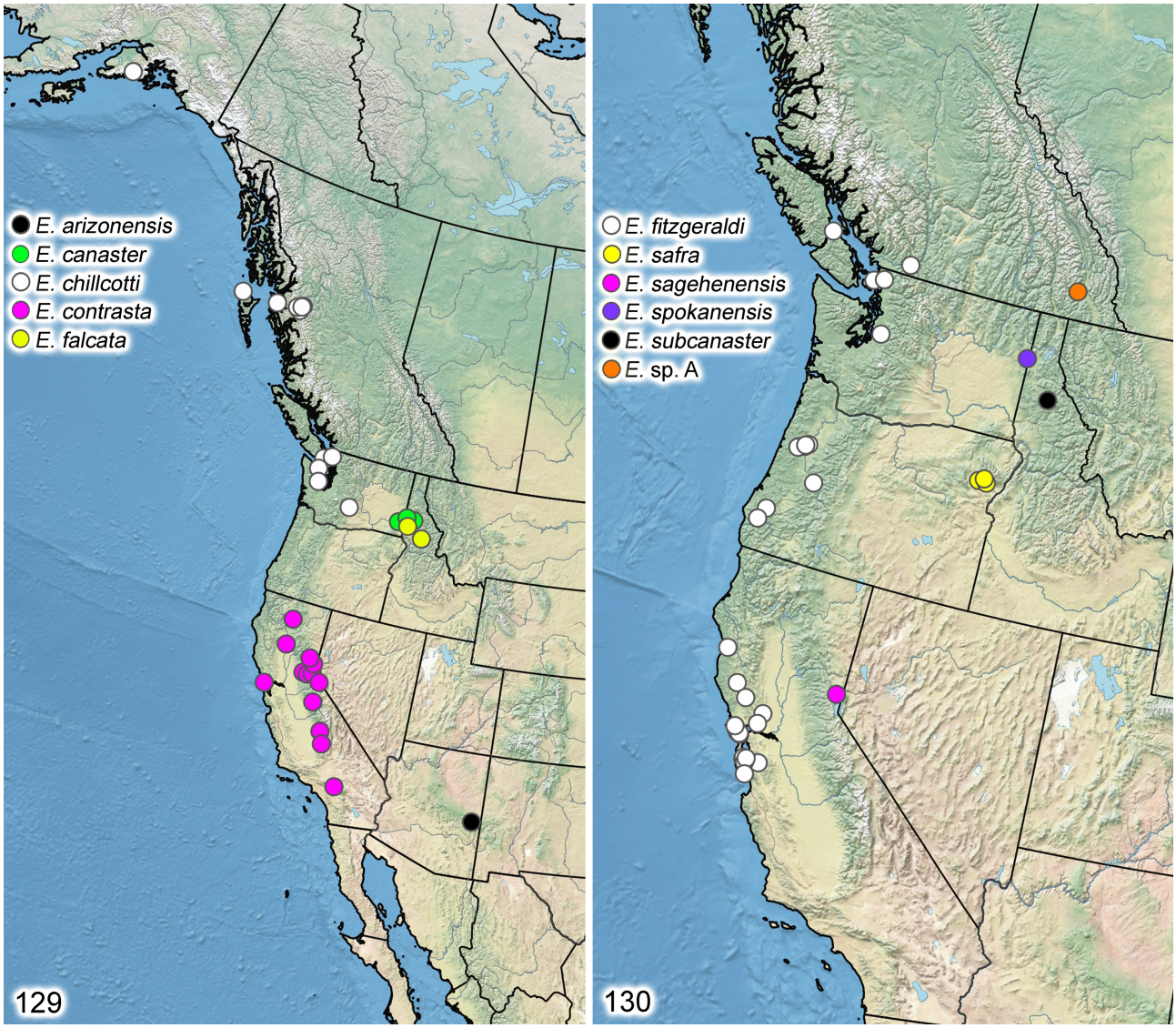


FIGURES 127–128. Male terminalia of the *E*. (*Enoplempis*) *canaster* species group, lateral view. **127,** *E*. (*En*.) sp. A; **128,** *E*. (*En*.) *subcanaster* **sp. nov.**

Empis (*Enoplempis*) *clava* species group

(Figs 131–142, 152)

This group includes three species, *E*. (*En.*) *clava* **sp. nov.**, *E*. (*En.*) *mariposa* **sp. nov.** and *E*. (*En.*) *tularensis* **sp. nov.**, which are distinguished by the slightly shiny abdomen in both sexes, the apically swollen or club-shaped male hind femur (Figs 132–138), often with long, thickened posterior preapical setae, male hind femur with long, pale, setulae, length nearly as long as width of femur (*e.g.*, Fig. 132), and subepandrial process with narrow, tapered apex (*e.g.*, Fig. 148).



FIGURES 129–130. Known geographical distribution of the *E.* (*Enoplempis*) *canaster* species group. **129,** *E.* (*En.*) *arizonensis* **sp. nov.**, *E.* (*En.*) *canaster* Melander, *E.* (*En.*) *chillcotti* **sp. nov.**, *E.* (*En.*) *contrasta* **sp. nov.** and *E.* (*En.*) *falcata* Melander; **130,** *E.* (*En.*) *fitzgeraldi* **sp. nov.**, *E.* (*En.*) *safra* **sp. nov.**, *E.* (*En.*) *sagehenensis* **sp. nov.**, *E.* (*En.*) *spokanensis* **sp. nov.**, *E.* (*En.*) *subcanaster* **sp. nov.** and *E.* (*En.*) sp. A.

Empis (*Enoplempis*) *clava* sp. nov.

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(Figs 131–134, 140, 141, 152)

Type material. HOLOTYPE ♂ (Figs 131–134), labelled: "USA:CALIF.: TulareCo. [? Kern Co.]/ Kern River, Campgrd. [35°26′N 118°52′W]/ No.3, alt. ca. 2900'/ 11-V-1971/ P. H. & M. Arnaud"; "COLLECTION OF/ PAUL H. ARNAUD JR [green label]"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *clava* Sinclair,/ Brooks & Cumming [red label]" (USNM). **PARATYPES: USA. California:** Same data as holotype (1♂, USNM); same data as holotype, except 10.v.1971 (1♀, USNM).

Diagnosis. This species is distinguished from other species in the *E.* (*En.*) *clava* group by the two pairs of brown vittae on the scutum (Fig. 131), long, thickened and wavy posterior preapical setae on the male hind femur, longer than apical width of femur and long fine, slender ventral setae on the male hind femur, slightly shorter than width of femur (Figs 132–134).



FIGURES 131–134. Holotype male habitus and hindleg of *E.* (*Enoplempis*) *clava* **sp. nov. 131,** habitus, lateral view; **132,** hindleg, anterior view; **133,** hind femur tibia joint, posterior view; **134,** hind femora, dorsal view.

Description. Wing length 4.3–4.7 mm. **Male.** Head dark in ground-colour, with greyish pruinescence. Eyes narrowly separated on frons; frons slightly narrower than width of anterior ocellus; short setulae along inner margin of eye. Face without setae; short, slightly divergent towards mouthparts, with oral margin dark and shiny. Ocellar triangle elevated, with thin greyish pruinescence, with pair of parallel ocellar setae, longer than occipital setae and several pairs of short posterior setulae. Occiput bearing single row of setae, as strong as upper 2–3 postocular setae; lower postocular setae slender, shorter than occipital row; postocellar region without setae. Antenna dark brown; scape 2× longer than pedicel, with short, black setae; pedicel with ring of apical setae; postpedicel long, slightly tapered, 4× longer than basal width; stylus length 1.5× basal width of postpedicel. Palpus yellowish brown, with dark setulae. Proboscis reddish brown, length less than 2× head height; labellum with short, dark setae.

Thorax dark brown in ground-colour, densely grey pruinescent. Scutum with 2 pairs of brown vittae; median narrower pair between acr and dc rows, ending at prescutellar depression; broader outer vittae extending to postalar ridge; postpronotal lobe with shiny orange-brown apex. Proepisternum with several pairs of short pale setae on lower section; upper proepisternum in front of spiracle without setae. Prosternum bare. Antepronotum with row of pale setae. Postpronotum with 1 long seta and several short setae. Scutum apparently without row(s) of acr; dc uniserial, increasing in size posteriorly; 1 posterior npl, with upper setula, 1–2 slender anterior npl; 1 presut spal; 1

psut spal, with anterior setula; 1 pal, with anterior setula. Scutellum with pair of long apical sctl, with pair of outer, shorter marginal setae; disc bare. Laterotergite with cluster of pale setae. Anterior and posterior spiracles pale.

Legs short, fore and midlegs slender, hindleg stocky, reddish brown, with apical tarsomeres darker; coxae with grey pruinescence (Fig. 131). Hind trochanter with numerous pale setae. Femora with white ventral pile; less distinct on fore femur. Fore femur with anteroventral and posteroventral row of short setulae. Fore tibia with 3–4 erect dorsal setae, longer than width of tibia; posterior and ventral faces with erect dense pile of setae; with circlet of preapical setae. Fore tarsomere 1 expanded, slightly broader than apex of tibia, with stronger anterior setae; ventrum with dense pile of setulae, without strong setae; tarsomeres 2–3 with biserial row of strong ventral setae; tarsomeres 1–3 with apicolateral pair of strong setae, longer than width of segment. Mid femur with anteroventral and posteroventral row of setae, denser at base. Mid tibia with 1–2 pairs of erect anterodorsal and posterodorsal setae near base; apex with circlet of preapical setae. Mid tarsus slender, with tarsomeres 1–3 with biserial row of strong ventral setae; tarsomeres 1–3 with apicolateral pair of strong setae, longer than width of segment. Hind femur strongly expanded apically, with long, pale, slender ventral setae, slightly shorter than width of femur; apical fourth with row of dark, thicker anteroventral setae; preapex expanded with thumb-like anteroventral process, clothed in short pubescence; preapex with short, nipple-like posteroventral projection, framing concave ventral region between nipple-like and thumb-like processes; preapical posterior face with 3 thickened, wavy setae on broad swellings and several long, slender setae, all longer than width of femur; preapical posterior face with dense setae (Figs 132–134). Hind tibia with base narrowed and geniculate; base laterally expanded and flattened opposite concave area on femur; anteroventral edge of expansion with tuft of short setae; inner ventral face of expansion with double transverse row of short, spine-like setae, increasing in length towards posterior face; posteroventral face of expansion with large, flattened sickle-shaped seta; 6–8 erect anterodorsal and posterodorsal setae, slightly longer than width of tibia, with erect pale setae on all faces of tibia; posteroapical comb with seta (Figs 132, 133). Hind tarsus with tarsomere 1 slightly swollen; tarsomeres 1–4 with biserial row of strong ventral setae; tarsomeres 1–4 with apicolateral pair of strong setae, longer than width of segment.

Wing lightly infuscate with dark veins; all veins well sclerotized, except CuA+CuP weak, not reaching wing margin. Basal costal seta present. R_5 and M_1 divergent near wing margin; R_5 ending near wing tip; radial fork acute. Halter pale, orange brown.

Abdomen darker than thorax, with thin greyish pruinosity to somewhat shiny; setae pale (Fig. 131). Pregenital segments unmodified, except sclerites of segment 8 weakly separated anterolaterally. Terminalia (Figs 140, 141): similar colour to abdomen; phallus brownish. Cercus linear, tapered to narrow rounded apex, shorter than epandrium; dorsal margin straight; setae slender, dense, shorter than width of cercus. Subepandrial process with narrow, tapered apex; extending to either side of phallus. Epandrial lamella linear, posterior margin broadly rounded, not expanded dorsally; not fused with cercus anteriorly; evenly clothed in slender setae, shorter than width of epandrium. Hypandrium short, apical margin truncate, without setae. Phallus (Fig. 141) expanded on lower half; tapered and sharply bent to expanded apex; pair of short, lateral lobes proximal to bend; apical opening surrounded by row of spicules; apex emerging beyond cerci; ejaculatory apodeme large, more than one-half length of epandrium, T-shaped, with lateral apodemes near lower margin.

Female. Similar to male, except as follows: frons broader, nearly as wide as ocellar triangle; hindleg without modified setae and processes; mid and hind femora with dense ventral setae; abdominal pleural membrane not visible; tergite 7 somewhat shiny; sternite 8 slightly projected.

Geographical distribution and seasonal occurrence (Fig. 152). This species is known only from May at the type locality in Tulare County, California.

Etymology. The species name *clava* is Latin for club, in reference to the club-shaped apex of the hind femur seen in this species.

Nuptial gift presentation. Form unknown.

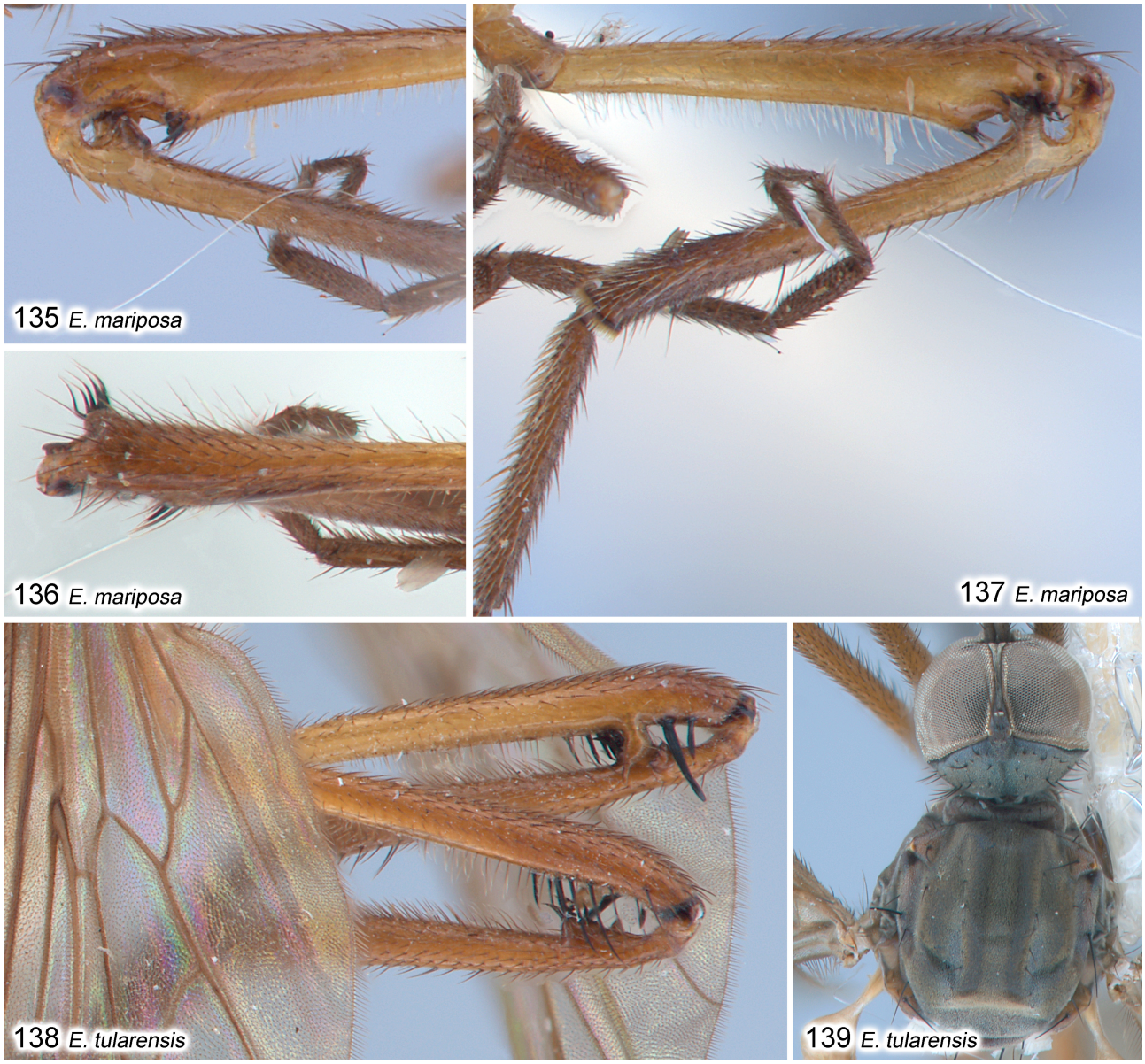
Remarks. This species is mostly similar to *E*. (*En.*) *mariposa* **sp. nov.** on the basis of the modified hindleg, including the geniculate tibia.

***Empis* (*Enoplempis*) *mariposa* sp. nov.**
urn:lsid:zoobank.org:act:221C7D82-B050-4476-9E97-6986AF749F3F
(Figs 135–137, 142, 152)

Type material. HOLOTYPE ♂, labelled: "[USA] El Portal [37°40′N 119°47′W]/ Mariposa Co. Cal./ IV.16.61.2200ft"; "J.W. Tilden/ Collector"; "ALMelander/ Collection/ 1961"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *mariposa* Sinclair,/ Brooks & Cumming [red label]" (USNM). **PARATYPES: USA. California:** Same data as holotype (1♂, USNM).

Diagnosis. This species is distinguished from *E.* (*En.*) *clava* **sp. nov.** by the absence of long, thickened, wavy posterior preapical setae on the male hind femur (Figs 135–137), apparent absence of brown vittae on the scutum and the closely approximated male eyes.

Description. Wing length 4.1 mm. **Male.** Similar to *E.* (*En.*) *clava* **sp. nov.**, except as follows: head with eyes closely approximated, nearly holoptic.



FIGURES 135–139. Male head, thorax and hindleg of the *E.* (*Enoplempis*) *clava* species group. **135,** *E.* (*En.*) *mariposa* **sp. nov.**, hind femur tibia joint (holotype), anterior view; **136,** same, hind femur (holotype), dorsal view; **137,** same, hindleg (holotype), posterior view; **138,** *E.* (*En.*) *tularensis* **sp. nov.**, hindlegs, lateral view; **139,** same, thorax, dorsal view.

Thorax without distinct vittae, mostly dark with dense grey pruinescence.

Legs short, fore and midlegs slender, hindleg stocky, reddish brown, with apical tarsomeres darker; coxae with faint grey pruinescence. Hind femur strongly expanded apically, with long, pale, slender ventral setae, slightly shorter than width of femur; preapex expanded with wedge-shaped anteroventral expansion, bearing short, strong apical setae and nipple-like projection on inner edge; preapical posterior face with distinct swelling, bearing horizontal row of 5 thickened, wavy setae, shorter than width of femur; short, spine-like seta dorsal to row of posterior setae; nipple-like lobe on inner margin of posterior swelling (Figs 135–137). Hind tibia with base narrowed and geniculate; base laterally expanded and flattened opposite concave area on femur [apex of lobes obscured by femur]; 3–4 erect anterodorsal and posterodorsal setae, slightly longer than width of tibia, with erect pale setae on all faces of tibia (Figs 135, 137). Hind tarsus with tarsomere 1 slightly swollen; tarsomeres 1–3 with biserial row of strong ventral setae; tarsomeres 1–4 with apicolateral pair of strong setae, longer than width of segment.

Abdomen darker than thorax, shiny; setae pale. Terminalia (Fig. 142): cercus linear, tapered to narrow apex, shorter than epandrium; dorsal margin sculptured; setae slender, shorter than width of cercus. Subepandrial process broad, with narrow, tapered apex; extending to either side of phallus. Epandrial lamella linear, posterior margin broadly truncate, not expanded dorsally; not fused with cercus anteriorly; evenly clothed in slender setae, shorter than width of epandrium. Hypandrium short, apical margin truncate, with several short setae. Phallus sharply bent at base; basal portion broad, gradually tapered; gently curved at subapical section; apical opening with several lateral spicules; apex emerging beyond cerci; ejaculatory apodeme one-half length of epandrium, T-shaped, with lateral apodemes near lower margin.

Female. Unknown.

Geographical distribution and seasonal occurrence (Fig. 152). This species is known only from April at the type locality in Mariposa County, California.

Etymology. The species name is in reference to the type locality, Mariposa County, California and is a noun in apposition.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *tularensis* sp. nov.

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(Figs 138, 139, 148, 149, 152)

Type material. HOLOTYPE ♂, labelled: "[USA] Calif: Tulare/ Co. 1 mi NE./ Posey [35°48′N 118°40′W] V-14-63"; "S.W. Earnshaw/ collector"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *tularensis* Sinclair,/ Brooks & Cumming [red label]" (EMEC). **PARATYPES: USA. California:** *Tulare County*: Hot Spring [35°52′N 118°40′W], 14.v.1963, C.A. Toschi (2♂, EMEC); same data except, S.W. Earnshaw (1♂, EMEC); 6 mi. N Kaweah [36°28′N 118°55′], 28.iv.1979, JAP (1♂, EMEC); same data except, 10 mi. SE Three Rivers [36°27′N 118°53′W], 2800 ft, 29.iv.1979 (1♂, EMEC); Sequoia NP, Ash Mt. [36.591°N 119.069°W], 26.vi.1961, E.I. Schlinger (1♂, UCDC); Sequoia NP, ½ mi. SE Ash Mtn., 3.v.1984, R.D. Haines (1♂, CSCA).

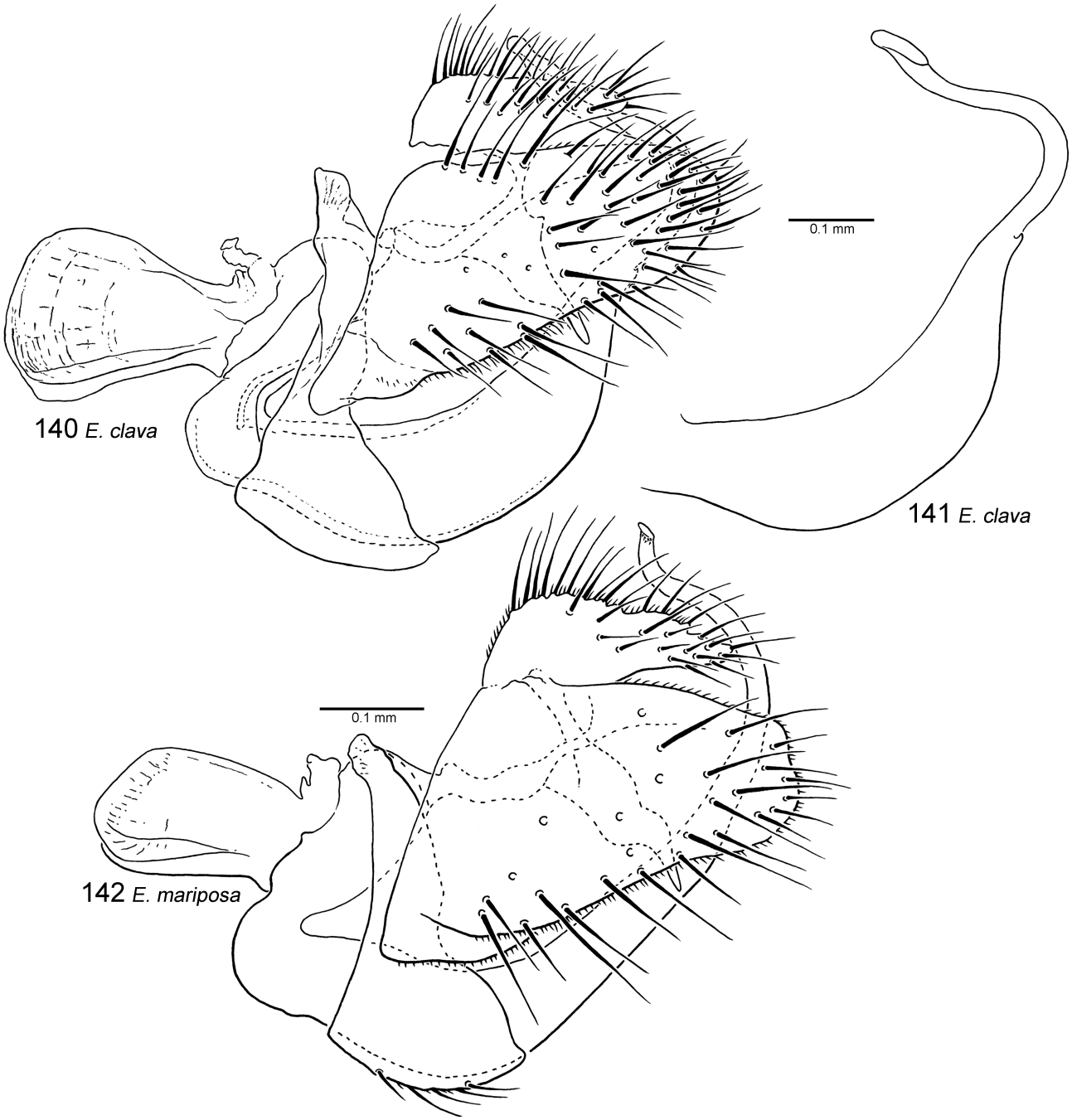
Diagnosis. This species is distinguished from *E.* (*En.*) *clava* **sp. nov.** by the single blade-like, posteroventral preapical seta on the male hind femur, longer than width of femur and row of strong anteroventral setae on apical third of hind femur, longer than width of femur (Fig. 138), absence of brown vittae on the scutum and the closely approximated male eyes.

Description. Wing length 3.7–4.3 mm. **Male.** Similar to *E.* (*En.*) *clava* **sp. nov.**, except as follows: head with eyes closely approximated on frons. Palpus brown, with dark setulae.

Thorax brown in ground-colour, pruinescent. Scutum with medial pair of dark brown vittae (viewed anteriorly) (Fig. 139); apparently without row of acr. Laterotergite with cluster of dark setae. Anterior and posterior spiracles pale brown.

Legs short, fore and midlegs slender, hindleg stocky; femora yellowish brown, tibiae and tarsomeres brownish, darker apically; coxae yellowish brown with or without greyish pruinescence. Femora without white ventral pile. Fore tibia with 3–4 erect dorsal setae, usually longer than width of tibia; posterior and ventral faces with erect dense pile of setae; apex with circlet of preapical setae. Fore tarsomere 1 expanded, slightly broader than apex of tibia; ventrum with dense mat of setae, with some stronger setae; tarsomeres 2–4 with biserial row of strong ventral setae; tarsomeres 1–4 with apicolateral pair of strong setae, longer than width of segment. Mid femur with anteroventral

and posteroventral row of dark, strong setae. Mid tibia with 2–3 pairs of erect anterodorsal and posterodorsal setae near base. Mid tarsus slender, with tarsomeres 1–4 with biserial row of strong ventral setae; tarsomeres 1–4 with apicolateral pair of strong setae, longer than width of segment. Hind femur not greatly expanded apically, with long, pale, slender ventral setae, slightly shorter than width of femur; apical third with row of 7–8 dark, strong anteroventral setae, anterior setae shorter and thicker; preapex without lobes or anteroventral processes; preapex with anvil-shaped posteroventral process, narrowly tapered apically with attenuated base; preapical posterior face with 2 thickened setae, proximal seta blade-like, longer than width of femur, distal seta shorter, slightly more than half-length proximal seta; apex with several strong anterior and posterior setae (Fig. 138). Hind tibia with base narrowed; anteroventral swelling expanded posteriorly with crown of strong to spine-like black setae; posterior face with swelling opposite anteroventral process, with rim of spine-like setae on outer face; 5–6 erect anterodorsal and posterodorsal setae, slightly longer than width of tibia, with erect setae on all faces of tibia; posteroapical comb with seta (Fig. 138). Hind tarsus with tarsomere 1 slightly swollen; tarsomeres 1–4 similar to mid tarsus.



FIGURES 140–142. Male terminalia of the *E*. (*Enoplempis*) *clava* species group. **140,** *E*. (*En*.) *clava* **sp. nov.**; **141,** same, phallus; **142,** *E*. (*En*.) *mariposa* **sp. nov.**

Wing infuscate with dark veins. Halter brown, with base of stalk paler.

Abdomen paler than thorax, subshiny, with thin pruinosity; setae dark. Pregenital segments unmodified, except sclerites of segment 8 weakly separated anterolaterally. Terminalia (Figs 148, 149): similar colour to abdomen; phallus brownish, paler apically. Cercus linear, tapered to narrow rounded apex, shorter than epandrium; dorsal margin straight; setae slender, dense, dorsal setae longer than width of cercus. Subepandrial process with narrow, tapered apex; extending to either side of phallus. Epandrial lamella linear, subtriangular, posterior margin broadly rounded, not expanded dorsally; narrowly fused with cercus anteriorly; evenly clothed in slender setae, shorter than width of epandrium. Hypandrium short, apical margin truncate, with numerous short setae. Phallus (Fig. 149) expanded on lower half; tapered and sinuous on apical half, sharply bent to expanded apex; without pair of short, lateral lobes proximal to bend; apical opening surrounded by 2–3 rows of spicules; apex emerging beyond cerci; ejaculatory apodeme large, more than one-half length of epandrium, T-shaped, with lateral apodemes near lower margin.

Female. Unknown.

Geographical distribution and seasonal occurrence (Fig. 152). This species is known only from April to June in Tulare County, California.

Etymology. The species name is in reference to the type locality, Tulare County, California.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *delumbis* species group

(Figs 143–147, 150, 151, 153–175)

This group includes five species, *E.* (*En.*) *delumbis* Melander, *E.* (*En.*) *floricola* **sp. nov.**, *E.* (*En.*) *sphaera* **sp. nov.**, *E.* (*En.*) *spiculata* **sp. nov.** and *E.* (*En.*) *tripenicillata* **sp. nov.**, which are distinguished by the phallus with paired lobes and usually with subapical spiny swelling (*e.g.*, Figs 151, 171, 173), hypandrium with long setae, subepandrial process present (*e.g.*, Figs 170, 172) and male hind femur usually with row of thickened posterior preapical setae (*e.g.*, Figs 147, 156). In addition, males of *E.* (*En.*) *sphaera* **sp. nov.** produce balloons.

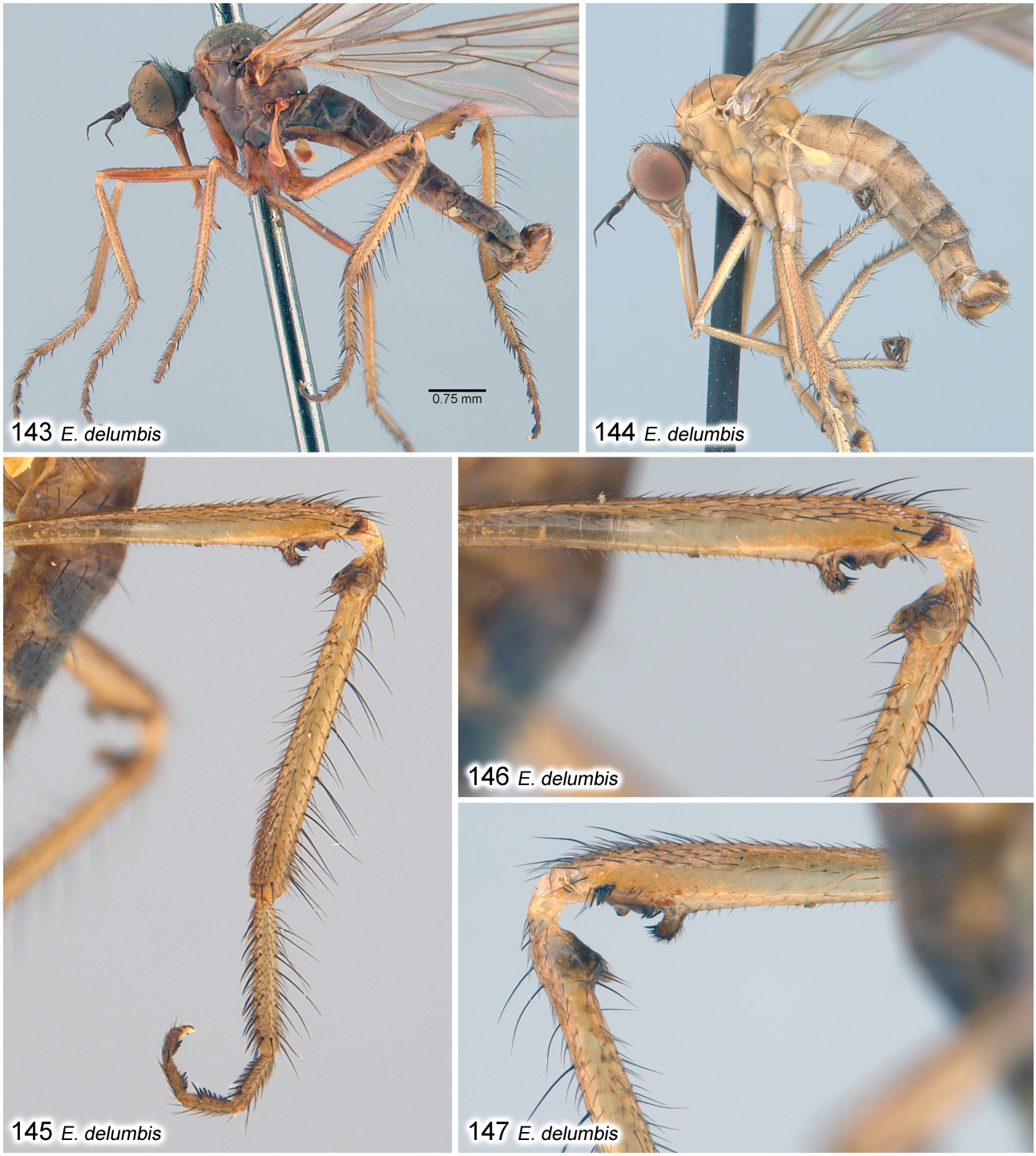
Empis (*Enoplempis*) *delumbis* Melander

(Figs 143–147, 150, 151, 153)

Empis clauda Coquillett, 1900: 407. Type locality: Popof Island, Alaska (USA), by lectotype designation.
Empis clauda: Melander, 1902: 321 (redescription).
E. (*Enoplempis*) *clauda*: Melander, 1928: 142 (assigned to subgenus *Enoplempis*).
Empis delumbis Melander, 1965: 459 (nom. nov. *clauda* Coquillett, catalogue); Yang *et al*., 2007: 133 (catalogue).

Type material examined. LECTOTYPE (here designated in order to fix identity of the species) ♂, labelled: "Popof Island [55°18′N 160°22′W]/ Alaska, July 12'99"; "Harriman Expedition '99/ T. Kincaid, Collector"; "TYPE/ No./ 5209/ U.S.N.M. [red label]"; "Empis/ clauda/ Coq. [Coquillett—handwritten]"; "LECTOTYPE/ *Empis clauda* Coquillett/ des. Sinclair, Brooks &/ Cumming 2025 [red label]" [abdomen lost] (USNM). **PARALECTOTYPES: USA. Alaska:** Same data as lectotype (1♂, USNM); same data except, 8.vii.1899 (2♂, 1♀, USNM); same data except, 9.vii.1899 (3♀, USNM); same data except, 10.vii.1899 (5♂, 3♀, USNM); same data except, 11.vii.1899 (2♂, 2♀, USNM). *Kodiak Island Borough*: Kodiak [57°47′N 152°23′W], 20.vii.1899, T. Kincaid (1♀, USNM). *Yakutat Borough*: Yakutat [59°32′49″N 139°43′38″W], 21.vi.1899, T. Kincaid (1♀, USNM).

Notes on type specimens. The syntype series included 17 males and 14 females from three Alaskan localities: Yakutat, Popof Island and Kadiak [sic] (Coquillett 1900). In addition, the type catalogue number "5209" was listed for this species. Only one male specimen bears the type catalogue number label and this was selected as the lectotype. Of the original number of specimens in the type series, only 11 male and 11 female syntypes were identified.



FIGURES 143–147. Male habitus and hindleg of *E.* (*Enoplempis*) *delumbis* Melander. **143,** habitus, dark form, lateral view; **144,** habitus, pale form, lateral view; **145,** hindleg, with tarsal spine-like setae, anterior view; **146,** hind femur tibia joint, anterior view; **147,** hind femur tibia joint, posterior view.

Additional material examined. CANADA: British Columbia: Aiyansh, Nass R. [55°12′N 129°4′W], 25. vi.1960, JGC (1♂, CNC); Bowser [49°26′N 124°40′W], 30.v.1955, R. Coyles (1♀, CNC); Vancouver Is., Courtenay [49°41′N 124°59′W], vi.1965, N.L.H. Krauss (1♂, CNC); Exchamsiks R, 35 mi. W Terrace [54°20′N 129°17′W], 9.vii.1960, JGC (1♂, 1♀, CNC); Gagnon Rd, 6 mi. W Terrace [54°29′N 128°44′W], 24.vi.1960, G.E. Shewell (1♀, CNC); same data except, 20.vi.1960, 220 ft, W.W. Moss (1♂, CNC); Glacier Ck, 10 mi. N Terrace [54°39′N 128°40′W], 7.vii.1960, JGC (2♂, CNC); Graham Is., 1 km W Queen Charlotte City [53°15′N 132°06′W], 26.vii.1981,

D.H. Kavanaugh (1♂, CAS); same data except, Queen Charlotte City just east of town, 53°15′10″N 132°02′50″W, 6.viii.2001, S. Allombert, #: GG-01-021 (1♂, RBCM); Haida Gwaii, Graham Is., Bonanza Ck, 4.viii.1983, R.A. Cannings (1♂, RBCM); Haida Gwaii, Gwaii Haanas Pk Res., Gordon Islands, 52°06′N 131°08′W, 5.vii.2000 (1♂, CNC); same data except, Burnaby Is., 52°21′N 131°16′W, 9.vii.2000 (1♂, CNC); same data except, Moresby Is., Garcin Rock, 52°12′N 130°58′W, 7.vii.2000 (1♂, CNC); same data except, Kunghit Is., 52°04′N 131°00′W, 10.vii.2000, grassy area by stream (2♀, CNC); Haida Gwaii, Laskeek Bay, Low Is., 52°54′38″N 131°32′07″W, 24.vii.2001, M. Creery, #: LG-01-035 (1♂, RBCM); same data except, 18.vii.2001, #: LG-01-031 (1♂, RBCM); same data except, 131°32′10″W, 19.vii.2001, S. Allombert #: LI-2SWE-2 (1♀, RBCM); same data except, Reef Is. 52°52′39″N 131°31′07″W, 15.vii.2001, #: RG-01-133 (1♀, RBCM); same data except, West Skedans Is., 52°57′26″N 131°34′42″W, 24.vii.2001, #: WI-3SWE-3 (1♂, RBCM); same data except, South Skedans Is., 52°57′00″N 131°34′00″W, 18.vii.2001, #: SI-1SWE-2 (1♂, RBCM); same data except, Lost Is., 52°48′14″N 131°29′11″W, 25.vi.2001, #: TS-6G02-3 (1♂, RBCM); Kleanza Ck, 14 mi. E Terrace [54°35′N 128°24′W], 17.vi.1960, CHM (5♂, 6♀, CNC); same data except, 29.vi.1960 (11♂, 2♀, CNC); same data except, 30.vi.1960 (14♂, 11♀, CNC); same data except, 4.vii.1960 (3♂, 3♀, CNC); same data except, 13.vii.1960 (1♀, CNC); same data except 17.vi.1960, JGT (1♂, 6♀, CNC); same data except, 29.vi.1960 (3♂, 1♀, CNC); same data except, 30.vi.1960 (4♂, 1♀, CNC); same data except, 4.vii.1960 (3♂, 1♀, CNC); same data except, 13.vii.1960 (3♂, CNC); same data except, W.R. Richards (1♂, 1♀, CNC); same data except, 19.vii.1960 (1♂, 4♀, CNC); same data except, 12.vii.1960, G.P. Holland (1♂, CNC); same data except, 30.vi.1960, 250 ft, B. Heming (2♀, CNC); same data except, 25.vii.1960 (1♂, 2♀, CNC); same data except, 17.vi.1960, R. Pilfrey (1♂, 2♀, CNC); same data except, W.W. Moss (2♀, CNC); same data except, 14.vii.1960, G.E. Shewell (1♂, CNC); Lakelse, nr Terrace [54°23′N 128°31′W], 300 ft, 14.vi.1960, W.W. Moss (1♂, 1♀, CNC); Lakelse Lk. bog, S of Terrace [54°23′N 128°31′W], 14.vi.1960, JGC (1♂, 2♀, CNC); same data except, B. Heming (1♀, CNC); same data except, 27.vi.1960 (1♂, CNC); Lulu I. [49°10′N 123°04′W], 10.vi.1916 (1♂, 1♀, USNM); Moresby Is., Mosquito Lk. [53°04′N 132°04′W], 20.vii.1988, meadow nr lake, T.A. Wheeler (1♀, CNC); Mt Thornhill nr Terrace [54°30′N 128°35′W], 14.vii.1960, JGC (1♂, 1♀, CNC); same data except, 26.vii.1960, B. Heming (1♂, 1♀, CNC); same data except, 30.vii.1960; Nares Islets [54°29′N 130°50′W], 29.vii.1987, largest islet open forest, C.S. Guppy (2♂, 1♀, RBCM); Prince Leboo Is. [54 27N 130 59W], 1 km E on small island shore & forest, 25.vii.1987, C.S. Guppy (2♂, 1♀, RBCM); Qualicum [49°21′N 124°26′W], 15.vi.1955, G.E. Shewell (1♀, CNC); 13 km SE Port Renfrew [48°30′N 124°17′W], 5.vii.1991, A. Borkent, CD1340 (1♂, CNC); Shames, 18 mi. SW Terrace [54°29′N 128°57′W], 17.vii.1960, CHM (1♀, CNC); same data except, 104 ft, 17.vii.1960, B. Heming (1♂, 1♀, CNC); Spring Ck, Terrace [54°30′N 128°35′W], 11.vi.1960, CHM (2♂, 1♀, CNC); Terrace, 220 ft, 19.vii.1960, B. Heming (3♀, CNC); same data except, Ferry Island, 8.vi.1985, R.A. Cannings (1♀, RBCM); 32 mi. SW Terrace [54°20′N 129°17′W], 9.vii.1960, JGC (1♂, CNC); same data except, 11.vi.1960 (2♀, CNC); same data except, 6.vii.1960, CHM (1♀, CNC); same data except, 100 ft, 5.vi.1960, B. Heming (1♂, 2♀, CNC); same data except, 9.vii.1960 (1♀, CNC); same data except, 13.vii.1960 (2♂, 1♀, CNC); 54 mi. SW Terrace [54°11′N 129°39′W], CHM (1♀, CNC); Zymoetz R, 6 mi. E Terrace [54°32′N 128°28′W], 3.vi.1960, JGC (1♀ CNC). **USA. Alaska:** *Aleutians East Borough*: On tundra, Cold Bay, 163°W [55°12′N 162°42′W], 13.viii.1952, W.R. Mason (3♂, 4♀, CNC); same data except, 28.vii.1952 (2♀, CNC); same data except, 18.viii.1952 (2♂, CNC); same data except, 20.viii.1952 (1♂, 1♀, CNC); same data except, 21.viii.1952 (1♂, CNC); same data except, 25.viii.1952 (7♂, 5♀, CNC); same data except, 26.viii.1952 (1♂, 1♀, CNC); same data except, 27.viii.1952 (2♀, CNC); same data except, 28.viii.1952 (1♂, 1♀, CNC); *Aleutians West Census Area*: Unalaska [53°53′N 166°31′W], 24.vii.1897 (1♂, 4♀, USNM); Unalaska, Makushin [53°54′N 166°42′W], 11.viii.1907, E.C. Van Dyke (2♂, 2♀, CAS). *Juneau Borough*: Douglas [58°16′N 134°23′W], 25.vii.1901 (1♀, USNM). *Kenai Peninsula Borough*: Seward, 60.11242°N 149.35723°W, *Populus* spp., pruned branch tips, 21.vii.2014, R. Progar, S. Bresney (1♂, UAM). *Ketchikan Gateway Borough*: Revillagigedo Is. [55°19′N 131°31′W], Herring Cove, 1.vii.1947, Reed (1♀, CAS). *Kodiak Island Borough*: Kodiak, Near Is. [57°46′N 152°24′W], 0–30 m, 57.78813°N 152.39081°W, *Picea* rainforest, *Heracleum* umbels, rocky beach, 29.vi.2013, I. MacDougall (1♀, UAM). **Oregon:** *Clackamas County*: Mt Hood NF, Tollgate Cpgd [45°19′N 121°54′W], T3S R7E Sec. 11, 22.vi.1977, DDW (4♂, 2♀, CAS). *Clatsop County*: Saddle Mtn [45°57′N 123°41′W], 14.vi.1969, K. Goeden (1♂, ODAC); S slope Saddle Mtn, 2500–3280 ft, 14.vi.1969, E.M. Fisher (1♂, CSCA). *Hood River County*: Starvation Ck SP [45°41′N 121°41′W], at falls, 26.vi.1978, DDW (1♀, CAS). *Lane County*: H.J. Andrews Exp. For. [44°13′N 122°10′W], 1450 ft, R.S.7, 18.v.1983, sweep, D.S. Chandler (3♂, UNHC). *Linn County*: 0.5 mi. past Tombstone Pass, Hackleman Ck, 44°23′51″N 122°7′53″W, 29.vi.2016, SJF (1♂, CNC); Willamette NF, 1007 m, Hackleman Ck Rd No. 2672, 44°24.733′N 122°02.555′W,

11.vii.2013, BJS (1♀, CNC); Willamette NF, 335 m, Rd 2025 along Moose Ck, 44°25.184′N 122°24.987′W, 11.vii.2013, streams, BJS (1♀, CNC). *Tillamook County*: Cascade Head Exp. For. [45°03′N 123°57′W], 24.vi.1961, S.L. Wood, J.B. Karren, D.E. Bright (1♂, BYU). **Washington:** *Clallam County*: Bogachiel, Bogachiel R [47°53′N 124°21′W], 29.vi.1974, PHA (1♀, CAS); Dean Ck, 7 mi. S Sequim [48°00′N 123°02′W], 4.viii.1972, WJT, W.B. Garrett (1♂, WSU); same data except, Dry Ice MT (1♂, WSU); Olympic NP, Deer Pk, Blue Mt. [47°57′N 123°15′W], 1650 m, 23.vii.1978, DDW (1♂, CAS); Olympic NP, Elwha Valley entrance (E side Lk. Mills) [48°01′N 123°35′W], 20.vii.1983, 1585/1/6, J.A. Downes (1♂, CNC); Olympic NP, Heart of the Hills [48°05′N 123°25′W], 15.vii.1977, R.S. & V.L. Zack (1♀, WSU); Olympic NP, Lk. Crescent, waterfalls W Storm King Visitor Center [48°03′N 123°47′W], 30.vi.1974, PHA (1♀, CAS); Olympic NP, along Lake Ck [48°01′N 123°24′W], 650 m, 24.vi.1978, DDW (1♀, CAS); Olympic NP, 11 km SSE Solduc Cpgd, entrance to loop B, Hemlock for., sweep nr fallen logs, 47°57′55″N 123°51′11″W, 545 m, 18.vii.2005, C.J. Borkent, CJB05-32 (1♂, LEM). *Grays Harbor County*: Preachers Slough E., Chehalis R Surge Plain Preserve, 46°56′41″N 123°39′01″W, 16.vii.2024, J.M. Cumming (2♀, CNC). *Jefferson County*: 17 mi. S Forks, Cottonwood Cpgd on Hoh R [47.7788°N 124.2930°W], 17–18.vii.1977, 200 ft, WJT (1♀, WSU); Hoh R Cons. & Rec. Corridor, riparian rainforest, 47°49′14″N 124°12′09″W, 20.vii.2024, J.M. Cumming (3♀, CNC); falls outside Olympic NP entrance, 15 km NE Quinault [47°31′N 123°42′W], 28.vi.1974, PHA (1♀, CAS); 2 mi. NW Triton, UFS Rt. 251 [47°36′N 122°59′W], 3.viii.1972, MT dry ice, WJT, W.B Garnett (1♂, WSU); Quilcene [47°49′N 122°53′W], 24.vii.1917, ALM (4♂, 2♀, USNM). *King County*: Seattle [47°36′N 122°19′W], 19.vi.1920, E.C. Van Dyke (2♂, CAS); same data except, 16.vi.1920, ALM (1♂, 1♀, USNM); 8 mi. W Snoqualmie Pass [47°23′N 121°28′W], 29.vi.1924, ALM (1♂, USNM). *Kittitas County*: Lk. Keechelus [47.35°N 121.37°W], 29.vi.1924, ALM (1♂, USNM). *Lewis County*: Big Ck, 2030 ft, 46°43′50″N 121°54′49″W, 15.vi.2018, SEB (1♂, 1♀, CNC); same data except, 16.vi.2018, J.M. Cumming (1♀, CNC); Big Ck Cpgd [46°44′N 121°58′W], 4.4 km SE Ashford, 2.vii.1974, 550 m, PHA (1♂, 1♀, CAS). *Mason County*: Lk. Cushman [47°25′N 123°13′W], 27.vi.1917, H.G. Dyar (4♂, 2♀, USNM); Lilliwaup [47°27′N 123°06′W], 23.vii.1917, ALM (1♀, USNM); Shelton [47°12′N 123°6′W], Walkers Pk, 21.vii.1917, ALM (1♀, USNM). *Pacific County*: Fort Canby SP [46°17′N 124°03′W], nr Ilwaco, 19.vii.1978, DDW (1♂ with Agromyzidae prey, 7♂, 4♀, CAS); same data except, 13–15.vi.1973, WJT (1♂, 1♀, WFBM); Ilwaco [46°18′N 124°01′W], viii.1917, ALM (1♂, 2♀, USNM); same data except, 28.vi.1925 (3♂, USNM); same data except, viii.1918, E. Miner (2♀, USNM); Naselle [46°22′N 123°47′W], 2.vii.1925, ALM (1♂, 1♀, USNM); Naselle R, 15.vi.1922 (1♂, USNM). *Pierce County*: Mt. Rainier NP, Fish Ck at West Side Rd [46°47′N 121°53′W], 910 m, 1.viii.1977, DDW (1♂, 1♀, CAS); Mt Rainier, Base No. Side [46°57′N 121°47′W], 26.vii.1924, ALM (1♂, USNM); Mt Rainier, White R [46°54′N 121°38′W], 20.vii.1924, ALM (1♀, USNM); Mt Rainier, Tahoma Fork [46°44′N 121°53′W], 25.vii.1922, ALM (1♂, USNM); Mt Rainier, Longmire [46°45′N 121°48′W], 20.vii.1922 ALM (1♂, USNM); Mt Rainier, Cougar Rock to Longmire Tr., 46°45.6′N 121°48.2′W, 17.vii.2012, 920 m, BJS (1♂, 1♀, CNC). *San Juan County*: Friday Harbor [48°32′N 123°01′W], 1.vi.1906 (1♀, USNM); Mt Constitution [48°40′N 122°49′W], 22.vii.1909 (3♂, 1♀, USNM). *Skagit County*: Anacortes [48°30′N 122°37′W], W. Mann (3♂, USNM); Anacortes, 28.vi.1909 (3♂, USNM); Mt Vernon [48°25′N 122°19′W], 3.vii.1924, ALM (7♂, USNM). *Skamania County*: 3 mi. W Spirit Lk. Cpgd, Rt. 504 [46°17′N 122°11′W], 30.vii.1972, MT with dry ice, WJT, W.B. Garnett (1♂, WSU). *Snohomish County*: Big Four Mtn [48°02′N 121°31′W], 5.vii.1924, ALM (18♂, 6♀, USNM); Everett [47°58′N 122°12′W], 19.vi.1920, ALM (10♂, 3♀, USNM); same data except, 4.vii.1924 (1♂, USNM). *Whatcom County*: Middle Fk Nooksack R, 900 ft, 48°46′15″N 122°4′27″W, 11.vi.2018, nr dam, S.H. Cumming (1♀, CNC). *Yakima County*: 10 mi. E Chinook Pass summit [46°56′N 121°21′W], 31.vii.1976, N.E. Woodley (1♂, USNM).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *delumbis* species group by the yellow colouration (occasionally thorax brown), male hind tibia bearing anteroventral lobe without setae, slightly arched with flattened anterior face (Figs 146, 147), phallus with subapical expansion with spiculate surface and pair of narrow lateral lobes.

Redescription. Wing length 6.0–7 mm. **Male.** Head dark in ground-colour, with greyish pruinescence. Eyes closely approximated, upper ommatidia not enlarged. Frons very narrow, divergent towards antennae; below ocellar triangle narrower than width of anterior ocellus; with short setulae along inner margin of eye. Face without setae; slightly divergent towards mouthparts, with oral margin dark and shiny. Ocellar triangle elevated, with thin greyish pruinescence, with pair of parallel ocellar setae, shorter than pprn, and several pairs of short setulae. Occiput bearing single row of strong setae, similar to vertical setae, longer and finer ventrally; postocular setae shorter and finer than occipital setae; postocellar region without setae. Antenna brown; scape 2× longer than pedicel, with short, black

setae; pedicel with ring of apical setae; postpedicel long and tapered, 4× longer than basal width; stylus 2× longer than basal width of postpedicel. Palpus yellow, with dark setulae. Proboscis reddish brown, length 2× or less head height; labellum with short, dark setae.

Thorax mostly yellow in ground-colour (Fig. 144), occasionally brown (Fig. 143), densely whitish pruinescent. Scutum colouration variable (dependent on preservation method), ranging from mostly yellow with broad brownish vittae between acr and dc rows and darker outer vittae to mostly dark or rarely with narrow dark vittae beneath dc; postpronotal lobe, lateral margin of scutum, postalar ridge and scutellum yellowish. Pleura yellow, lower half of katepisternum, anepisternum, meron and metakatepisternum often dark brown; mediotergite sometimes with pair of large, dark ventral spots. Proepisternum with short, dark setae on lower section; upper proepisternum in front of spiracle without setae. Prosternum bare. Antepronotum with row of dark setae. Postpronotum with 1 long seta and several dark setae of various thicknesses. Scutum with short, fine biserial acr; dc slightly longer than acr, with 1 prescutellar seta distinctly longer and stouter; 1–2 posterior npl, with several short anterior npl setulae; 1 presut spal; 1 psut spal; 1 pal. Scutellum with 2 pairs of sctl, outer pair shorter; disc bare. Laterotergite with patch of strong, dark setae. Anterior and posterior spiracles pale.

Legs slender, yellow, with apical tarsomeres darker; coxae clothed in whitish pruinescence, concolourous with pleura (Figs 143, 144). Coxae with short black setae. Hind trochanter with short setulae. Fore femur clothed in short, black setae. Fore tibia with 3–5 erect anterodorsal setae, longer than width of tibia; apex with circlet of preapical setae; anterior face with short appressed setae. Fore tarsomere 1 slightly inflated, wider than apical tarsomeres, with 1 long dorsal seta, more than twice width of tarsomere, with fine ventral setae and biserial row of stronger setae, longer than width of tarsomere; tarsomeres 2–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur similar to fore femur, with strong preapical anterior seta. Mid tibia with 3–4 posteroventral setae; 1 long, ventral preapical seta slightly longer than apical width of femur; 4–5 erect anterodorsal and posterodorsal setae; posterior face with dense fine setulae and several erect, strong setae; circlet of strong preapical setae. Mid tarsus with long, strong ventral setae on tarsomere 1; tarsomeres 2–5 similar to fore tarsus. Hind femur with apex somewhat inflated; anteroventral process knob-like, arched posteriorly with setae on outer face, denser on apex and strong setulae at base; tuft of thickened setae distal to process; circular ridge with thinly sclerotized centre distal to tuft; apex with preapical row of 4–5 flattened, black posterior setae; preapical anterior seta strong, longer than width of femur; 1–2 preapical anterodorsal setae (Figs 145–147). Hind tibia with subbasal swelling and bend, bearing anteroventral lobe without setae, slightly arched with flattened anterior face; posteroventral swelling tapered to small ridge, with swelling appressed into depression and circular ridge of femur (when legs folded); with seta in posteroapical comb; long, numerous anterodorsal and posterodorsal setae, length more than twice width of tibia; long setae on anterior and ventral surfaces (Figs 145–147). Hind tarsomere 1 slightly inflated with long dorsal setae similar to tibia; remaining tarsomeres similar to fore tarsus.

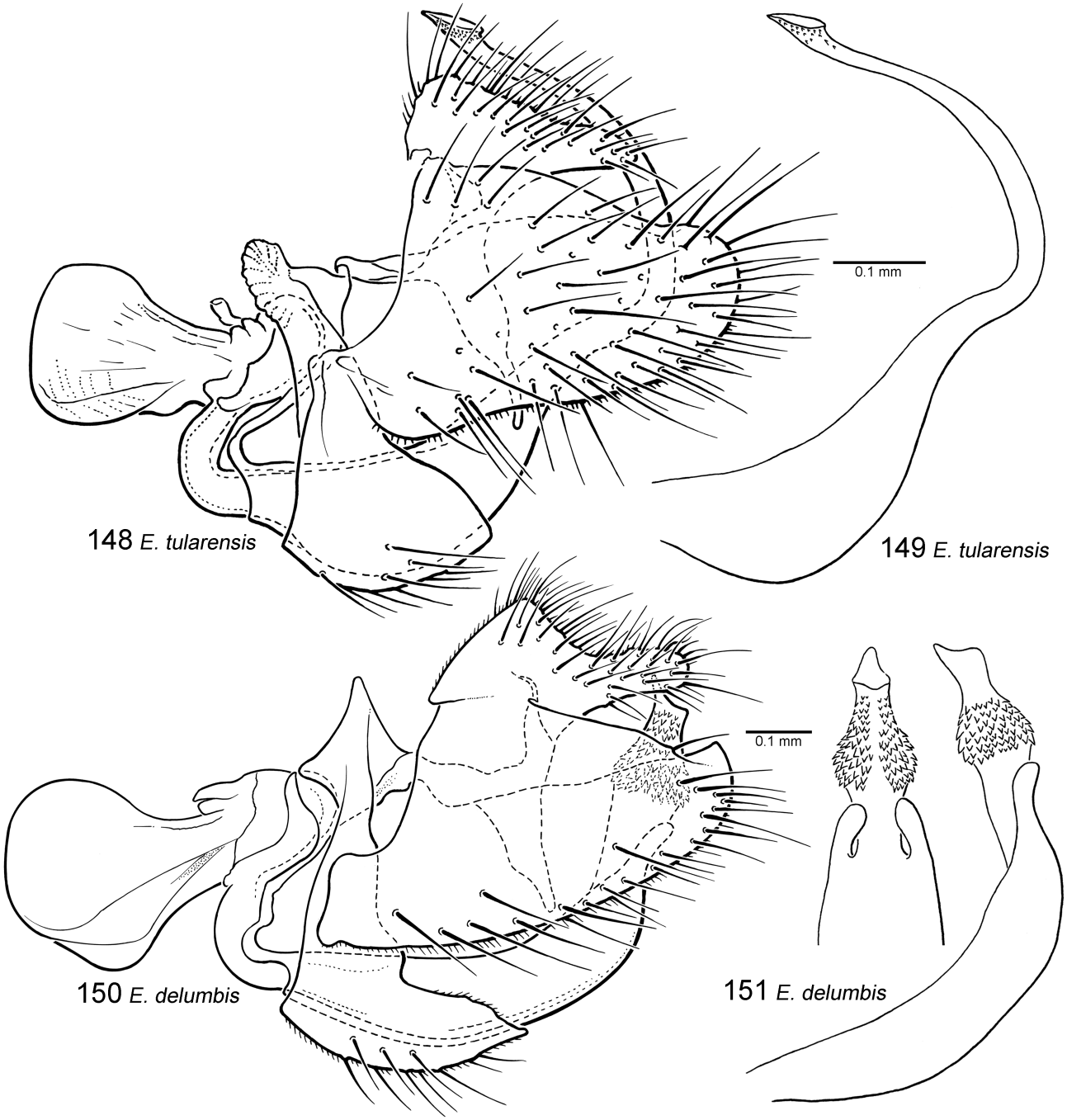
Wing infuscate with dark veins; veins mostly complete (except Sc), CuA+CuP weakly sclerotized, often fading out before wing margin. Basal costal seta absent. R_5 and M_1 divergent near wing margin; R_5 ending posterior to wing tip; radial fork acute. Halter yellow.

Abdomen variable in colour (dependent on preservation method) yellow, with central vitta to dark, with greyish pruinescence, darker than scutum; with long dark setae on posterior margin. Pregenital segments unmodified, except sclerites of segment 8 narrowly fused anteriorly. Terminalia (Figs 150, 151): yellow with ventral margin of epandrium, cerci and hypandrium brown. Cercus short, with triangular anterior half; posterior half digitiform, projecting obliquely from epandrium; setae nearly as long as width of cercus. Subepandrial process extending to either side of phallus. Epandrial lamella triangular, broad, width twice width of cercus; posterior tapered, with short, upturned projection, bearing setae ventrally, length about half width of epandrium. Hypandrium long, sharply tapered, pointed medially; setae longer than width of hypandrium. Phallus (Fig. 151) with basal half slightly broader than apical half, strongly bent beyond mid-length, with lateral digitiform processes flanking apical section; apex emerging beyond epandrium; apical portion with subapical expansion with spiculate surface, sometimes spicules extending to apex; apex broad, ventral margin somewhat prolonged; ejaculatory apodeme more than half-length of epandrium, Y-shaped, with ventrally positioned lateral apodemes.

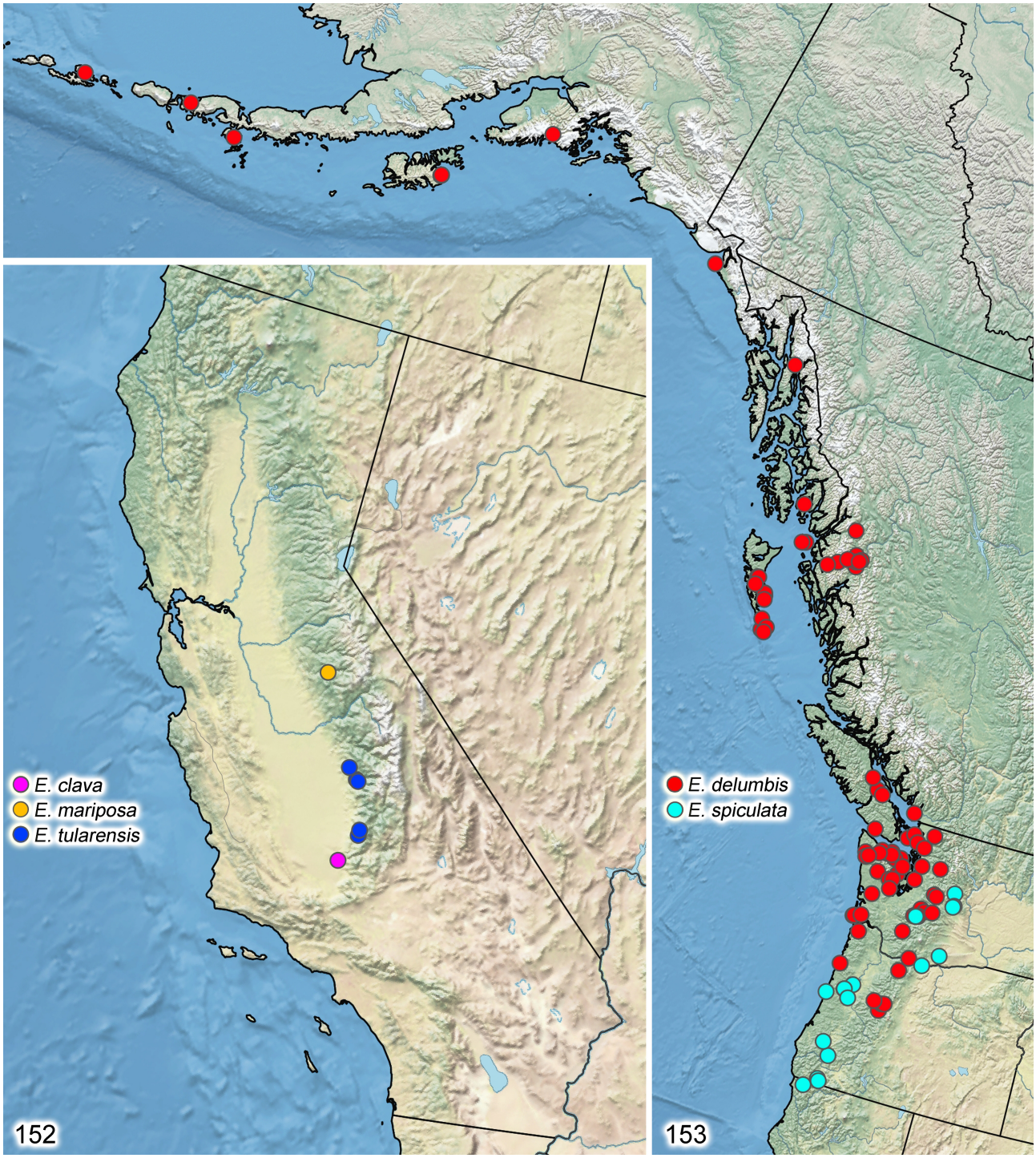
Female. Similar to male, except as follows: frons broader, wider than anterior ocellus; hindleg without modified setae and processes; abdominal pleural membrane without darkened, expanded region; tergites 7 and 8 with pruinescence.

Geographical distribution and seasonal occurrence (Fig. 153). *Empis* (*En.*) *delumbis* is known from Alaska, British Columbia, Washington and Oregon. Adults have been collected from June to August.

Nuptial gift presentation. A male specimen was examined with an unwrapped fly (Agromyzidae) prey item pinned below the specimen. This may indicate that males of this species present unwrapped prey to females as nuptial gifts.



FIGURES 148–151. Male terminalia of the *E*. (*Enoplempis*) *clava* and *delumbis* species groups. **148,** *E*. (*En*.) *tularensis* **sp. nov.**, lateral view; **149,** same, phallus, lateral view; **150,** *E*. (*En*.) *delumbis* Melander, lateral view; **151,** same, phallus lateral and posterior view.



FIGURES 152–153. Known geographical distribution of the *E.* (*Enoplempis*) *clava* and *E.* (*Enoplempis*) *delumbis* species groups. **152,** *E.* (*En.*) *clava* **sp. nov.**, *E.* (*En.*) *mariposa* **sp. nov.** and *E.* (*En.*) *tularensis* **sp. nov.**; **153,** *E.* (*En.*) *delumbis* Melander and *E.* (*En.*) *spiculata* **sp. nov.**

***Empis* (*Enoplempis*) *floricola* sp. nov.**

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(Figs 154–156, 160, 161, 174)

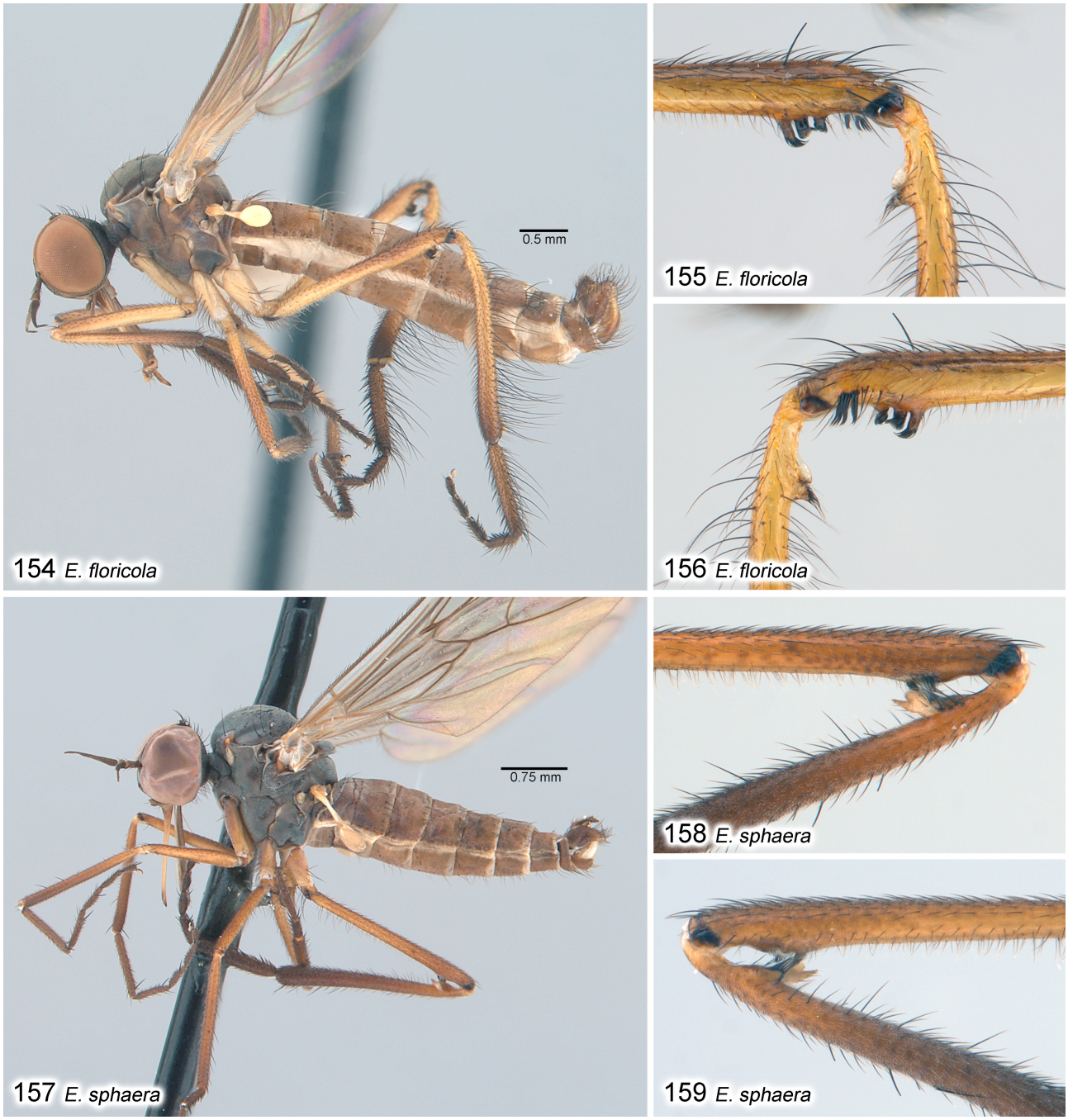
Type material. HOLOTYPE ♂, labelled: "CAN: BC: Glacier NP/ Illecillewaet tr from Cpgd./ 20.vii.2012, 1320 m/ N51°10.018′W117°29.799′/ B.J. Sinclair"; "ex. flowers of Mtn vallaria/ (Vallariana sitchensis)"; "CNC/

1078375"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *floricola* Sinclair,/ Brooks & Cumming [red label]" (CNC). **PARATYPES: CANADA. British Columbia:** Same data as holotype (4♂, 2♀, CNC); Bowser [49°26′N 124°40′W], 30.v.1955, J.R. McGillis (1♂, CNC); same data except, 31.v.1955, R. Coyles (1♂, CNC); Copper Slough, 10 mi. E Terrace [54°30′N 128°35′W], 16.vii.1960, CHM (1♀, CNC); Glacier Ck, 10 mi. N Terrace [54°39′N 128°40′W], 7.vii.1960, JGC (1♂, 4♀, CNC); Glacier NP, Bostock Tr., 51.2303°N 117.6695°W, 993 m, 14.vii.2010, BIObus 2010, Subset of LOT# L#PC2010GR-081 (1♂, 2♀, CNC); Glacier NP, Illecillewaet trails, +1325 m, 51°10.018′ N 117°29.799′W, 20.vii.2012, swept trails from cpgd, BJS (2♂, CNC); Kitsumkalum Lk., 20 mi. N Terrace [54°43′N 128°46′W], 16.vi.1960, JGC (1♀, CNC); same data except, 500 ft, W.W. Moss (1♂, CNC); same data except, R. Pilfrey (1♀, CNC); Kleanza Ck, 14 mi. E Terrace [54°35′N 128°24′W], 17.vi.1960, CHM (12♂, 39♀, CNC); same data except, 29.vi.1960 (1♂, 6♀, CNC); same data except, 30.vi.1960 (1♂, 2♀, CNC); same data except, 4.vii.1960 (1♂, 3♀, CNC); same data except, 13.vii.1960 (1♀, CNC); same data except, 12.vii.1960, G.P. Holland (7♂, CNC); same data except, 19.vii.1960, W.R. Richards (1♀, CNC); same data except, 250 ft, 17.vi.1960, R. Pilfrey (1♂, CNC); same data except, 29.vi.1960, B. Heming (1♂, CNC); Kleanza Ck, 14 mi. E Terrace, 17.vi.1960, wet scrub in cutover forest, JGC (1♀, CNC); same data except, swept from old lumber pile (1♀, CNC); same data except, 29.vi.1960, on liliaceous undergrowth hemlock forest (1♂, 4♀, CNC); same data except, 4.vii.1960, wet scrubby clearing (5♀, CNC); same data except, 13.vii.1960, along trail in second growth woods (2♀, CNC); same data except, lumber scrap (1♀, CNC); 5 mi. S Lakelse, Hot Springs, [54°21′N 128°32′W], 8.vii.1960, CHM (1♀, CNC); Manning PP, Lightning Lk., 49°03.52′N 120°50.48′W, 1265 m, 22.vii.2015, forest, BJS (1♂, 1♀, CNC); Manning PP, Skyline Tr., 49°03.63′N 120°53.96′W, 1460 m, 22.vii.2015, BJS (1♂, CNC); Mt Allard, 23 mi. N Terrace [49°33′N 121°26′W], 20.vii.1960, alpine meadow *Arnica*, *Achillea*, 4000–5000 ft, CHM (1♀, CNC); Mt Thornhill nr Terrace [54°29′N 128°27′W], 26.vii.1960, B. Heming (2♂, 1♀, CNC); same data except, 30.vii.1960, W.R. Richards (2♀, CNC); same data except, 29.vii.1960, 700 ft (1♂, 1♀, CNC); same data except, 3000–4000 ft (1♀, CNC); same data except, 26.vii.1960, 2000 ft, wet hollow along trail, B. Heming (6♂, 6♀, CNC); same data except, 8.viii.1960, along trail in hemlock forest, 2500 ft (2♀, CNC); same data except, in boggy seepage area, 3500 ft (1♀, CNC); same data except, 26.vii.1960, along trail in hemlock forest, 2500 ft, CHM (3♂, 2♀, CNC); same data except, second growth hemlock forest, 1500–2000 ft (1♂, 3♀, CNC); same data except, 3000–4000 ft (1♀, CNC); same data except, 14.vii.1960, 1500 ft (2♀, CNC); same data except, 8.viii.1960 (1♀, CNC); same data except, 14.vii.1960, 2000 ft, JGC (3♂, 3♀, CNC); same data except, wet hollow along trail, 2500 ft, (1♂, 1♀, CNC); same data except, wet hollow along trail, 3000 ft (1♀, CNC); same data except, 14.vii.1960, second growth hemlock forest, 1500–2000 ft (4♂, 1♀, CNC); Shames, 18 mi. SW Terrace [54°29′N 128°57′W], 17.vii.1960, CHM (1♀, CNC); Squamish, Diamond Head Tr. [49°45′N 123°02′W], 3700 ft, 17.viii.1953, W.R.M. Mason (1♂, CNC); same data except, 3600 ft, 12.viii.1953 (1♀, CNC); same data except, 3300 ft, 18.viii.1953, G.J. Spencer (1♀, CNC); Terrace [54°30′N 128°35′W], 12.viii.1960, W.R. Richards (1♀, CNC); same data except, 220 ft, 19.vii.1960, B. Heming (1♂, 1♀, CNC); 54 mi. NE Terrace nr Woodcock [55°03′N 128°13′W], 25.vii.1960 (1♀, CNC); Zymagotitz R, 6 mi. W Terrace [54°28′N 128°44′W], 190 ft, 20.vi.1960, W.W. Moss (1♀, CNC). **USA. Alaska:** *Haines Borough*: Mosquito Lk., 59 27N 136 02W, 6.vii.1983, G.G.E. Scudder (1♂, UBCZ). **Idaho:** *Benewah County*: St Joe NF, Wilson Ck [47°07′N 116°24′W], Vista Point, 21.vi.1970, W.B. Garnett (1♂, WSU). *Latah County*: 5 mi. NE Harvard, Palouse R/ Strychnine Ck [46°56′N 116°38′W], 19.vi.1972, B.J. Hanson (1♂, WSU); 7 mi. SE Harvard, L. Sand Ck [46°54′N 116°37′W], 2500–3000 ft, 22.vi.1973, WJT (1♂, 1♀, WFBM); Big Meadow Ck Rec. Area, 5 mi. NW Troy [46°44′N 116°46′W], 14.vii.1979, R.S. Zack (1♀, WSU); Big Meadow Rec. Area, 7 mi. NNE Troy, 3000 ft, 19.vi.1986, sweeping, WJT (1♂, 1♀, WSU); 7 mi. NNE Moscow [46.73°N 117.00°W], 2700 ft, 29.vi.1975, WJT (1♂, 2♀, WSU); Moscow Mtn, Tamarack Rd, 16.vi.2014, 1130 m, 46°48.162′N 116°49.552′W, streamlets, BJS (2♂, 2♀, CNC); same data except, Moscow Mtn Rd, 22.vi.2014, 1000 m, 46°47.721′N 116°54.093′W, cascading str. (1♂, 2♀, CNC); Moscow Mtn [46°48′N 116°52′W], 1.v.1907 (1♂, 1♀, USNM); same data except, 12.vi.1910 (1♀, USNM); same data except, 2.vii.1911 (1♂, 1♀, USNM); same data except, 9.vii.1911 (1♀, USNM); same data except, 6.vii.1912 (2♂, 3♀, USNM); same data except, 19.vi.1972, Dry Ice MT, WJT (1♂, 4♀, WSU); Troy, Hwy 8 + mm 15, West Fk Ck, 747 m, 46.733°N 116.757°W, 9.vi.2009, E09-62c, I.S. Winkler (1♂, CNC). *Shoshone County*: Hobo Cedar Grove 12 mi, NNE Clarkia [47.0911°N 116.127°W], 20.vi.1987, 4400 ft, WJT, sweep (4♂, WSU). **Oregon:** *Baker County*: L. Goose Ck, 36 mi. SE Union [44°56′N 117°25′W], 4000 ft, 29.vi–5.vii.1975, E.J. Davis, MT baited with CO_2 (3♂, 6♀, WSU); same data except, 9–12.vi.1977 (1♀, WSU); U. Goose Ck, 34 mi. SE Union [44°56′N 117°25′W], 4160 ft, 13–19.vii.1975, E.J. Davis, MT baited with CO_2 (1♂, 2♀, WSU); Velvet Ck [45°1′N 117°31′W], 28 mi. SE Union, 4720 ft, Wallowa-Whitman NF, 17.vi.1977, swarm, WJT (2♂, WFBM); same

data except, 18–20.vii.1976, E.J. Davis, MT baited with CO_2 (1♂, 1♀, WSU). *Clackamas County*: Mirror Lake, outlet ck, 45°18′15″N 121°47′30″W, 1.viii.2016, SJF (3♂, 1♀, CNC); Mt Hood NF, Still Ck Rd, 45°17.879′N 121°53.276′W, 8.vii.2013, 570 m, BJS (1♂, 8♀, CNC); Mt Hood NF, Still Ck Cpgd, 45°17.703′N 121°44.313′W, 9.vii.2013, 1150 m, BJS (2♂, 4♀, CNC); same data except, 27.vi.1978, DDW (3♂, CAS); Mt Hood NF, Still Ck jct. Timberline Hwy, 45°18′21″N 121°43′59″W, 1.vii.2016, SJF (5♂, 2♀, CNC). *Lane County*: Salt Ck Falls Cpgd, 33 km SE Oakridge [43°36′N 122°07′W], 26.vii.1974, 1219 m, PHA (1♂, CAS); 40 mi. NNE Oakridge, Skookum Ck [43°51′N 122°01′W], 4450–4500 ft, 1.vii.1978, L. & N. Herman (2♂, AMNH); Willamette NF, Proxy Falls [44°09′N 121°55′W], 22.vi.1978, DDW (1♂, CAS). *Linn County*: 0.5 mi. E Tombstone Pass, Hackleman Ck, 44°23′51″N 122°07′53″W, 29.vi.2016, SJF (1♂, CNC); same data except, 0.6 mi. E Tombstone Pass, 29.vi–1.viii.2016, MT (1♂, 1♀, CNC); Willamette NF, Hackleman Ck Rd No. 2672, 44°24.733′N 122°02.555′W, 11.vii.2013, BJS (3♂, 5♀, CNC); Monument Peak Guard Sta. s.21, TIOS, R4E [44°43′N 122°22′W], 4000 ft, 17.vii.1969, E.M. Fisher (1♂, CSCA); N. Santiam R at Hwy 22 & Parrish Lk. Rd, 44°31′26.7″N 121°59′49.3″W, 948 m, 10.vii.2014, swp along river & in forest, SEB (1♂, CNC); Willamette NF, 1175 m, Fork of No. 410 & 420, 44°23.413′N 122°02.808′W, 11.vii.2013, small stream, BJS (1♀, CNC). *Union County*: L. Lick Ck, 26 mi. SE Union [45°12′N 117°52′W], 4280 ft, 23–26.vi.1976, MT baited with CO_2, E.J. Davis (1♂, 2♀, WSU); same data except, 15–21.vi.1975 (1♀, WSU); Whiskey Ck, 23 mi. SSW La Grande [45°16′N 118°13′W], 5120 ft, 22–28.vi.1975, MT baited with CO_2, E.J. Davis (1♀, WSU). *Wallowa County*: Joseph [45°21′09″N 117°13′49″W], 6.vii.1949, J.L. & G.H. Sperry (2♂, USNM). **Washington:** *Asotin County*: Anatone [46.135°N 117.132°W], 19.vi.1948, R.R. Sanders, sweep (1♀, WSU); Fields Spring SP [46°4′N 117°10′W], 4 mi. S Anatone, 3500–4000 ft, 7.vi.1973, WJT (2♀, WSU); same data except, 26.vi.1979 (1♀, WSU); same data except, 12–13.vi.1974, MT with dry ice (2♂, 5♀, WSU); Fields Spring SP, 19.vii.1948, M.T. James (2♂, 1♀, WSU); same data except, 15.vi.1972, dry ice MT (1♂, WSU); Fields Spring SP, 6.65 km SSW Anatone, Tr. To Puffer Butte, open *Pinus ponderosa* forest, 46°04′43″N 117°10′19″W, 1260 m, sweep, 16.vi.2005, C.J. Borkent (1♂, LEM). *Clallam County*: Olympic NP, Heart of the Hills [48°05′N 123°25′W], 15.vii.1977, R.S. & V.L. Zack (5♂, 2♀, WSU). *Chelan County*: Scotty Ck, 2520 ft, 47°24′5″N 120°39′20″W, 13.vi.2018, SEB (2♂, 3♀, CNC). *King County*: 8 mi. W Snoqualmie Pass [47°23′N 121°28′W], 29.vi.1924, ALM (2♂, 2♀, USNM). *Kittitas County*: Lk. Keechelus [47.35°N 121.37°W], 29.vi.1924, ALM (2♂, USNM). *Lewis County*: trib. of Catt Ck, 2847 ft, 46°41′53″N 121°57′46″W, 16.vi.2018, SEB (1♂, 3♀, CNC); Mt Rainier, Eagle Peak [46°45′N 121°46′W], 19.vii.1922, ALM (14♂, 7♀, USNM); Mt Rainier NP, Narada Falls to Reflection Lk. Tr., 46°46′N 121°44′W, 1400 m, 17.vii.2012, BJS (1♂, CNC); Mt Rainier NP, Stevens Ck Tr., 4.vii.2013, 860 m, 46°45.338′N 121°38.530′, BJS (3♂, 2♀, CNC); Wonderland Tr. (Narada Falls to Cougar Rock), 46°46′22″N 121°44′52″W, 29.vii.2016, crk, R.J. Pivar (1♀, CNC). *Mason County*: 16 km NW Lilliwaup, Staircase, Olympic NP, W side of N fork Skokomish R, 47°31′06″N 123°19′58″W, 280 m, 10.vi.2004, C.J. Borkent, CJB04-5 (1♂, LEM). *Pierce County*: Mt Rainier NP, Comet Falls Tr., above via Trump Ck [46°46′N 121°47′W], 4500 ft, 13.viii.1977, sweeping, WJT (1♂, WSU); Mt Rainier NP, Comet Falls Tr., 46°46.724′N 121°47.029′W, 16.vii.2012, 1100 m, BJS (4♂, 2♀, CNC); Mt Rainier NP, Cougar Rock to Longmire Tr., 46°45.6′N 121°48.2′W, 17.vii.2012, 920 m, BJS (8♂, 11♀, CNC); Mt Rainier NP, Fairfax Tr. [47°00′N 122°01′W], 9.viii.1922, ALM (1♂, USNM); Mt Rainier NP, Longmire [46°45′N 121°48′W], 18.vii.1922, ALM (19♂, 3♀, USNM); same data except, 26.viii.1921 (1♂, USNM); Mt Rainier NP, Longmire, Trail of the shadows (cedar-hemlock forest) and Marsh (*Carex*, *Lysichitum*) W of Inn, sweep, 46°44′56″N 121°48′51″W, 850 m, 25.vi.2005, C.J. Borkent, CJB05-27 (3♂, 3♀, LEM); Mt Rainier NP, Ramparts [46°45′N 121°49′W], 1.viii.1922, ALM (1♀, USNM); Mt Rainier NP, West Side Rd nr Fish Ck, 46°46.743′N 121°53.069′W, 4.vii.2013, 880 m, BJS (13♂, 7♀, CNC); same data except, 910 m, 1.viii.1977, DDW (1♂, CAS); Mt Rainier NP, West End Rd nr Puyallup R [46°50′N 121°55′W], 3500 ft, 12.viii.1977, WJT (1♂, WSU); Mt Rainier NP, White R Cpgd on White R [46°54′N 121°38′W], 4400 ft, 9–10.viii.1977, sweep, WJT (2♀, WSU). *Skamania County*: Mt St Helens [46°16′N 122°13′W], 22.vii.1978, T.L. Whitworth (2♂, LACM). *Stevens County*: 5 mi. NE Deer Lk. [48°10′N 117°35′W], 3200 ft, 11–13.vii.1975, WJT (1♂, 1♀, WSU). *Whatcom County*: Bellingham [48°45′N 122°29′W], 15.v.1910 (1♂, 1♀, USNM).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *delumbis* species group by the male hind tibia and swollen hind tarsomere 1 with very long dorsal setae (Fig. 154), setae on male terminalia long and slender, phallus with spiculate apex and subapical expansion and pair of narrow lateral lobes.

Description. Wing length 5.5–6.5 mm. **Male.** Similar to *E.* (*En.*) *delumbis* except as follows: head holoptic. Antenna with postpedicel long, slender, 6× longer than basal width. Palpus brown, with dark setulae and 1 long apical seta.



FIGURES 154–159. Male habitus and hindleg of the *E.* (*Enoplempis*) *delumbis* species group. **154,** *E.* (*En.*) *floricola* **sp. nov.**, habitus, lateral view; **155,** same, hind femur tibia joint, anterior view; **156,** same, hind femur tibia joint, posterior view; **157,** *E.* (*En.*) *sphaera* **sp. nov.**, habitus, lateral view; **158,** same, hind femur tibia joint, anterior view; **159,** same, hind femur tibia joint, posterior view.

Thorax greyish brown in ground-colour. Scutum with narrow, faint brownish vittae along inner margin of dc; postpronotal lobe, postalar ridge and scutellum yellowish. Pleura with pale margins of katepisternum and anepimeron.

Legs slender, yellow, with apical portion of femora and tibia brownish, tarsomeres darker; coxae pale, in contrast to greyish pleura (Fig. 154). Fore tibia with 3 erect anterodorsal setae, longer than width of tibia; with circlet of preapical setae; anterior face with short appressed setae. Fore tarsomere 1 inflated, slightly narrower than width of tibia, with 2 long dorsal setae, longer than width of tarsomere, with fine ventral setae and biserial row of stronger

setae, longer than width of tarsomere; tarsomeres 2–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur with erect, pale ventral setulae, length one-third width of femur, with strong preapical anterior seta. Mid tibia with 1–2 erect anterodorsal and posterodorsal setae; ventral and posterior faces with dense fine setulae; circlet of strong preapical setae. Mid tarsus slender; tarsomeres 1–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Hind femur with erect, pale ventral setulae, length one-third width of femur; 3 closely approximated preapical ventral protuberances, with dark, curved, flattened apices; apex with preapical row of 7–8 flattened, black posterior setae; preapical anterior seta strong, longer than width of femur; 1–2 preapical anterodorsal setae (Figs 154–156). Hind tibia with narrow base, without subbasal swelling and bend; basiventral swelling with posteroventral lobe with appressed apical setae; face of swelling with small circular ridge of depressed inner surface; long, numerous dorsal setae, length more than 3 times width of tibia; long setae on ventral surface (Figs 154–156). Hind tarsomere 1 inflated, with long dorsal setae similar to tibia, ventral stout setae longer than width of tarsomere; remaining tarsomeres similar to fore tarsus (Fig. 154).

Abdomen paler than thorax, subglossy. Pregenital segments modified: tergite 6 with posterior margin broadly U-shaped; posterolateral corner prolonged with long, dark marginal setae. Tergite 7 with rectangular invagination along posterior margin; posterolateral margin with strong, long dark setae; dorsolaterally with knob-like swelling. Tergite 8 divided into two sclerites: rectangular posterior sclerite, broadly separated from anterior sclerite fused laterally to sternite 8; posterior margin of sternite 8 and posterior sclerite of tergite 8 with long, dark marginal setae. Terminalia (Figs 160, 161): brown with long dense setae. Cercus short, L-shaped, projecting obliquely from epandrium; apical half rectangular with narrow apical projection; setae longer than width of cercus. Subepandrial process extending to either side of phallus. Epandrial lamella subrectangular, tapered, posterior margin rounded with short, upturned projection; setae longer than width of epandrium. Hypandrium long, tapered, apical margin truncate; setae shorter than length of hypandrium. Phallus (Fig. 161) with basal half gradually tapered; paired, slender lateral processes beyond mid-length; spiculate surface on subapical swelling and broad apex; ejaculatory apodeme half-length of epandrium, Y-shaped, with ventrally positioned lateral apodemes.

Female. Similar to male, except as follows: frons broader, slightly wider than anterior ocellus; hindleg without modified setae and processes; hind tibia with long anterodorsal and posterodorsal setae, twice width of tibia; ventral surfaces of mid and hind femora as in male; abdominal pleural membrane without darkened, expanded region; tergites 7 and 8 with pruinescence.

Geographical distribution and seasonal occurrence (Fig. 174). *Empis* (*En.*) *floricola* **sp. nov.** is known from the pan handle of Alaska south through British Columbia, Washington, Oregon and Idaho. Adults have been collected from May to August.

Etymology. The species name is Latin for flower (*flora*) and dweller (*cola*) in reference to the flower visiting habits of this and many other species of *Empis*.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *sphaera* sp. nov.

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(Figs 157–159, 162, 163, 175)

Type material. HOLOTYPE ♂, labelled: "CAL: Tulare Co./ Big Fern Spr. [36°32′N 118°46′W]/ 9 mi.NE Ash Mt./ HQ IV-30-79/ J.T. Doyen, coll. [with Phoridae prey on collapsed balloon]"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *sphaera* Sinclair,/ Brooks & Cumming [red label]" (EMEC). **PARATYPES: USA. California:** *Tulare County*: Same data as holotype (8♂ with Cecidomyiidae, Chironomidae and Sciaridae prey on balloons, EMEC; 2♂, EMEC); same data as holotype except, 4.v.1979, J. DeBenedictis (1♂ with Phoridae prey on balloon, EMEC); Sequoia NP [36°33′53″N 118°46′22″W], 13.iv.1934, 328-1 (2♂, WSU); S. Fork Camp, 13 mi. SE Three Rivers [36°21′N 118°45′W], 3.v.1979, M.E. Buegler (1♂, EMEC).

Additional material examined. USA: Oregon: *Hood River County*: E11-58, Mount Hood NF, 45.3735°N, 121.6859°W, 17.vi.2011, S.P. Turner, *ex* observed with balloons [not attached with pinned specimen] (2♂, 1♀, CNC) [there is doubt concerning the accuracy of the label data as the state is mis-labelled as Washington].

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *delumbis* species group by the male

head holoptic, male hind tibia without preapical row of posterior setae and bearing pale mitten-shaped anteroventral lobe (Figs 157–159).

Description. Wing length 5.4–6.3 mm. **Male.** Similar to *E*. (*En.*) *delumbis* except as follows: head holoptic, upper ommatidia not enlarged. Antenna brown; postpedicel long, slender and tapered, 6× longer than basal width; stylus 2× longer than basal width of postpedicel. Palpus yellow, with dark setulae.

Thorax dark grey in ground-colour, densely whitish pruinescent. Scutum with faint narrow brownish vittae between acr and dc rows and very faint broader outer vittae; postpronotal lobe and postalar ridge yellowish brown. Pleura as dark as scutum. Postpronotum with 1 long seta and several dark, slender setae. Scutum with short, fine uniserial acr; dc uniserial, long and slender anteriorly, with longer, stronger seta nearly prescutellar depression; 2 posterior npl, with several short anterior npl setulae; 1 presut spal; 1 psut spal; 1 pal. Scutellum with 2 pairs of sctl, outer pair shorter; disc bare.

Legs slender, brown with yellowish ventrum on femora and apical tarsomeres darker; coxae pale brown to yellowish, with some bluish pruinescence (Fig. 157). Fore femur with row of slender posteroventral setae. Fore tibia with 1–2 erect anterodorsal setae on apical half, longer than width of tibia; apex with circlet of preapical setae; anterior face with short appressed setae. Fore tarsomere 1 slender, with fine ventral setae and row of strong anteroventral setae, shorter than width of tarsomere; tarsomeres 2–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur with erect, pale ventral setae, basal setae nearly twice width of femur; strong preapical anterior seta present. Mid tibia with 3–4 posteroventral setae; 2–3 erect anterodorsal and posterodorsal setae; posterior face with dense fine setulae and several erect, strong setae; circlet of strong preapical setae. Mid tarsus with long, strong ventral setae on tarsomere 1; tarsomeres 2–5 similar to fore tarsus. Hind femur with erect pale ventral setae, basal setae longer than width of femur; apex with tuft of black anteroventral setae arising directly from femur; tuft of black posteroventral setae arising directly from femur, proximal to anteroventral tuft, with short distal; apex without preapical row of posterior setae; preapical anterior seta slightly longer than width of femur (Figs 158, 159). Hind tibia without subbasal swelling and not bent; anteroventral lobe pale brown, mitten-shaped, clothed in pubescence; posteroventral lobe triangular, with black apical setae, longer than lobe; 7–10 long dorsal setae, less than twice width of femur; ventral surface with long, slender setae, several longer than width of tibia (Figs 157–159). Hind tarsomere 1 inflated with long dorsal setae similar to tibia, otherwise all tarsomeres similar to mid tarsus.

Wing with CuA+CuP weakly sclerotized, often fading out before wing margin; R_5 ending near wing tip. Halter brownish.

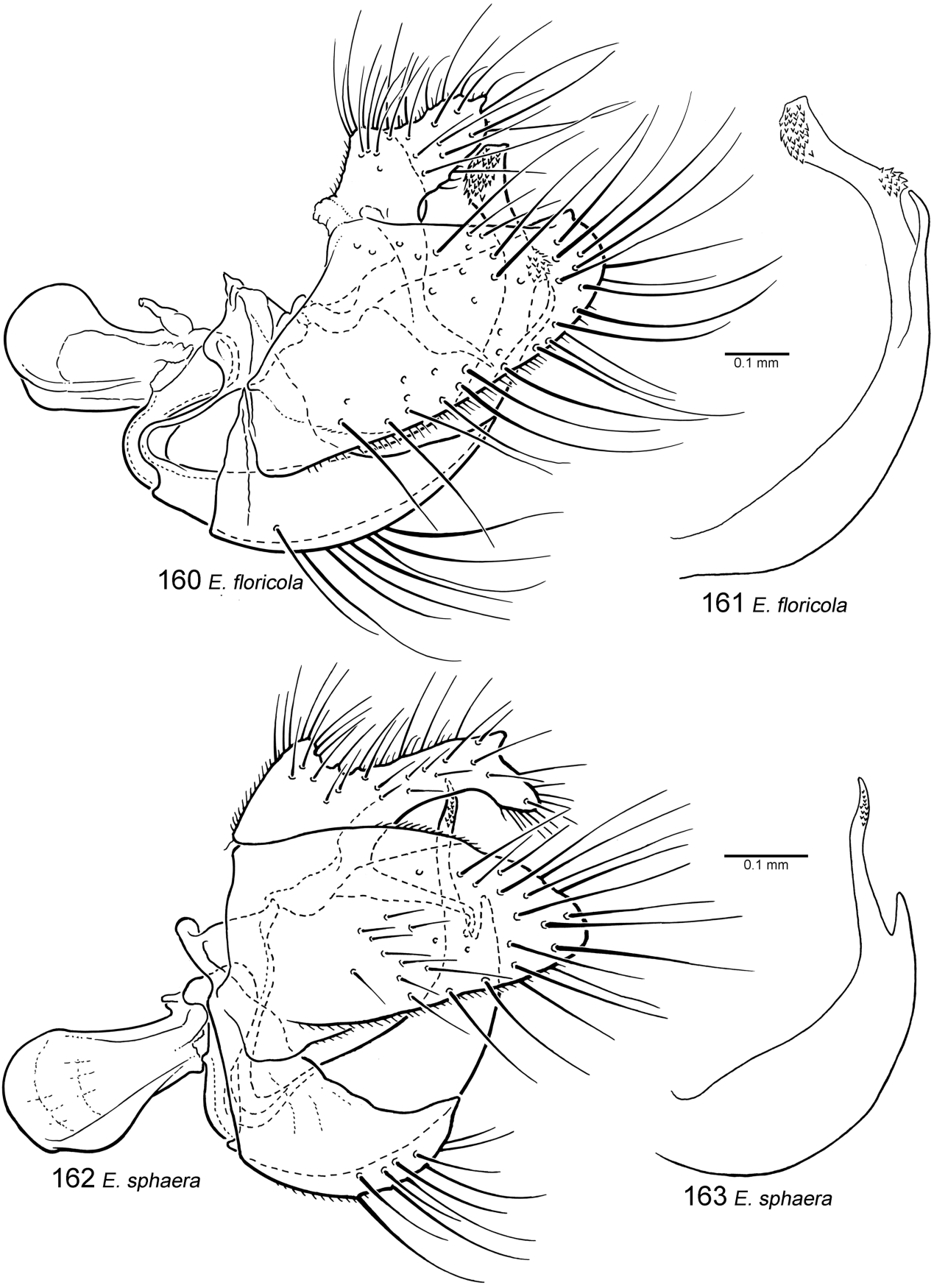
Abdomen dark brown, with greyish pruinescence; with long, slender setae on posterior margin of sclerites. Pregenital segments unmodified, except sclerites of segment 8 narrowly separated or partially fused anteriorly. Terminalia (Figs 162, 163): brown with yellowish phallus. Cercus long and narrow, projecting obliquely from epandrium; apex forked with narrow tapered upper lobe (shorter in northern populations); lower apical lobe broader with rounded apex; setae nearly as long as width of cercus. Subepandrial process extending to either side of phallus. Epandrial lamella subtriangular, broad, with rounded, tapered apex, without upturned projection, bearing long setae on apical third, length longer than width of epandrium. Hypandrium well developed, with bulbous posterior face as base of long setae; apex pointed medially; setae longer than width of hypandrium. Phallus (Fig. 163) with basal half broader than apical half, tapered, gently arched, with pair of posterior digitiform processes flanking apical section; apex emerging beyond epandrium; apical portion slender, sinuous with narrow, spiculate tip; ejaculatory apodeme more than half-length of epandrium, Y-shaped, with ventrally positioned lateral apodemes.

Female. Similar to male, except as follows: frons broader, wider than anterior ocellus; hindleg without modified setae and processes; abdominal pleural membrane without darkened, expanded region; tergites 7 and 8 with pruinescence.

Geographical distribution and seasonal occurrence (Fig. 175). *Empis* (*En.*) *sphaera* **sp. nov.** is known from Tulare County, California and Hood River County, Oregon. Adults were collected in April, May and June.

Etymology. The species name is Latin for sphere, in reference to the balloons used as nuptial gifts in this species.

Nuptial gift presentation. Numerous males included a balloon attached to the pin beneath the specimen (see "Type material" above). Each balloon is hollow with a small fly (Cecidomyiidae, Chironomidae, Sciaridae and Phoridae) attached to the outside. The balloons are shiny, generally cylindrical in shape, comprising layers of hexagonal shaped cells, usually with a large circular opening at one end.



FIGURES 160–163. Male terminalia of the *E.* (*Enoplempis*) *delumbis* species group, lateral view. **160,** *E.* (*En.*) *floricola* **sp. nov.**; **161,** same, phallus; **162,** *E.* (*En.*) *sphaera* **sp. nov.**; **163,** same, phallus.

***Empis* (*Enoplempis*) *spiculata* sp. nov.**
urn:lsid:zoobank.org:act:B4B99042-D9DC-4278-AF45-036BB1BB2EC5
(Figs 153, 164–166, 170, 171)

Type material. HOLOTYPE ♂, labelled: "USA: OR: Benton Co./ Siuslaw NF, 675 m, Marys/ Peak Rd; Adler Ck Falls/ N44°28.462′W123°31.711′/ 12.vii.2013; B.J. Sinclair"; "CNC/ 1078376"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *spiculata* Sinclair,/ Brooks & Cumming [red label]" (CNC). **PARATYPES: USA. California:** *Del Norte County*: Patrick Ck Cpgd, middle fork Smith R, Six Rivers NF, 41°52′21″N 123°50′41″W, 210 m, 2.vi.2009, (09-11), S.D. Gaimari (3♂, 3♀, CSCA). **Oregon:** *Benton County*: Corvallis, Lewisburg Saddle, below Old Growth Tr., 44°38′32.28″N 123°17′20.76″W, MT over creek, 31.v–12.vi.2013, SJF (1♂, CNC); Mary's Peak Rd waterfalls mi. 2–5 [44°28′N 123°32′W], 18.vii.1994, SJF (1♂, CSUC); same data as holotype (4♂, 9♀, CNC); Mary's Peak, Alder Creek below Mary's Peak Rd, 44°28′28″N 123°31′40″W, 24.vi.2018, SJF (1♂, 1♀, CNC); Mary's Peak, Alder Ck Falls jct Mary's Peak Rd, 44.2846°N 123.3171°W, 12.vii.2013, SJF (1♂, CNC). *Douglas County*: Cow Ck Rest Area, 7 km ENE Glendale, 470 m, 42°45.46′N 123°21.12′W, 29.vi.2008, C. Borkent, CJB08-28 (11♂, 1♀, LEM); summit Camas Mt. jct. Rd 42, 1448 ft, dry woods, 43.062450°N 123.652791°W, 23.v.2014, SJF (1♂, CNC). *Josephine County*: Grayback Camp [42°08′N 123°27′W], Siskiyou NF, 19.vi.1962, C.A. Toschi (1♂, EMEC); Oregon Caves [42°05′N 123°24′W], 27.vi.1972, W.N. Mathis (1♂, OSAC). *Lane County*: Siuslaw NF, 3 mi. S Yachats [44°16′N 124°06′W], 15.vii.1989, streams along Gwynn Ck Tr., BJS (3♂, CNC). *Wasco County*: 3.6 mi. S The Dalles [45°36′N 121°10′W], 4.v.1973, Oman (1♂, 1♀, OSAC). **Washington:** *Chelan County*: Eight Mi. Cpgd [47°33′N 120°45′W], 8 mi. S Leavenworth, 18.vii.1972, MT dry ice, WJT & W.B. Garnett (1♂, WSU). *Kittitas County*: Liberty, Williams Ck [47°15′N 120°39′W], 17.vii.1972, Dry Ice MT, WJT & W.B. Garnett (1♂, WSU); Swauk Ck [47°13′N 120°41′W], 28.vi.1924, ALM (1♂, USNM). *Klickitat County*: Brooks SP [45°57′N 120°40′W], 2.5 mi. S Satus Pass, 27.vi.1975, JAP (1♂, 1♀, EMEC); Brooks Mem. SP, 12 mi. NE Goldendale, 2700–3000 ft, 27.vi.1975, WJT (3♂, 4♀, WFBM; 3♂, 4♀, WSU). *Pierce County*: Mt Rainier, Tahoma Fork [46°44′N 121°53′W], 25.vii.1922, ALM (1♂, USNM).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *delumbis* species group by the male hind femur with row of strong, black anteroventral setae proximal to preapical region, male hind tibia bearing divergent digitiform anteroventral and posteroventral processes, with sparse setae, except long ventral setae on posteroventral process (Figs 164–166) and phallus with subapical expansion with spiculate surface and narrow apex.

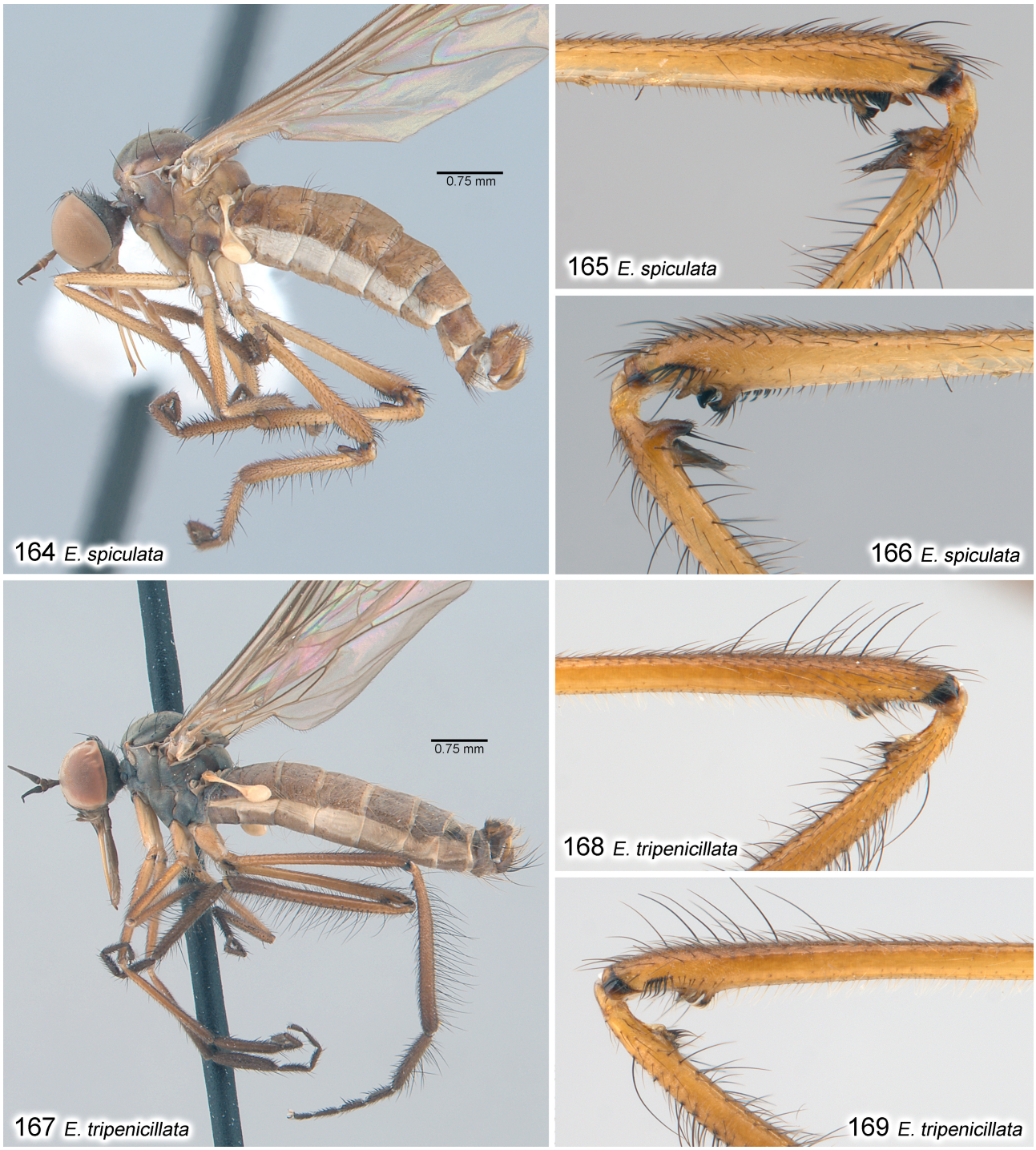
Description. Wing length 5.3–5.9 mm. **Male.** Similar to *E.* (*En.*) *delumbis* except as follows: head with ocellar triangle with pair of parallel ocellar setae, length subequal to pprn.

Thorax mostly dark in ground-colour, with whitish pruinescence. Scutum faintly bivittate between acr and dc rows; postpronotal lobe, lateral margin of scutum, postalar ridge and scutellum yellowish. Pleura dark, especially lower half of katepisternum and meron; upper half of katepisternum and meron, anepimeron, laterotergite and metakatepisternum pale brown to yellowish; mediotergite mostly dark.

Legs slender, yellow, darker towards apex of tibiae and tarsomeres (Fig. 164). Fore femur with anteroventral row of fine, short setae. Fore tibia with 3–5 erect anterodorsal setae, longer than width of tibia; apex with circlet of preapical setae; anterior face with short appressed setae. Fore tarsomere 1 inflated, slightly narrower than apex of tibia with 1 dorsal seta, slightly longer than width of tarsomere, with fine ventral setae and row of stronger ventral and anterior setae, longer than width of tarsomere; tarsomeres 2–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur with erect, fine short ventral setae, with strong preapical anterior seta. Mid tibia with several erect anterodorsal and posterodorsal setae; posterior face with dense fine setulae and several erect, strong setae; circlet of strong preapical setae. Mid tarsus with long, strong ventral setae on tarsomere 1; tarsomeres 2–5 similar to fore tarsus. Hind femur with apex somewhat inflated; row of strong, black anteroventral setae proximal to preapical region, distal setae closely appressed and sickle-shaped; narrow hook-shaped posteroventral process with long black apical setae, medial to row of strong setae; bilobed process with divergent tapered lobes distal to posteroventral process; apex with preapical row of 5–6 flattened, black posterior setae; preapical anterior seta strong, longer than width of femur; 2 preapical anterodorsal setae (Figs 165, 166). Hind tibia with slight subbasal bend, bearing anteroventral digitiform lobe with sparse lateral setae, apical half of process flattened with truncate apex; posteroventral lobe curved, half-length of anteroventral process, with short marginal setae and several long subapical ventral setae, longer than

process; long, numerous anterodorsal and posterodorsal setae, length nearly twice width of tibia; long setae on ventral surface (Figs 164–166). Hind tarsomere 1 slightly inflated with long dorsal setae similar to tibia; remaining tarsomeres similar to fore tarsus.

Halter yellow to pale brown.



FIGURES 164–169. Male habitus and hindleg of the *E.* (*Enoplempis*) *delumbis* species group. **164,** *E.* (*En.*) *spiculata* **sp. nov.**, habitus, lateral view; **165,** same, hind femur tibia joint, anterior view; **166,** same, hind femur tibia joint, posterior view; **167,** *E.* (*En.*) *tripenicillata* **sp. nov.**, habitus (holotype), lateral view; **168,** same, hind femur tibia joint, anterior view; **169,** same, hind femur tibia joint, posterior view.

Abdomen shiny to pruinescent (dependent on preservation method), tergites darker than pale sternites; with long dark setae on posterior margin. Pregenital segments unmodified, except sclerites of segment 8 narrowly fused anteriorly. Terminalia (Figs 170, 171): yellowish brown to brown with hypandrium and cerci darker. Cercus narrow and tapered on apical half short, projecting obliquely from epandrium; shorter than length of epandrium; setae nearly equal to width of cercus. Subepandrial process extending to either side of phallus. Epandrial lamella subrectangular, broad basally, more than twice width of cercus; with short, upturned projection apically; length of setae more than half basal width of epandrium. Hypandrium long, apex rounded; setae longer than width of hypandrium, closely orientated nearly parallel to hypandrium. Phallus (Fig. 171) with basal half broader than apical half, distinctly bent beyond mid-length, with slender lateral digitiform processes flanking apex section; apex emerging beyond epandrium; apical portion with subapical expansion with spiculate surface; apex very narrow and tapered; ejaculatory apodeme more than half-length of epandrium, Y-shaped, with ventrally positioned lateral apodemes.

Female. Similar to male, except as follows: frons broader, wider than anterior ocellus; hindleg without modified setae and processes; abdominal pleural membrane without darkened, expanded region; tergites 7 and 8 with pruinescence.

Geographical distribution and seasonal occurrence (Fig. 153). *Empis* (*En.*) *spiculata* **sp. nov.** is known from Washington, Oregon and northern California. Adults have been collected from May to July.

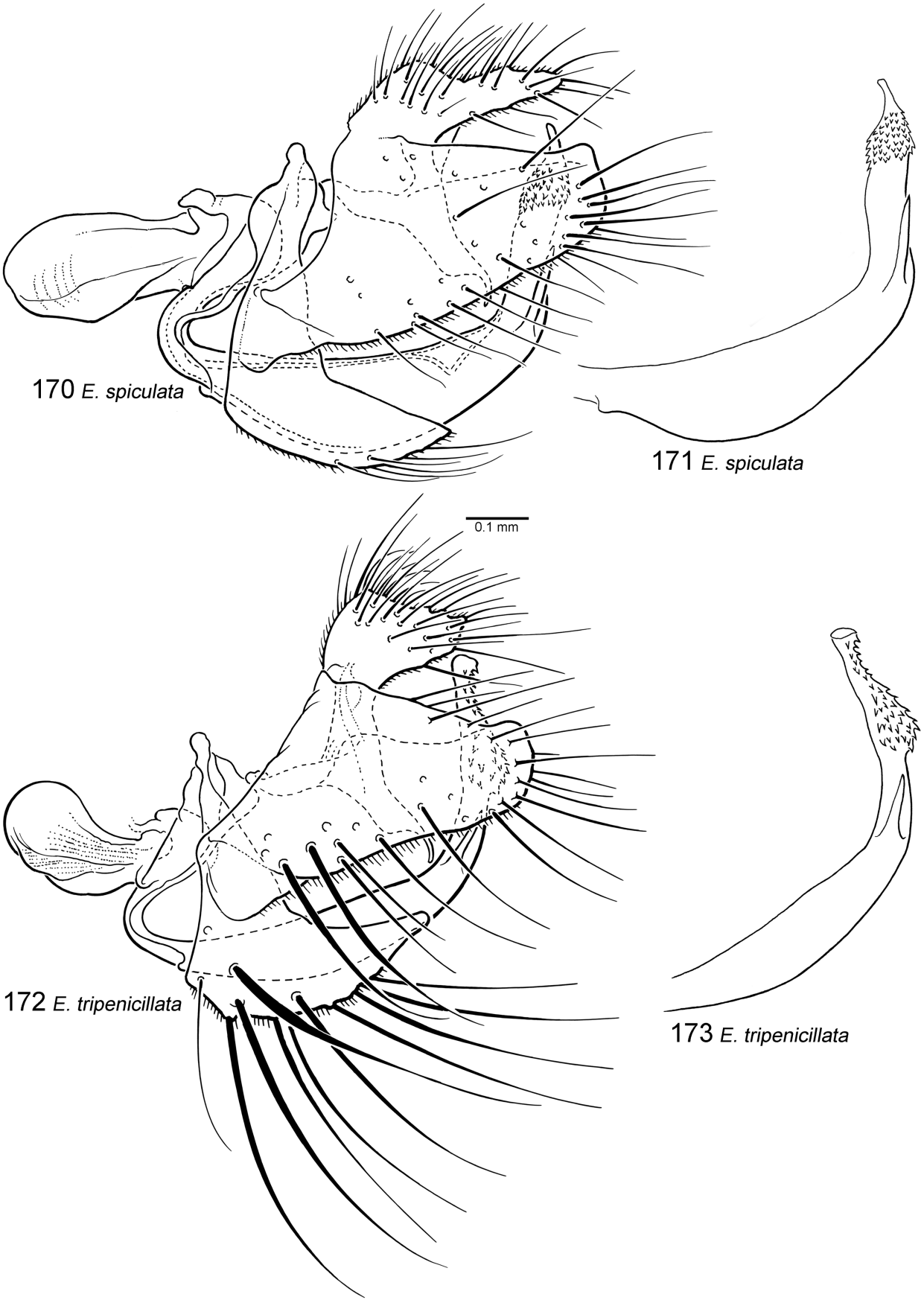
Etymology. The species name is in reference to the subapical spiculate surface of the phallus in this species.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *tripenicillata* sp. nov.

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(Figs 167–169, 172, 173, 175)

Type material. HOLOTYPE ♂ (Fig. 167), labelled: "USA: WA: Lewis Co., trib./ of Catt Creek, 2847 ft,/ 46°41′53″N 121°57′46″W,/ 16.vi.2018, S.E. Brooks,/ CNC1109361" "HOLOTYPE/ *Empis* (*Enoplempis*)/ *tripenicillata* Sinclair,/ Brooks & Cumming [red label]" (CNC). **PARATYPES: CANADA. British Columbia:** Agassiz [49°14′N 121°46′W], 7.v.1927, R. Glendenning (1♂, CNC); Horne Lk. [49°20′N 124°42′W], 4.vi.1955, R. Coyles (1♂, CNC); Qualicum Bay [49.398°N 124.613°W], 29.v.1955, R. Coyles (1♂, CNC). **USA. California:** *Del Norte County*: Six Rivers NF, Fire Rd 17N21 nr Myrtle Ck, 41.870°N 124.040°W, 1.vi.2009, K. Collins & I.S. Winkler, E09-41 (1♂, CNC). *Mendocino County*: NCCRP, 3 mi. N Branscomb [39°42′N 123°39′W], 1400 ft, 17.v.1975, S. Mikasaka (1♂, EMEC); same data except, 30.v–1.vi.1980, N. Davidson (1♂, EMEC); same data except, J.R. Wilson (1♂, EMEC). *Sonoma County*: Cazadero [38°32′N 123°5′W], 12–14.iv.1918, Cornell Univ. Lot 542, Sub, J.C. Bradley (1♂, CUIC). **Oregon:** *Benton County*: Corvallis, Lewisburg Saddle, below Old Growth Tr., 44°38′32.28″N 123°17′20.76″W, MT over creek, 23.iv–6.v.2013, SJF (1♂, CNC). *Clackamas County*: Mt Hood NF, Tollgate Cpgd [45°19′N 121°54′W], T3S R7E Sec. 11, 22.vi.1977, DDW (1♂, CAS). *Coos County*: Rogue R, Siskiyou NF, NFD 5325, *ca* 3.5 mi. from jct. 33, high dry open woods, 42.675843°N 124.127834°W, 24.v.2014, SJF (1♂, CNC); Rogue R, Siskiyou NF, Coquille R Falls tr. #1257, *ca* 42.713657°N 124.022767°W, 24.v.2014, SJF (1♂, CNC). *Curry County*: Rogue R, Siskiyou NF, NF-23 8.6 mi. jct. NF-33, sweep dry woods, 42.627418°N 123.955349°W, 26.v.2014, SJF (1♀, CNC). *Douglas County*: Glide [43°19′N 123°4′W], 28.iv.1964, K. Goeden (2♂, ODAC); Umpqua NF, 9.5 km NE Tiller, 42°59.16′N 122°51.47′W, 22.vi.2008, C. Borkent, CJB08-17 (1♂, LEM). *Hood River County*: Hood River [45°42′N 121°31′W], Childs (1♂, USNM); same data except, 1.vii.1917 (4♀, USNM). *Josephine County*: Grayback Camp [42°08′N 123°27′W], Siskiyou NF, 19.vi.1962, C.A. Toschi (1♂, EMEC). *Lane County*: N end Blue R Res. [44°10′N 122°19′W], 13.v.1983, D.S. Chandler, sweep (1♂, UNHC); Oakridge, 18 mi. NW [43°52′N 122°42′W], 12.v.1969, E.M. & J.L. Fisher (13♂, 1♀, CSCA); H.J. Andrews Exp. For. [44°13′N 122°10′W], 1450 ft, R.S.7, 18.v.1983, sweep, D.S. Chandler (2♂, UNHC); same data except, R.S.20, 2250 ft, Rd 134, 12.v.1984, flying (1♂, 1♀, UNHC); same data except, Rd 130, 1750 ft, sweep (2♂, 1♀, UNHC); same data except, Lookout Ck, flying (1♂, 1♀, UNHC). *Lewis County*: same data as holotype (3♂, 7♀, CNC). *Skagit County*: Rockport SP [48°29′N 121°36′W], 7 mi. E Concrere, 16–17.vi.1971, D.N. Ferro (1♂, WSU); same data except, WJT (2♀, WSU).



FIGURES 170–173. Male terminalia of the *E.* (*Enoplempis*) *delumbis* species group, lateral view. **170,** *E.* (*En.*) *spiculata* **sp. nov.**; **171,** same, phallus; **172,** *E.* (*En.*) *tripenicillata* **sp. nov.**; **173,** same, phallus.

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *delumbis* species group by the male hind tibia and swollen hind tarsomere 1 with very long dorsal setae, male mid tibia with very long dorsal setae, male lateral abdominal setae long and pale (Fig. 167), setae on male terminalia long and strong, hypandrial setae longer than hypandrium and phallus with spiculate surface from apex to subapical expansion and pair of narrow lateral lobes.

Description. Wing length 5.4–6.0 mm. **Male.** Similar to *E.* (*En.*) *floricola* **sp. nov.** except as follows: thorax greyish brown in ground-colour; postpronotal lobe, postalar ridge and usually scutellum yellowish. Pleura without pale margins of katepisternum and anepimeron.

Legs slender, yellow, with apical portion of femora and tibia brownish, tarsomeres darker; coxae pale, in contrast to greyish pleura (Fig. 167). Femora with pale ventral setulae, shorter and less dense on fore femur. Fore tibia with 2–3 erect anterodorsal setae, longer than width of tibia; apex with circlet of preapical setae, posterior setae longer; anterior face with short appressed setae. Fore tarsomere 1 inflated, slightly broader than width of tibia, without long dorsal setae, row of strong anterior setae, fine ventral setae and biserial row of slightly stronger setae; tarsomeres 2–5 with biserial row of strong ventral setae; tarsomeres 1–4 with apicolateral pair of strong setae, longer than width of segment. Mid femur with strong, anterior preapical seta. Mid tibia with row of very long, erect posterodorsal setae, length 3 times width of tibia; ventral and posterior faces with dense fine setulae; circlet of strong preapical setae. Mid tarsomere 1 slender, with long dorsal setae, length twice width of tarsomere; tarsomeres 1–5 with biserial row of strong ventral setae; tarsomeres 1–4 with apicolateral pair of strong setae, longer than width of segment. Hind femur with long dorsal setae on distal half, longer than width of femur; with 2 closely approximated preapical ventral protuberances and third offset protuberance nearly perpendicular to paired protuberances; protuberances with dark, curved, flattened apex or flattened setae; apex with preapical row of 6 flattened, black posterior setae; preapical setae longer than width of femur (Figs 168, 169). Hind tibia with narrow base, without subbasal swelling and bend; basiventral swelling divided into anteroventral and posteroventral setose lobes; clear, thin basal ridge extended to posteroventral lobe; long, numerous dorsal setae, length more than 3 times width of tibia; long anteroventral and posteroventral setae, shorter than dorsal setae (Figs 167–169). Hind tarsomere 1 inflated with long dorsal setae similar to tibia, ventral strong setae longer than width of tarsomere; remaining tarsomeres similar to mid tarsus.

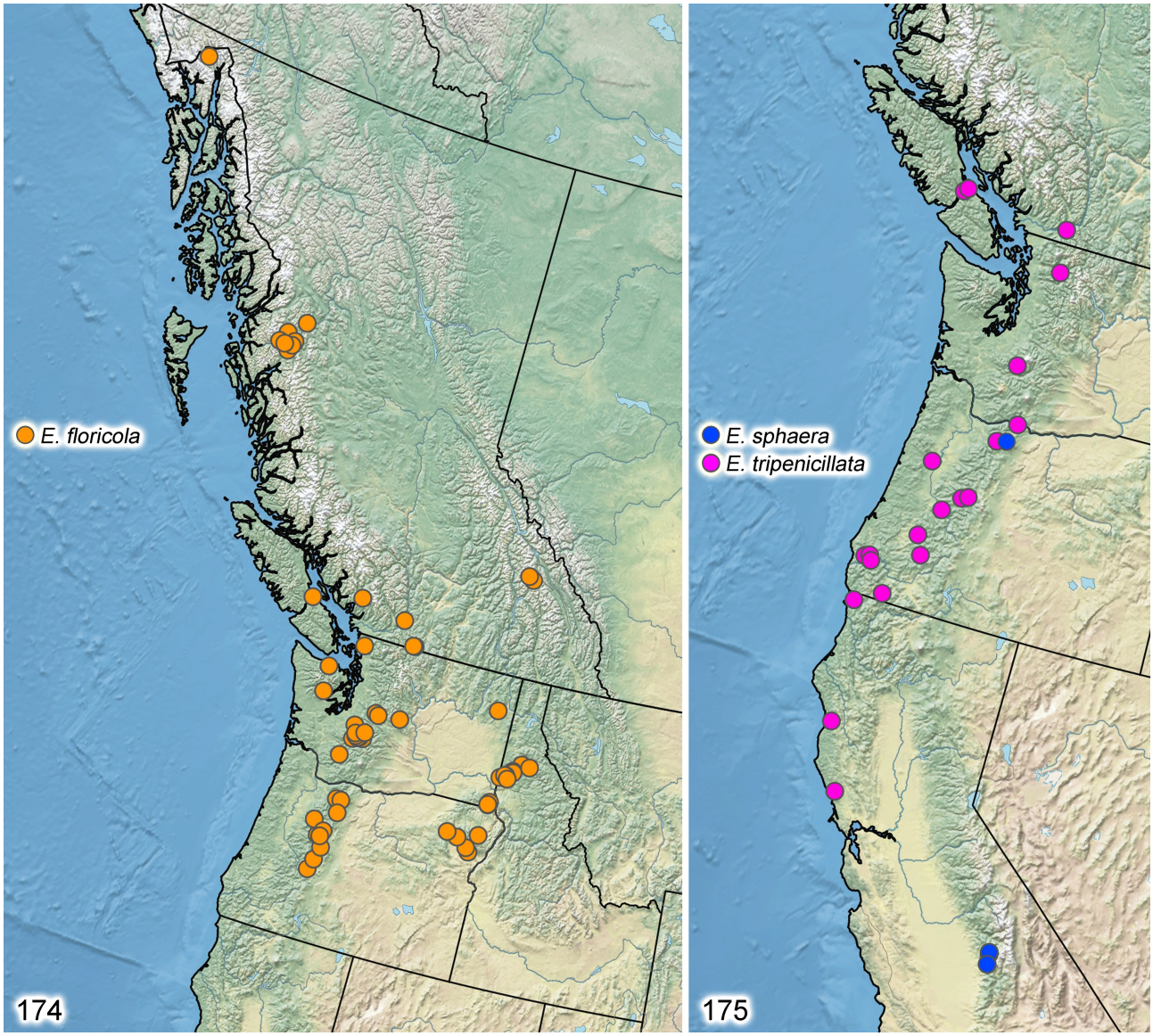
Abdomen paler than thorax, with whitish pruinescence; lateral margins of tergites with long pale setae. Pregenital segments modified: tergite 6 with broad U-shaped posterolateral margin. Tergite 7 with posterolateral margin with dark setae; dorsolaterally with knob-like, shiny swelling, flattened dorsally. Tergite 8 with narrow, darkened posterior margin, broadly separated from broader, darkened anterior margin; sclerite fused laterally to sternite 8; posterior margin of ring sclerite with long, dark setae. Terminalia (Figs 172, 173): brown with long, strong dense setae. Cercus short, subtriangular, projecting obliquely from epandrium; apical half slightly tapered; apical setae longer than width of cercus. Subepandrial process extending to either side of phallus. Epandrial lamella subtriangular, tapered, posterior margin rounded with short, upturned projection; setae longer than width of epandrium, stronger near anteroventral margin. Hypandrium long, tapered, apical margin rounded; setae strong, longer than length of hypandrium. Phallus (Fig. 173) with basal half narrow; paired slender lateral processes beyond mid-length; spiculate surface on subapical swelling, extending to broad apex; ejaculatory apodeme half-length of epandrium, Y-shaped, with ventrally positioned lateral apodemes.

Female. Similar to male, except as follows: frons broader, slightly wider than anterior ocellus; hindleg without modified setae and processes; hind tibia with long anterodorsal and posterodorsal setae, twice width of tibia; ventral surface of femora as in male; abdominal pleural membrane without darkened, expanded region; tergites 7 and 8 with pruinescence.

Geographical distribution and seasonal occurrence (Fig. 175). *Empis* (*En.*) *tripenicillata* **sp. nov.** is known from southern British Columbia, Washington, Oregon and northern California. Adults have been collected from April to July.

Etymology. The species name is Latin for three and painter's brush, in reference to the row of three short lobes on the hind femur in this species, one of which ends in a setal cluster that looks like a painter's brush.

Nuptial gift presentation. Form unknown.



FIGURES 174–175. Known geographical distribution of the *E.* (*Enoplempis*) *delumbis* species group. **174,** *E.* (*En.*) *floricola* **sp. nov.**; **175,** *E.* (*En.*) *sphaera* **sp. nov.** and *E.* (*En.*) *tripenicillata* **sp. nov.**

Empis (*Enoplempis*) *geneatis* species group

(Figs 12, 13, 176–187, 192)

This group includes four species, *E.* (*En.*) *fisheri* **sp. nov.**, *E.* (*En.*) *geneatis* (Melander), *E.* (*En.*) *oharai* **sp. nov.** and *E.* (*En.*) *subgeneatis* **sp. nov.**, which are distinguished by male head holoptic (Fig. 176), unmodified male hindleg (*e.g.*, Fig. 180, except *E.* (*En.*) *fisheri* **sp. nov.**, Fig. 178), long setae on scape, palpus and occiput (*e.g.*, Fig. 181, except *E.* (*En.*) *fisheri* **sp. nov.**), long acrostichal and dorsocentral setae (*e.g.*, Fig. 180) and subepandrial process present (*e.g.*, Fig. 186). In addition, males of this species group (unknown for *E.* (*En.*) *subgeneatis* **sp. nov.**) produce balloons (Figs 12, 13).

Empis (*Enoplempis*) *fisheri* sp. nov.

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(Figs 176–178, 183, 184, 192)

Type material. HOLOTYPE ♂, labelled: "USA:CA: El Dorado Co./ El Dorado Hills, New York/ Creek, 680 ft. 38°41′43″N,/ 121°04′38″W E.M. Fisher/ IV.20.2002"; "El Dorado Hills/ IV-20-2002/ ♂ swarm, ea. w/ balloon, w/o prey"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *fisheri* Sinclair,/ Brooks & Cumming [red label]" (CSCA). **PARATYPES: USA. California:** *El Dorado County*: Same data as holotype (1♂ with balloon without prey, 2♂, CNC; 2♂ with balloon without prey, 2♂, CSCA); same data as holotype except, 21.vi.2002 (1♂ with balloon without prey, CNC; 1♂, CSCA); El Dorado Hills, New York Ck, 22.iii.1998, in swarm, each with balloon, E.M. Fisher (2♂, CNC; 2♂, 1♂ with balloon without prey, CSCA); El Dorado Hills, N. York Ck, 700 ft, 18–20.iv.2002, male swarm, each w/ white balloon w/o prey (4♂, CNC; 3♂ CSCA); El Dorado Hills, 38°41′43″N 121°04′44″W, 222 m, 24.iii.2003, J. & A. Skevington (1♂, CNC). *Placer County*: 4 km NE Auburn at American R, 38.9164°N 121.0392°W, 563 ft, 6.vi.2012, G.W. Forister (2♂, 2♀, UCDC).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *geneatis* species group by the absence of long setae on the face, palpus or antenna (Fig. 177), male hindleg with lobes and modified setae (Fig. 178), hind tibia somewhat clavate with expanded hind tarsomere 1, and the male cercus is narrower than epandrium, projecting horizontally.

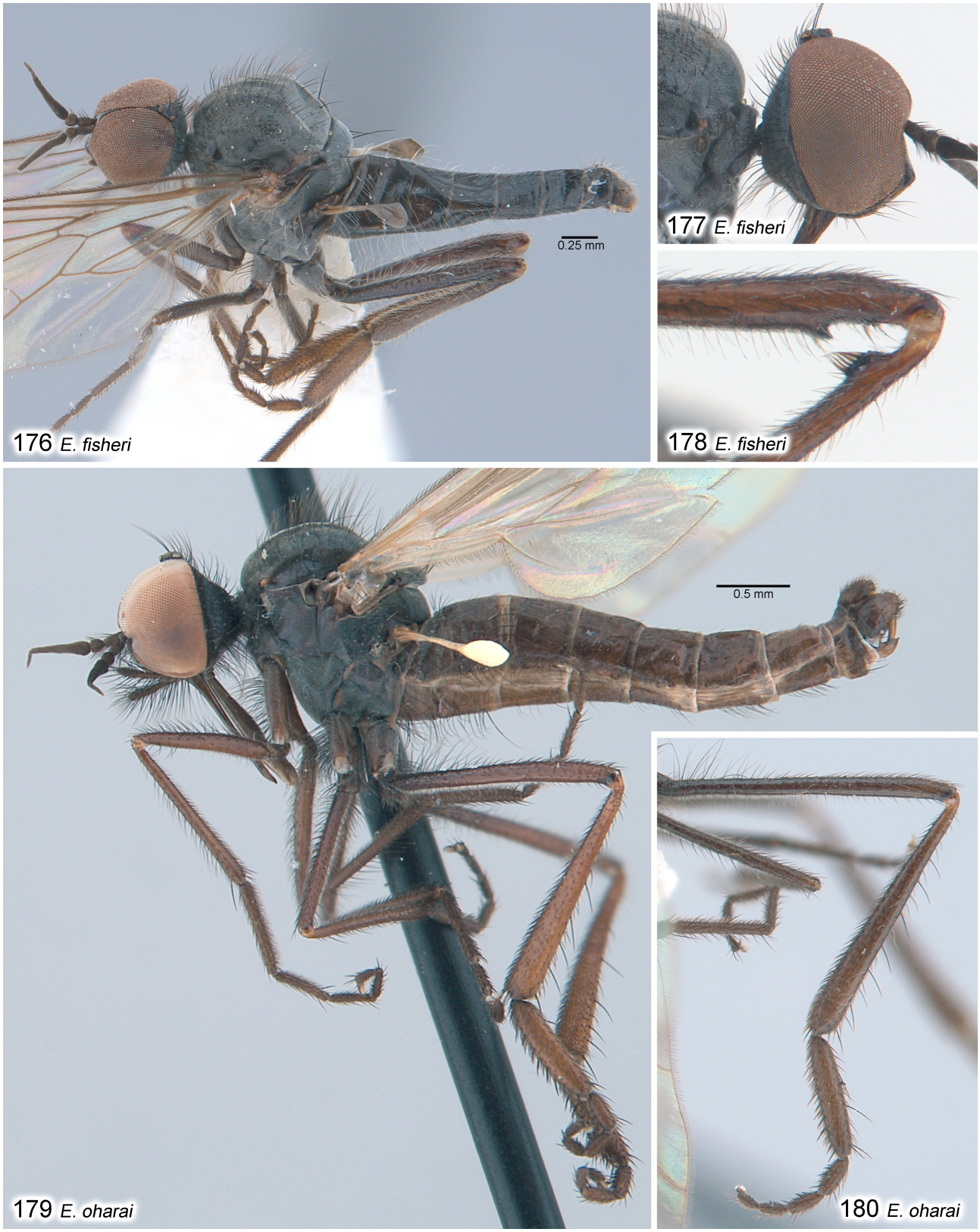
Description. Wing length 3.3–3.6 mm. **Male.** Similar to *E.* (*En.*) *geneatis*, except as follows: head with face without setae (Fig. 177). Ocellar triangle elevated, grey pruinescent, with pair of thin ocellar setae, longer than pprn; posterior setulae half length of ocellars. Occiput bearing slightly arched setae on upper half; thinner, wavy setae posterior to mouth opening; bare posterior to ocellar triangle. Scape 2× longer than pedicel, with short setulae, at most subequal to width of scape; pedicel with normal circlet of setulae; postpedicel long and tapered, 5× longer than basal width; stylus 1.5× basal width of postpedicel. Palpus black, with short setae.

Thorax dark brown in ground-colour, densely grey pruinescent. Scutum with pair of distinct greyish vittae between acr and dc rows (viewed anteriorly or posteriorly). Proepisternum with short setae on lower section; upper proepisternum in front of spiracle without setae. Postpronotum with 1 long seta and several shorter, silky setae. Scutum with long bi-serial acr, increasing in length posteriorly; dc multi-serial, similar to acr, increasing in length posteriorly; 2 posterior npl, with several shorter anterior npl; 1 presut spal and several long, silky setae; 1 psut spal and several long, silky setae; 1 pal. Scutellum with pair of long sctl, with 2–3 pairs of shorter marginal setae; disc bare. Laterotergite with numerous long, pale setae.

Legs short, slender, entirely dark brown (Fig. 176). Coxae with pale setae, shorter than length of coxae. Leg setae mostly pale. Fore femur with fine, erect posterior setae. Fore tibia with fine, erect posterior setae; ventrally with fine, dense setae, length less than half width of segment, continuing on tarsomeres. Fore tarsomere 1 not broader than apex of tibia; all tarsomeres without spine-like ventral setae; tarsomeres 2–3 with apicolateral pair of spine-like setae, not longer than width of segment. Mid femur with similar setae to fore femur, longer dorsally and anteriorly. Mid tibia with several erect anterodorsal and posterodorsal setae; ventrally with long, dense setae, longer than twice width of tibia. Mid tarsomeres 1–3 with several pairs of strong ventral setae, shorter than width of tarsus; tarsomeres 1–3 with apicolateral pair of spine-like setae, shorter than width of segment. Hind femur slender, clothed in fine ventral setae, shorter than width of femur; longer anterior and dorsal setae on basal half; short anteroventral tubercle with dark, sharp semi-circular ridge; posteroventral tubercle distal to anteroventral tubercle, with radiating row of 5–8 pale setae, longer than length of tubercle (Fig. 178). Hind tibia somewhat clavate, with sub-basal ventral swelling, truncate with ridge of long posteroventral setae; dorsal setae shorter than width of tibia (Fig. 178). Hind tarsomeres distinctly swollen, narrower than apex of tibia, with strong ventral setae; tarsomeres 2–5 similar to mid tarsus.

Wing clear with dark veins; veins mostly well sclerotized, CuA+CuP very weak, not reaching wing margin.

Abdomen dark brown, thinly pruinescent to shiny, with long, pale wavy setae on tergites and sternites of segments 1 and 2. Terminalia (Figs 183, 184): dark brown. Cercus narrower than epandrium, subtriangular, tapering posteriorly to rounded apex; fused anterolaterally with epandrium; dorsal margin straight; length of setae about same as width of cercus. Subepandrial process extended to phallus; apex arched ventrally. Epandrial lamella subtriangular, posterior margin projecting beyond cercus, bearing apical setae, slightly longer than cercal setae; apex broadly rounded, not upturned. Hypandrium longer and wide along posterior margin; apex tapered, less than half as long as epandrium; several short setae present. Phallus (Fig. 184) with base not greatly expanded, with pair of slender processes beyond mid-length; apical section abruptly curved beyond epandrium, with numerous lateral setulae; apex of wide dorsal opening; ejaculatory apodeme short, less than half-length of epandrium, with narrow horizontal wings ventrally.



FIGURES 176–180. Male habitus, head and hindleg of the *E*. (*Enoplempis*) *geneatis* species group. **176,** *E*. (*En*.) *fisheri* **sp. nov.**, habitus, dorsolateral view; **177,** same, head (holotype), lateral view; **178,** same, hind femur tibia joint, anterior view; **179,** *E*. (*En*.) *oharai* **sp. nov.**, habitus, lateral view; **180,** same, hindleg, lateral view.

Female. Similar to male, except as follows: frons as broad as antennal sockets, with short setulae along eye margin; legs similar to male, without tubercles on hindleg; cercus long and slender, subequal to length of tergite 8.

Geographical distribution and seasonal occurrence (Fig. 192). *Empis* (*En.*) *fisheri* is known from March to June in El Dorado and Placer Counties in California.

Etymology. This species is named in honour of the collector of most of the type series, Eric M. Fisher, formerly of the California State Collection of Arthropods (CSCA).

Nuptial gift presentation. Males have been observed in swarms each carrying a relatively small white balloon, without prey (see "Type material" above). The balloons appear to collapse after collection.

Remarks. This species has been collected in March and April, together with swarms of *E.* (*En.*) *bigoti*. *Empis* (*En.*) *fisheri* is tentatively assigned to the *E*. (*En.*) *geneatis* group, on the basis of similarly long acrostichal and dorsocentral setae, holoptic male with upper facets enlarged, and shape of hind tibia and tarsomeres. This species differs from the other two species of this group by the absence of long setae on the head and modified male hindleg.

Empis (*Enoplempis*) *geneatis* (Melander)

(Figs 12, 13, 181, 182, 185, 192)

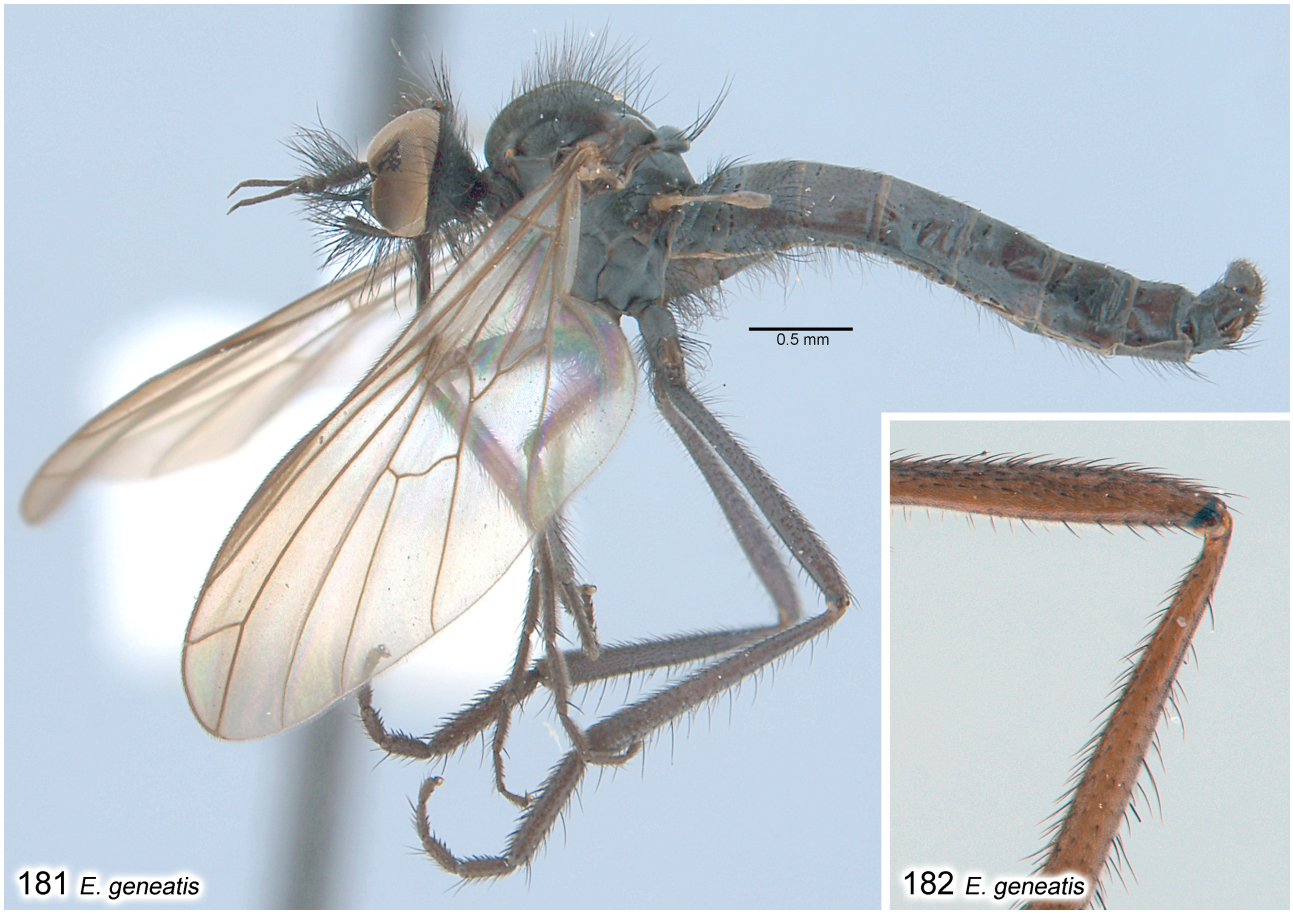
Empimorpha geneatis Melander, 1902: 329. Type locality: California (USA).
Empimorpha geneatis: Melander, 1928: 179 (checklist); Kessel & Karabinos, 1947: 181 (behaviour); Kessel, 1955: 101 (behaviour).
E. (*Empidomorpha*) [sic] *geneatis*: Cumming (1994) (behaviour).
Empis geneatis: Melander, 1965: 459 (catalogue); Yang *et al*., 2007: 134 (catalogue).
E. (*Enoplempis*) *geneatis*: Turner, 2012: 26 (phylogeny).

Type material examined. HOLOTYPE ♂, labelled: "Calif./ Baron"; "W.M. Wheeler,/ collection."; "TYPE/ No./ A.M.N.H. [red label]; "Am. Mus. Nat. Hist./ Dept. Invert. Zool./ No. 919"; "HOLOTYPE/ Empimorpha ♂/ (=Empis)/ geneatis/ Melander/ teste WJ Turner '82 [red label]" [dissected] (AMNH).

Additional material examined. USA. California: *Alameda County*: Patterson Res. Del Valle Lk. [37°35′N 121°43′W], 15.iii.1973, JAP (1♂ with Sciaridae prey on balloon, EMEC); Redwood Pk E Oakland [37°48′N 122°09′W], 22.iv.1956, *Ceanothus*, M. Wasbauer (1♀, EMEC). *Contra Costa County*: Briones Reg. Pk [37.9358°N 122.1374°W], Alhambra Tr. on Ridge, 23.iii.1978, DDW (3♂ with Chalcidoidea and Sciaridae prey on balloons, CAS); same data except, 4.iv.1979 (5♂ with Chalcidoidea and 2♂ with Sciaridae prey on balloons, CAS); Briones Reg. Pk, at Alhambra Valley Rd, 29.iii.1978, DDW (1♂ with Chalcidoidea prey on balloon, CAS). *Kern County*: Kern Cyn [35°41′N 118°40′W], 2300 ft, 22.v.1967, C. Goodpasture (3♂, LACM). *Lake County*: Anderson Springs [38°46′N 122°41′W], 25.ii.1951, W.R. Bauer (2♂, CAS). *Madera County*: San Joaquin Exp. Sta. [37°05′N 119°43′W], 22.ii.1953, P.D. Hurd (1♂, EMEC). *Marin County*: Carson Ridge [38°00′N 122°38′W], 15.iii.1968, JAP (2♂ with Chalcidoidea and Sciaridae prey on balloons, EMEC); same data except, nr Woodacre, 7.iv.1966 (2♂ with Chalcidoidea and Sciaridae prey on balloons, EMEC); Inverness [38°06′N 122°51′W], 13.ii–6.iii.1964, PHA (1♂ with Chalcidoidea prey on balloon, 1♂, USNM); Mill Valley [37°54′N 122°32′W], 16.iii.1946, E.L. Kessel (1♂ with Sciaridae prey on balloon, AMNH; 2♂ with Chalcidoidea and unknown prey on balloons, USNM); same data except, 15.iii.1946 (1♂, 1♀ mounted as pair, 3♂, CAS; 1♂, USNM); same data except, 17.iii.1946 (1♂, CAS); same data except, 29.iii.1946 (1♂, CAS); same data except, 2.iv.1946 (1♂, CAS; 2♂, USNM); same data except, 4.iv.1946 (2♂, CAS); same data except, 22.ii.1947 (2♂, AMNH); same data except, 24.ii.1947 (3♂, CAS); same data except, 25.ii.1947 (1♂, CAS); same data except, 20.iii.1948 (2♂ with ?Cynipoidea and ?Sciaridae prey on balloons, CAS; 1♂ with Chalcidoidea prey on balloon, USNM); same data except, 21.iii.1948 (1♂ with ?Ceratopogonidae prey on balloon, CAS); same data except, 27.iii.1948 (2♂ with Chalcidoidea prey on balloons, CAS); same data except, 7.iii.1926, M.C. Van Duzee (1♂, CAS); same data except, flight trap, 7–11.iii.1966, PHA (4♂, USNM); Phoenix Lk. [37°57′N 122°34′W], 4.iv.1964, C.N. Slobodchikoff (1♂, CAS). *Mendocino County*: UC Hopland Field Sta. [39°00′N 123°05′W], Lookout Pt., 2880 ft, 2.v.1969, WJT (4♂ with ?Sciaridae prey on balloons, 2♂, WSU); same data except, Coon Lk., 1900 ft, 26.iv.1975, JAP (1♂ with ?Sciaridae prey on balloon, EMEC); same data except, M. Bales (1♀, EMEC); same data except, M. Buegler (1♂ with ?Sciaridae prey on balloon, EMEC). *Monterey County*: Carmel [36°33′N 121°55′W], 25.iii.1919, E.P. Van Duzee (2♂, CAS). *Napa County*: N side Howell Mt

[38°34′N 122°27′W], 2 mi. NNE Angwin, 1300 ft, 6.iii.1978, H.B. Leech (4♂ with Cecidomyiidae, Chalcidoidea and Sciaridae prey on balloons, CAS); same data except, 14.iii.1975 (1♀, CAS). *Solano County*: Cold Cyn Res. [38°30′N 122°5′W], 9.v.1983, J.L. Stebbins (1♂, UCDC).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *geneatis* species group by males with long, dark facial setae, in addition to similar long black setae on the palpus and scape (Fig. 181), and the male cercus is broader than the epandrium, prolonged dorsally.



FIGURES 181–182. Male habitus and hindleg of *E.* (*Enoplempis*) *geneatis* (Melander). **181,** habitus, lateral view; **182,** hind femur tibia joint, anterior view.

Redescription. Wing length 4.3–5.2 mm. **Male.** Head dark in ground-colour, with greyish pruinescence. Holoptic, eye with upper ommatidia enlarged. Frons small, triangular, without setulae. Face with long, black setae, longer than scape and pedicel combined (Fig. 181). Ocellar triangle elevated, dark, subshiny, with pair of thin ocellar setae, similar in size and length to occipital and facial setae; pair of similar posterior setulae. Occiput bearing long, wavy black setae on lateral and ventral surfaces, similar to facial setae; postocular setae not differentiated; upper posterior surface with few setae. Antenna dark; scape 3× longer than pedicel, with long, wavy black setae, longer than segment; pedicel with thin wavy setae, 1.5× length of segment; postpedicel longer and tapered, more than 5× longer than basal width; stylus slightly longer than basal width of postpedicel. Palpus black, with elongate, wavy black setae, similar to facial setae, similar in length to palpus. Proboscis largely dark; length of proboscis 1.5× to more than twice head height; apex of labrum reddish brown; labellum with short, dark setae.

Thorax dark brown in ground-colour, densely grey pruinescent (Fig. 181). Scutum with pair of distinct greyish vittae between acr and dc rows (viewed anteriorly); clothed in long silky setulae, except vittae and prescutellar depression bare. Proepisternum with long, wavy dark setae on lower section; upper proepisternum in front of spiracle with similar, shorter setae. Prosternum bare. Antepronotum with row of dark setae, longer laterally. Postpronotum with 1 long seta and numerous long, silky setae. Scutum with multi-serial acr setae, increasing in length posteriorly; dc similar to acr, increasing in length posteriorly; 1 posterior npl; presut spal undifferentiated;

psut spal undifferentiated; 1 pal. Scutellum with pair of long sctl, with several pairs of marginal setae; disc bare. Laterotergite with numerous long, dark setae. Anterior and posterior spiracles brown.

Legs long, entirely dark brown (Figs 181, 182). Fore and mid coxae with long, wavy anterior setae, twice width of coxa; hind coxa with long, wavy anterior, lateral and posterior setae. Hind trochanter with long, slender, unmodified wavy setae. Fore femur clothed in long, wavy setae, longer dorsally and posteriorly. Fore tibia with long posterodorsal setae similar to femur; ventrally with fine, dense setae, length half width of segment, continuing on tarsomeres 1–4. Fore tarsomere 1 slender, not swollen; all tarsomeres without spine-like ventral setae; tarsomeres 1–3 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur with similar setae to fore femur, longer dorsally and anteroventrally. Mid tibia with long posterodorsal setae similar to femur; ventrally with long, dense setae, longer than twice width of tibia. Mid tarsomere 1 with strong ventral setae, slightly longer than width of tarsus; tarsomeres 2–5 with ventral spine-like setae; tarsomeres 2–4 with apicolateral pair of spine-like setae, longer than width of segment. Hind femur slightly swollen distally, clothed in fine setae, longer posteriorly; on apical half (Fig. 182). Hind tibia broader than femur distally, longest of dorsal setae twice width of tibia; 1 long seta in posteroapical comb (Fig. 182). Hind tarsomeres distinctly swollen compared to fore and mid legs; tarsomere 1 with long dorsal setae, similar to tibia; tarsomeres 2–5 with anteroventral and posteroventral spine-like setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment.

Wing infuscate with dark veins; all veins complete (except Sc), well sclerotized. Basal costal seta absent. R_5 and M_1 divergent near wing margin; R_5 ending at wing tip; radial fork acute. Halter dark.

Abdomen dark brown, similar to scutum, with long, wavy setae on tergites and sternites of segments 1 and 2; setae sparse on distal tergites; distal sternites with long, fine setae. Pregenital segments unmodified, except sclerites of segment 8 narrowly separated. Terminalia (Fig. 185): dark brown. Cercus broader than epandrium, prolonged dorsally, fused anterolaterally with epandrium; margin invaginated dorsally and posteriorly, inner face clothed in dense, short setae; outer distal half with long setae, longer than epandrial setae. Subepandrial process extended to phallus. Epandrial lamella subquadrate, posterior margin not projecting beyond cercus, bearing apical setae, shorter than cercal setae. Hypandrium slender, prolonged posteriorly with rounded margin, less than half as long as epandrium; without setae. Phallus with base not greatly expanded, with tight, subapical S-shaped curve; apex not emerging beyond cercus; ejaculatory apodeme half-length of epandrium, comprising only flat median keel, without horizontal wings.

Female. Similar to male, except as follows: lacking all long, wavy setae from head, legs, thorax and abdomen; face with dark setae, shorter than scape; frons as broad as antennal sockets, with short setulae long eye margin; scutum with broad brown vittae along acr and dc rows; tarsomeres similar to male; spine-like setae of hind trochanter sometimes less numerous and slightly less stout; halter pale; cercus long and slender, subequal to length of tergite 8.

Geographical distribution and seasonal occurrence (Fig. 192). *Empis* (*En.*) *geneatis* is known from February to May in California.

Nuptial gift presentation. The behaviour of this balloon carrying species was extensively described by Kessel & Karabinos (1947). Males swarm with small to moderate size balloons (about half the length of the fly) that contain a minute inedible dried-up prey item attached (see Kessel 1955, fig. 3). The balloons are presented to females, which do not consume the prey during copulation. The balloon is dense in nature and doesn't collapse after collection (Figs 12, 13). No circular opening was observed in the balloons, which are possibly not hollow.

Remarks. A spring species that appears to attract the eye of collectors due to the white shiny balloons. In fact, a majority of the material obtained (see "Additional material examined" above) were males collected with balloons, whereas only a few individual females have been collected.

Empis (*Enoplempis*) *oharai* sp. nov.

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(Figs 179, 180, 186, 192)

Type material. HOLOTYPE ♂, labelled: "USA:OR: Benton Co./ Alsea Falls Rec./ Area [44°19′N 123°29′W] 16km. SW/ Alpine 29.IV 1981/ J.E. O'Hara"; "Collected with/ balloon that/ dissolved in Etoh"; "CNC/ 1078369"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *oharai* Sinclair,/ Brooks & Cumming [red label]" (CNC). **PARATYPES:**

USA. California: *Mendocino County*: Coastal Range, 5 mi. N Branscomb [39°42′N 123°39′W], 26.v.1976, JAP (1♂, EMEC); same data except, 24–25.v.1976, R. Wharton (1♂, EMEC). **Oregon:** *Benton County*: Same data as holotype (2♂, CNC); Alsea Falls Cpgd [44.3205611°N 123.4878222°W], 21.vi.1977, DDW (4♂ with collapsed balloons, 4♂, 2♀, CAS); Corvallis, 25.vi.1925, ALM (1♀, USNM); Corvallis, Lewisburg Saddle, below Old Growth Tr., 44°38′32.28″N 123°17′20.76″W, MT over ck, 23.iv–6.v.2013, SJF (2♂, 2♀, CNC); same data except, 6–31.v.2013 (1♀, CNC); MacDonald Forest [44.638°N 123.338°W], Oak Ck, 30.vi.1971, G. Steyskal (1♀, USNM); Marys Peak, rest area at Marys Peak Rd jct. Hwy 34, 13.v.2014, 44.467699°N 123.505158°W, SJF (2♂, CNC); along Hwy 34, 4 mi. W Philomath [44°32′N 123°21′W], 21.vi.1977, DDW (3♀, CAS). *Chelan County*: Scotty Ck, 2520 ft, 47°24′5″N 120°39′20″W, 13.vi.2018, S.H. Cumming (2♀, CNC). *Coos County*: *ca* 3 mi. SE Remote, Rock Ck, 42°59′27″N 123°57′27″W, 28.v.2009, SEB (1♂, CNC). *Lewis County*: trib Catt Ck, 2847 ft, 46°41′53″N 121°57′46″W, 16.vi.2018, SEB (1♂, 1♀, CNC). *Linn County*: N Santiam R at Hwy 22 & Parrish Lk. Rd, 44°31′26.7″N 121°59′49.3″W, 948 m, 10.vii.2014, SEB (1♂, 1♀, CNC); Hackleman Ck, 0.6 mi. E Tombstone Pass, 44°23′51″N 122°7′53″W, 29.vi–1.viii.2016, SJF (1♂, CNC). *Marion County*: Detroit, French Ck, 805 m, 44°46′25.7″N 122°12′41.8″W, 11.vii.2014, J.M. Cumming (1♂, CNC); same data except, SEB (1♂, CNC). *Tillamook County*: Boyer [45°04′N 123°43′W], 23.vii.1937 (1♂, AMNH). **Washington:** *Clallam County*: Forks [47°57′N 124°23′W], 1.vii.1920, E.P. Van Duzee (1♂, CAS).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *geneatis* species group by the short, dark facial setae, in addition to similar black setae on the palpus and scape (Fig. 179), and the male cercus is narrower than the epandrium, projecting horizontally.

Description. Wing length 4.3–5 mm. **Male.** Similar to *E.* (*En.*) *geneatis*, except as follows: head with face with black setae, about as long as scape and pedicel combined (Fig. 179). Occiput bearing long, black setae on lateral and ventral surfaces, ventral setae wavy; occipital setae less dense, with postocular setae differentiated, in distinct row. Scape short, slightly more than 2× longer than pedicel, long setae not wavy, subequal to length of segment; pedicel with short, straight setae. Palpus black, with elongate, slightly curved black setae, basal setae similar in length to palpus; apical setae shorter.

Scutum less densely clothed in long silky setulae; 2–3 npl.

Legs similar to *E. geneatis*, but setae somewhat less dense and slightly shorter overall (Figs 179, 180).

Halter with base of stalk brown; knob yellowish brown to white.

Abdomen dark brown, similar to scutum, subshiny. Terminalia (Fig. 186): cercus narrower than epandrium, projecting horizontally, not fused anterolaterally with epandrium; margin invaginated dorsally and posteriorly, inner face clothed in dense, short setae; outer distal half with setae, shorter than epandrial setae. Subepandrial process extended to phallus. Epandrial lamella subquadrate, posterior margin projecting beyond cercus, bearing apical setae, longer than cercal setae. Hypandrium slender, prolonged posteriorly with rounded margin, less than half as long as epandrium; without setae. Phallus with base not expanded, with deep invagination subapically; apex bent anteriorly, just emerging beyond cercus when contracted; ejaculatory apodeme half-length of epandrium, comprising flat median keel, with short horizontal wings.

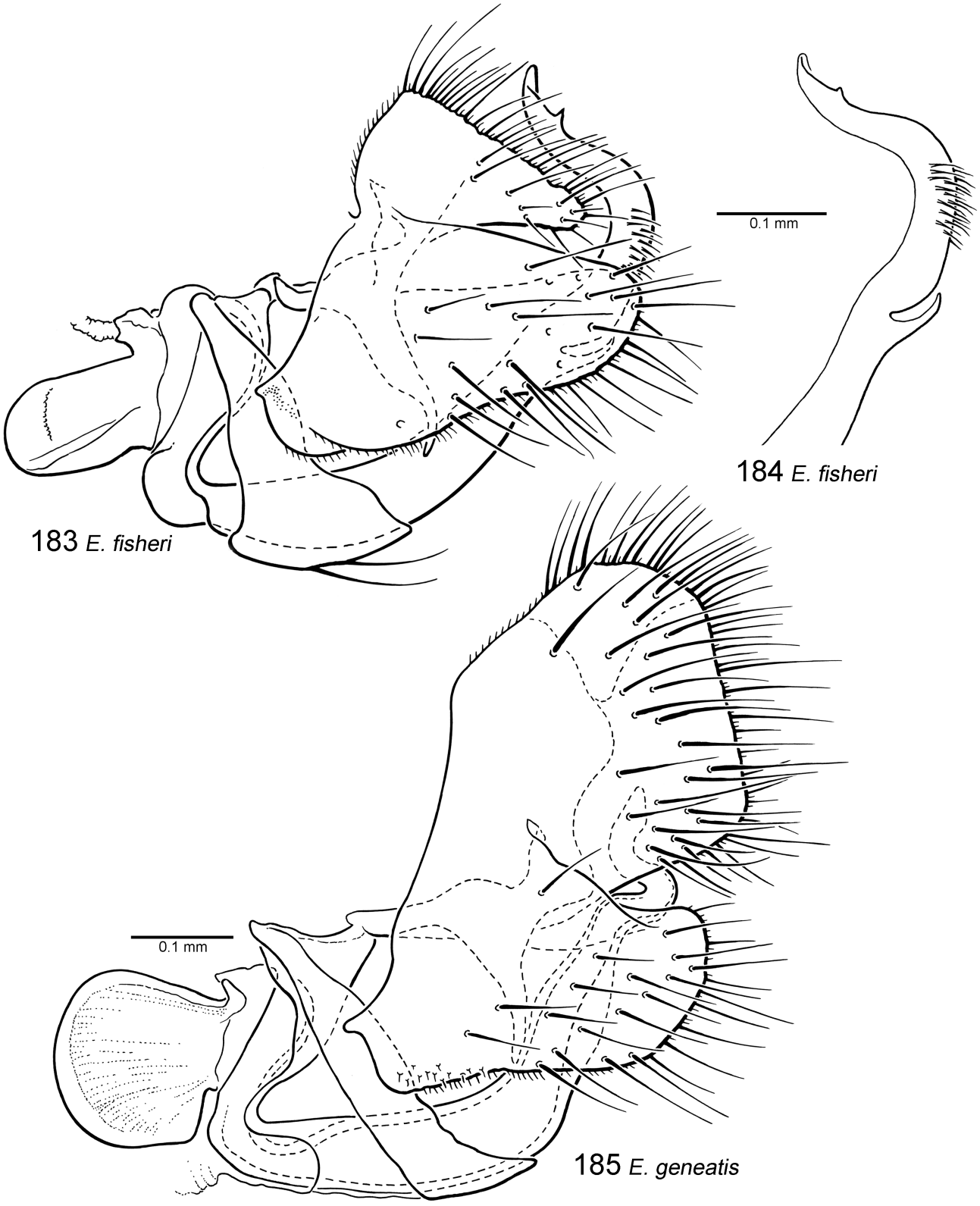
Female. Similar to male, except as follows: palpus pale; scutum with 3 brown vittae; halter pale; abdomen shiny; legs with posterior face of coxae and base of femora yellowish brown; scutum with broad brown vittae along acr and dc rows.

Geographical distribution and seasonal occurrence (Fig. 192). *Empis* (*En.*) *oharai* **sp. nov.** is known from April to August in northern California, Oregon and Washington.

Etymology. This species is named in honour of the collector of the holotype, James (Jim) O'Hara, our CNC colleague and dedicated Tachinidae specialist.

Nuptial gift presentation. The holotype and several paratype specimens were collected with balloons (see "Type material" above). These males were collected by J.E. O'Hara directly into ethanol and the balloons dissolved (Cumming 1994). In addition, four males collected by D.D. Wilder (DDW) were each pinned with a tiny collapsed prey-less balloon glued to a point. No further details of the shape or density of the balloons are known.

Remarks. This species is most closely related to *E. geneatis*.



FIGURES 183–185. Male terminalia of the *E*. (*Enoplempis*) *geneatis* species group, lateral view. **183,** *E*. (*En*.) *fisheri* **sp. nov.**; **184,** same, phallus; **185,** *E*. (*En*.) *geneatis* (Melander).

***Empis* (*Enoplempis*) *subgeneatis* sp. nov.**
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(Figs 187, 192)

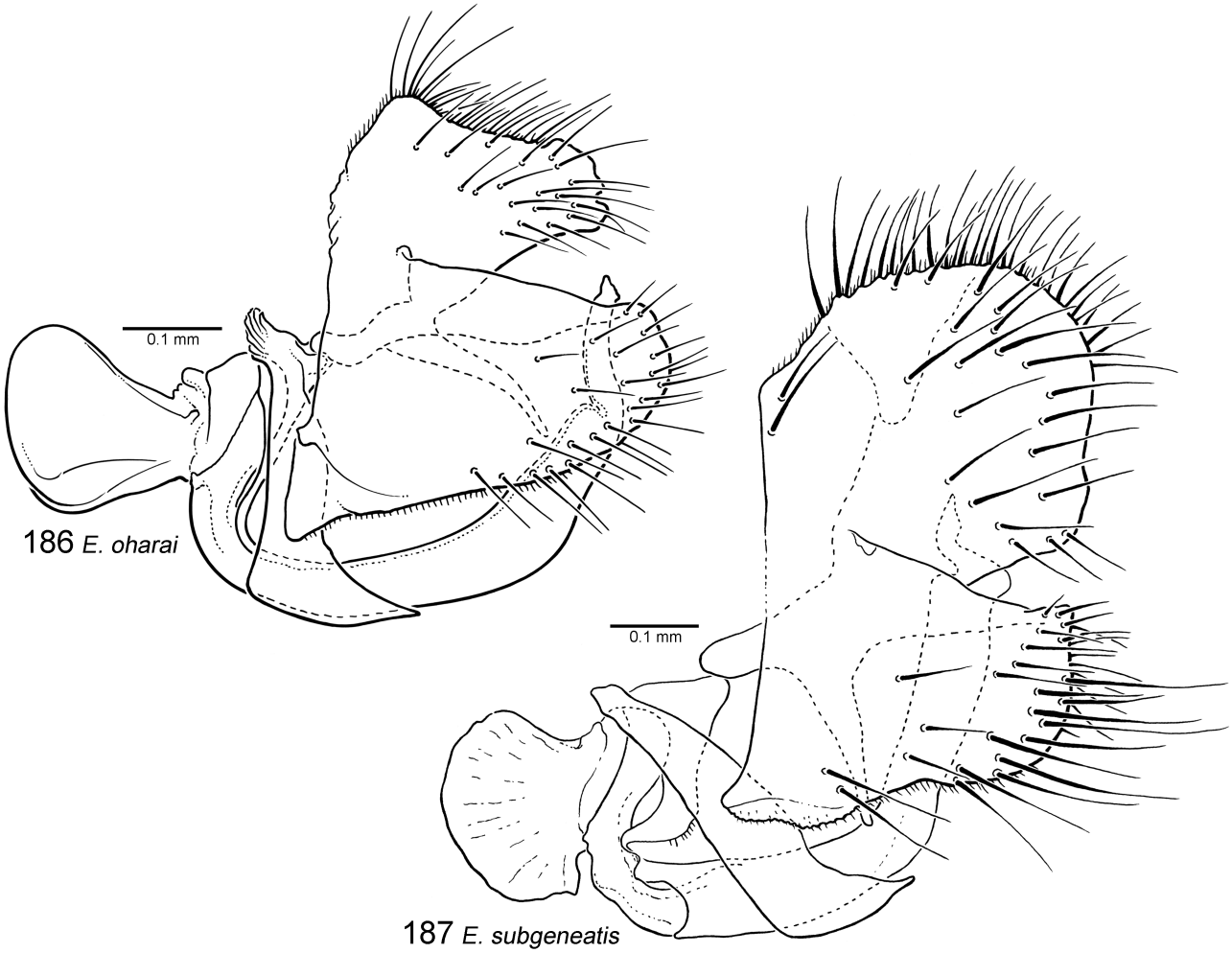
Type material. HOLOTYPE ♂, labelled: "Alsea [44°22′N 123°35′W]/ Ore. 4-26-29"; J.E. Davis/ Coll."; "Empis/ (Pogoenempis)/ geneatis/ Melander/ det. WJ Turner 1978"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *subgeneatis* Sinclair,/ Brooks & Cumming [red label]" [dissected] (OSAC). **PARATYPE: USA. Oregon:** *Washington County*: Banks [45°36′N 123°06′W], 20.v.1964, Blk. light trap, K. Goeden (ODAC).

Possible additional material (unassociated females). USA. Oregon: *Benton County*: Corvalis, Lewisburg Saddle ck below Old Growth Tr., 44.6423°N 123.2891°W, MT, 29.iii–23.iv.2013, SJF (1♀, CNC); same data except, 44°38′32.28″N 123°17′20.76″W, MT over ck, 23.iv–6.v.2013 (1♀, CNC); Marys Peak, 12 mi. W Corvallis, 3800 ft, 10.vi.1984, Darling (1♀, ROM).

Diagnosis. This species is very similar to *E.* (*En.*) *geneatis*, distinguished by its larger size (wing length more than 6 mm), dense dorsal setae on the male hind femur, length more than twice femur width, and the male cercus is more rounded dorsally.

Description. Wing length 6.2–6.5 mm. **Male.** Similar to *E.* (*En.*) *geneatis*, except as follows: head with ocellar triangle with several pairs of posterior setulae. Scape 5× longer than pedicel.

Scutum without pair of greyish vittae. Postpronotum with numerous short, silky setae. Notopleuron clothed in long silky setae; 1 long pal and short silky setulae. Scutellum with pair of long sctl, with numerous pairs of long silky marginal setae.



FIGURES 186–187. Male terminalia of the *E.* (*Enoplempis*) *geneatis* species group, lateral view. **186,** *E.* (*En.*) *oharai* **sp. nov.**; **187,** *E.* (*En.*) *subgeneatis* **sp. nov.**

Fore femur clothed in long, wavy setae, longer dorsally and posteriorly. Fore tibia with long posterodorsal setae, 3× longer than width of tibia; ventrally with fine, dense setae, subequal to width of segment. Hind tibia evenly expanded apically, not broader than femur distally.

Terminalia (Fig. 187): cercus broader than epandrium, suboval, rounded dorsally.

Female. Not confirmed.

Geographical distribution and seasonal occurrence (Fig. 192). *Empis* (*En.*) *subgeneatis* **sp. nov.** is known from Oregon. Adults have been collected in April and May and also possibly March and June.

Etymology. The species name is in reference to the similarity of this species with *E. geneatis*.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *manca* species group

(Figs 1, 188–191, 193–206, 208)

This group includes four species, *E.* (*En.*) *bova* **sp. nov.**, *E.* (*En.*) *manca* Coquillett, *E.* (*En.*) *submanca* **sp. nov.** and *E.* (*En.*) *wilderae* **sp. nov.**, which are distinguished by the sickle-shaped anteroventral preapical lobe on the hind femur (*e.g.*, Figs 1, 190, 203–205), apex of phallus expanded (*e.g.*, Figs 198–200, except *E.* (*En.*) *bova* **sp. nov.**, Fig. 197), hind femur sometimes with row of preapical posteroventral setae (*e.g.*, Figs 191, 196) and subepandrial process present (*e.g.*, Fig 197).

Empis (*Enoplempis*) *bova* sp. nov.

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(Figs 188–191, 193, 197)

Type material. HOLOTYPE ♂, labelled: "USA: CA: Humboldt Co./ ca. 7 miles SE of Orick/ Lost Man Creek trail/ N41°15′53″ W123°59′16″/ 2.VI.2009, J.M. Cumming"; "CNC/ 1078374"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *bova* Sinclair,/ Brooks & Cumming [red label]" (CNC). **PARATYPES: USA. California:** *Humboldt County*: Arcata [40°52′N 124°5′W], 26.vi.1969, W.G. Goodman (2♀, UCDC); same data except, 29.vi.1969 (1♀, UCDC); same data except, 19.vii.1969 (1♂, UCDC); same data except, 21.vii.1969 (1♀, UCDC); same data except, 24.vi.1969, J.W. Pearson (1♂, 1♀, UCDC); same data except, 10.vi.1969, JAP (1♀, EMEC); same data except, 10.vi.1969 (1♂, EMEC); same data except, 21.vii.1969 (1♂, 2♀, EMEC); same data except, w/prey 3:00pm (1♂ with Tipulidae prey, EMEC); same data except, dappled sun in redwood forest solitary (1♂, EMEC); same data except, 24.vi.1969, C. Slobodchikoff (1♂, 1♀, EMEC); same data except, 1.vii.1969 (2♂, 1♀, EMEC); Bair's Rch Redwood Ck [41°18′N 124°02′W], 17.vi., H.S. Barber (1♂, USNM); Dyerville [40°21′N 123°55′W], 20.vi.1935, ALM (1♂, 1♀, USNM); Fieldbrook [40°57′N 124°02′W], 19.v.1903, H.S. Barber (1♂, USNM); same data except, 19.v.1903 (1♂, USNM); Humboldt Redwoods SP [40°18′N 123°58′W], jct. Calf Ck & Bull Ck, 17.vi.1978, DDW (1♂, CAS); 1 mi. W Kneeland [40°45′N 124°00′W], 27.vi.1969, JAP (1♂, 1♀, EMEC); same data except, D.P. Levin (1♂, 1♀, LACM); 5 mi. W Kneeland, 27.vi.1969, J.W. Pearson (1♂, UCDC); Lord Ellis Summit [40°55′N 123°51′W], Hwy 299, 9.vii.1980, T.W. Davies (1♂, CAS); Orick [41°17′N 124°03′W], 21.vi.1935, ALM (5♂, 1♀, USNM); same data as holotype (5♂, 2♀, CNC); same data as holotype except, SEB (7♂, 7♀, CNC); same data as holotype except, BJS (2♂, 4♀, CNC); Prairie Ck Redwood SP, Prairie Ck, 41°24.454′N 124°01.872′W, 3.vi.2009, BJS (3♂, 1♀, CNC).

Additional material examined. USA. California: *Alameda County*: Albany Hill [37°53′N 122°18′W], 24.iii.1995, JAP (6♂, EMEC); same data except, 10.iv.1996 (2♂, 1♀, EMEC); same data except, 5.iii.1997 (1♂, 1♀, EMEC); Berkeley [37°52′N 122°16′W], 31.iii.1915, M.C. Van Duzee (2♂, USNM); same data except, 6.iv.1915 (1♂, USNM); same data except, 8.v.1915 (3♂, USNM); same data except, 14.v.1915 (2♂, USNM); same data except, 15.v.1915 (1♂, USNM); same data except, 16.v.1915 (1♂, USNM); same data except, 20.v.1915 (1♂, USNM); same data except, 24.v.1915 (2♂, USNM); same data except, 29.iii.1921, B. Brookman (1♂, CAS); same data except, 20.v.1940, G.E. Bohart (1♂, CAS); same data except, 3.iv.1948, W.W. Wirth (1♀, USNM); same data except, 3.iv.1948 (1♂, 1♀, USNM); same data except, 19.iii.1949, L.W. Quate (1♀, USNM); same data except, 30.v.1951, E.I. Schlinger (1♂, UCDC); same data except, 22.iv.1952, W.C. Bentinck (3♂, 1♀, EMEC); same data except, 23.ii.1980, E.J. Wright (2♂, DEBU); same data except, 1.vi.1948, light trap, W.W. Wirth (1♂, USNM);

Berkeley, 90 Tamalpais Rd, 10.v.1992, #00720, PHA (2♂, USNM); Berkeley U.C., 8.vi.1982, C.L. Powell (1♂, EMEC); Hayward [37°40′N 122°04′W], 29.iv.1965, E. King (1♂, EMEC); Kilkare Rd, 2.2 km N Sunol [37°36′N 121°53′W], 13.v.1979, T.W. Davies (29♂, 65♀, CAS); Hills back of Oakland [37°50′N 122°12′W], 25.iii.1951, W.C. Bentinck (1♂, EMEC); same data except, 13.v.1951 (2♂, 2♀, EMEC); same data except, 9.v.1952, (4♂, 2♀, EMEC); same data except, 14.v.1952 (1♂, EMEC); Patterson Reserve, Del Valle Lk. [37°35′N 121°43′W], 15.iii.1973, JAP (1♂, 2♀, EMEC); same data except, 8.iii.1974 (1♂, 3♀, EMEC); Strawberry Cyn [37°52′N 122°14′W], Berkeley, 14.iv.1968, D.D. Munroe (1♂, 2♀, CNC); same data except, Berkeley Hills, 6.iv.1962, H.V. Daly (4♂, 2♀, EMEC); same data except, 15.vi.1961, prey held between mid and hind coxae, M.J. Tauber, C.A. Toschi (1♂ with Cecidomyiidae prey, EMEC); Sunol Reg. Wilderness, along Indian Joe Ck [37°30′N 121°49′W], 7.iii.1979, DDW (1♂, CAS); same data except, 29.iii.1979, DDW (52♂, 59♀, CAS). *Contra Costa County*: Briones Regional Pk [37.935804°N 122.137413°W] at Alhambra Valley Rd, 20.iii.1978, DDW (5♂, 2♀, CAS); same data except, 29.iii.1978 (5♂, 15♀, CAS); same data except, along Alhambra Trail, on ridge, 23.iii.1979, DDW (2♂, 2♀, CAS); same data except, 4.iv.1979 (11♂, 6♀, CAS); Briones Regional Pk, along Cascade Ck at Bear Ck Rd entrance, 14.iii.1978, DDW (2♂, CAS); Briones Regional Pk, Toyon Cyn, 25.v.1978, DDW (4♂, CAS); Briones Reservoir [37.915°N 122.205°W], 22.iv.1995, JAP (1♂, EMEC); Canyon [37°50′N 122°09′W], 9.v.1981, D. Denning (1♂, LACM); same data except, 6.xi.1981 (1♂, LACM); Canyon Post Office, 8–9 km S of Moraga, 11.vi.1981, D.G. Denning (1♂, CAS); 1.0 km N Cave Point oak/bay forest, 37°50′56″N 121°53′13″W, 22.iv.2012, MT, 438 m, K. Will [CAL2012.iv.22.15]10407 (1♂, 2♀, CNC); El Sobrante [37°58′N 122°17′W], cyn at San Pablo Dam Rd, 15.iii.1978, DDW (5♂, 6♀, CAS); same data except, 5.iv.1978 (3♂, 5♀, CAS); Lafayette [37°53′N 122°07′W], 6.iv.1968, D.D. Munroe (3♂, CNC); Las Trampas Regional Wilderness [37.82°N 122.05°W], 4.iv.1978, DDW (1♂, 3♀, CAS); Mt Diablo [37°52′N 121°54′W], 26.iv.1942, J.W. Tilden (1♂, CAS); same data except, 18.iv.1948, W.W. Wirth (1♂, USNM); Tilden Regional Pk [37°53′N 122°14′W], 24.iv.1971, collected at flower blackberry *Rubus*, PHA (1♂ with flower; 2♂, 2♀, USNM); same data except, collected at shaded flower *Heracleum lanatum* Michx. (1♂, 2♀, USNM); same data except, resting on vegetation (2♀, USNM); Tilden Regional Pk, trail Jewel Lk. to Wildcat Peak & return, 6.vi.1992, #00739-E, on vegetation along trails, PHA, (1♂, USNM); Tilden Pk, Berkeley Hills, 19.iv.1969, P.A. Opler (6♂, EMEC); same data except, 20.iv.1969 (1♂, 3♀, EMEC); same data except, 17.iv.1969, JAP (1♀, EMEC); N entrance Wildcat Regional Pk [37°56′N 122°17′W], 5.iv.1978, DDW (1♂, 1♀, CAS). *Del Norte County*: Hunter Ck Rd 2 mi. N Requa, 41°34′14″N 124°3′10″W, muddy disturbed roadside, 23.v.2009, J.M. Cumming (1♂, CNC); Jedediah Smith Redwoods SP, Howland Hill Rd at Mill Ck [41°46′N 124°06′W], 16.v.1978, DDW (5♂, 2♀, CAS); same data except, Howland Hill Rd at Pk boundary (2♂, CAS); Klamath [41°31′N 124°02′W], 20.vi.1939, T.G.H. Aitken (1♂, CAS); Smith River, Rowdy Ck [41°55′N 124°08′W], 11.vii.1930, J.M. Aldrich (1♂, USNM). *Los Angeles County*: Gorman [34.79611°N 118.85167°W], 22.vi.1958, W.E. Simonds (1♂, CSCA); *Marin County*: Alpine L. [37°56′N 122°38′W], 1500 ft, 10.iv.1968, D.D. Munroe (1♂, CNC); Bolinas [37°54′N 122°41′W], 4.iv.1976, R.O. Schuster (2♂, 1♀, UCDC); across Bolinas-Fairfax Rd from Meadow Club [37°58′N 122°37′W], 10.iv.1978, DDW (1♂ with Cecidomyiidae prey, 1♂ with Chironomidae prey, 1♀, CAS); Fairfax [37°59′N 122°35′W], 2 mi. W, 21.iv.1969, JAP (1♂, 1♀, EMEC); 2 mi. SE Inverness, Inverness Ridge [38°5′N 122°51′W], 88–1014 ft, 14.v.1972, E.I. Schlinger (1♂, EMEC); same data except, Alder Seepage W side of ridge, 16.v.1970, JAP (2♂, EMEC); same data except, top of ridge (1♀, EMEC); Inverness [38°06′N 122°51′W], 8–15.iv.1963, PHA (4♂, 4♀, CAS); along Lagunitas Ck below Alpine Dam [37°56′N 122°38′W], 23.ii.1978, DDW (4♂, 1♀, CAS); same data except, 23.ii.1978 (3♂, CAS); same data except, 15.iii.1978 (1♂, CAS); same data except, 28.v.1979 (3♂, CAS); Lagunitas [38°0′N 122°42′W], 25.iii.1924, E.H. Nast (1♂, CAS); Lk. Lagunitas [37°56′51″N 122°35′46″W], 30.iii.1961, D.Q. Cavagnaro (2♂, UCDC); same data except, 9.iii.1958, D.C. Rentz (1♂, CAS); Liberty Gulch nr Alpine Lk. [37°57′N 122°37′W], 640–900 ft, 17.iv.1971, K. Wahl (1♀, EMEC); same data except, E.I. Schlinger (1♀, EMEC); same data except, 19.iv.1975, M. Buegler (1♂, EMEC); same data except, JAP (2♂, EMEC); same data except, 17.iv.1976, M.M. Helena (1♀, EMEC); same data except, 3.v.1980, C. Parisek (1♂, EMEC); Lily Pond, Alpine Lk. [37°56′N 122°38′W], 1500 ft, 10.v.1969, MT, D.D. Munroe (1♂, CNC); same data except, 11.iv–9.v.1970 (3♂, 3♀, CNC); same data except, v–vi.1970 (2♂, 8♀, CNC); same data except, 18.iii–1.iv.1971 (1♀, CNC); same data except, 8–13.iv.1971 (1♂, CNC); same data except, 19–27.iv.1971 (1♂, CNC); same data except, 17–25.v.1971 (2♂, 3♀, CNC); same data except, 15–25.v.1971 (1♂, 1♀, CNC); Lily Lk. nr Alpine Lk., 680–720 ft, 22.iv.1973, E. Schlinger (1♂, EMEC); same data except, 19.iv.1975, M. Buegler (1♂, EMEC); same data except, B. Burroughs (1♀, EMEC); same data except, JAP (4♂, 4♀, EMEC); Mill Valley [37°54′N 122°33′W], iii.1926 (1♀, CAS); same data except, 7.iii.1926 (1♂, CAS); same data except,

21.iii.1926 (2♂, CAS); same data except, 24.iii.1926 (1♂, CAS); same data except, 28.iii.1926 (2♂, 1♀, CAS); same data except, 4.iv.1926 (1♂, 1♀, CAS); same data except, 11.iv.1926 (1♂, CAS); same data except, 12.iv.1926 (1♀, CAS); same data except, 15.iv.1926 (1♀, CAS); same data except, 21.iv.1926 (3♂, CAS); same data except, 24.iv.1926 (1♂, CAS); Mill Valley, 19.iv.1946, E.L. Kessel (1♂, CAS); same data except, 21.iv.1946 (1♂, CAS); Mill Valley, v.1949, E.S. Ross (1♀, CAS); Mill Valley, 17.iv.1949, H.B. Leech (1♀, CAS); same data except, 26.iv.1949 (1♂, 1♀, CAS); same data except, 10.v.1949 (1♂, CAS); same data except, 21.v.1950 (1♂, CAS); same data except, 24.iii.1951 (1♂, CAS); Mill Valley, 19.iv.1950, H.B. Leech, at light (2♂, 2♀, CAS); same data except, 16.iii.1955 (1♂, CAS); Mill Valley, 9.ii.1958, H.B. Leech, on window in house (1♂, CAS); same data except, 10.iii.1958, in house (1♂, CAS); Mill Valley, 31.iii.1950, F.X. Williams (1♂, CAS); Mill Valley, 360 ft, 4.iv.1965, PHA (1♂, USNM); same data except, 15.v.1965 (1♂, USNM); same data except, 17.v.1965 (1♀, USNM); same data except, 22.v.1965 (1♂, USNM); Mill Valley, 14–17.iv.1965, PHA, Flight Trap (1♂, USNM); same data except, 28.iv.1965 (1♂, USNM); same data except, 18–19.v.1965 (1♂, USNM); Mill Valley, Lee Street, 110 m, 28.iii.1965, PHA (1♀, USNM); same data except, 5–6.v.1965 (1♂, USNM); same data except, Blithedale Ridge, 9–10.v.1965 (1♂, CAS); same data except, 8–12.v.1966 (1♂, CAS); Mill Valley, Lee Street, 360 ft, 22.iii.1969, I.A. Boussy (1♂, USNM); Mill Valley, Mill Ck, nr Cascade Reservoir, 20.iii.1978, DDW (57♂, 31♀, CAS); same data except, 31.v.1978 (1♂, CAS); 3 mi. W Mill Valley, 13.v.1962, R.L. Westcott (1♂, 1♀, LACM); Mt Tamalpais [37°55′N 122°34′W], 25.v.1974, D.G. Denning (2♂, UCDC); same data except, 26.v.1974, (13♂, 8♀, UCDC); Mt Tamalpais along Cataract & Kent Trails, 12.iv.1979, DDW (12♂, 7♀, CAS); Mt Tamalpais, Old Stage Rd at Rattlesnake Ck #1, 11.v.1996, PHA, Field Note #01461 (1♂, USNM); same data except, vicinity Rattlesnake Ck No.1, 10.v.1997, swept shaded seepage in road cut, Collection 01745-A (1♂, USNM); Mt Tamalpais, vic. Rock Springs, 610 m, 13.v.1978, PHA (1♂, USNM); Mt Tamalpais, Rock Springs Trail between West Point & Bootjack Camp, 5.v.1990, #00233-E, PHA (3♂, USNM); Muir Beach [37°51′N 122°34′W], 25.vi.1964, PHA (1♂, CAS); Point Reyes [37.997°N 123.020°W], 25.v.1925, D.G. Denning (2♂, UCDC); same data except, 19.iv.1980, S.A. Marshall (1♂, 1♀, DEBU); North Beach, Pt. Reyes, 20.vi.1976, E.I. Schlinger, M.E. Buegler (1♂, EMEC); North Beach, Pt. Reyes Natl. Seashore, 10–100 ft, 10.v.1975, M. Buegler (1♂, 1♀, EMEC); same data except, 11.v.1974, <100 ft, A. Hajak (1♂, EMEC); Novato [38°06′N 122°34′W], 10.iii.1963, D.C. Rentz (1♂, 1♀, CAS); Paradise Beach Co. Pk [37°53′N 122°27′W], 15.v.1963, PHA (2♂, 1♀, USNM); Phoenix Lk. [37°57′N 122°34′W], 4.iv.1964, C. Slobodchikoff (3♂, EMEC; 2♂, CAS); same data except, 2.iv.1966, J. Haddock (1♂, EMEC); Taylor SP [38°1′N 122°43′W], 8.v.1949, PHA (6♂, USNM); same data except, H.B. Leech (2♂, 1♀, CAS); Samuel P. Taylor SP, 8.vi.1975, J.B. Johnson (1♂, WFBM); Samuel P. Taylor SP, Madrone Picnic Area, 23.v.1970, PHA (1♀, USNM); Samuel P. Taylor SP, Lagunitas Ck, 20.v.1977, DDW (4♂, 1♀, CAS); Samuel Taylor SP, 38.017°N 122.728°W, 1.iv.2009, I.S. Winkler (1♂, CNC); Marin Co., 14.iv.1970, 1000 ft, J. Kipping (2♂, CAS); same data except, 2100 ft, 29.iv.1974, (1♂, 1♀, CAS); same data except, 2.v.1974 (4♀, CAS); same data except, 13.v.1974 (6♂, 11♀, CAS). *Mendocino County*: 10 km N Branscomb, Angelo Coast Range, Ahlquist tr., chaparral, 39°44′ 37″N 123°37′39″W, 495 m, 10.v.2005, sweep, C.J. Borkent, CJB05-02 (1♂ with Mycetophilidae prey, 3♂, CNC); Inglenook Fen [39°30′N 123°46′W], 4 mi. N Ft Bragg, 9.vi.1975, M.E. Buegler, E.I. Schlinger (1♂, EMEC); Monte Rio [38°28′N 123°0′W], 25.v.1975, W.W. Middlekauff (1♂, EMEC); 3 mi. N Branscomb [39°42′N 123°39′W], NCCRP, 1400 ft, 17.v.1975, JAP (1♂, EMEC); same data except, 5–6.v.1989, S. O'Keefe (1♂, EMEC); 5 mi. N Branscomb, NCCRP, 26.v.1976, JAP (22♂, 13♀, EMEC); same data except, 12–14.v.1978 (2♂, EMEC); same data except, 26.v.1976, E. Rogers (1♂, EMEC); same data except, 25–27.v.1976 (1♀, EMEC); same data except, 26–27.v.1976, R. Wharton (1♂, EMEC); 3.9 km NW Branscomb, along Redwood Ck nr jct. Branscomb Rd & Wilderness Rd, 39°40.77′N 123°39.29′W, 445 m, moist redwood forest along creek, 13.v.2005, C.J. Borkent, CJB05-09 (3♀, LEM); 15 mi. W Willits [39°20′N 123°32′W], 14.vi.1948, E.L. Kessel (2♂, CAS). *Monterey County*: Big Creek Reserve [36°4′N 121°35′W], 25–26.iii.1980, JAP (1♀, EMEC); same data except, 4.vi.1982 (2♂, 3♀, EMEC); same data except, 5.vi.1982 (1♀, EMEC); same data except, 11–13.vi.1985 (1♂, EMEC); same data except, 21–22.iv.1993, N. Access Rd, Chamise chaparral-grassland, 490–450 m (2♂, EMEC); same data except, 12–13.v.1992, JAP & Scaccia, Brunette Ck trail, 100–240 m (1♂, EMEC); Landels-Hill Big Creek Res., 5 mi. N Lucia, 4–6.vi.1982, E.I. Schlinger (1♂, EMEC); Carmel [36°33′N 121°55′W], 24.iii.1919, E.P. Van Duzee (1♂, 2♀, CAS); Monterey [36°36′N 121°53′W], 23.v.1964, *Arctostaphylos* sp., P. Rude (3♂ with Sciaridae prey, 4♂, 2♀, EMEC); Pacific Grove [36°37′N 121°55′W], 9.v.1906 (1♀, USNM); same data except, iii.1923, L.S. Jr. U. Lot. 132 Sub. (1♂, USNM); Point Lobos [36°31′N 121°56′W], 24.iii.1897, L.S. Jr. U. Lot. 133 Sub. (1♂, CAS). *Napa County*: Napa [38°18′N 122°17′W], 28.iii.1954, JAP (1♂, EMEC); Bothe Napa Val. SP [38°33′N 122°30′W], 15.v.1980, sweeping, K.S. Corwin (1♂,

CSCA). *Plumas County*: Portola [39°48′N 120°28′W], 13.iv.1906 (1♂, USNM). *San Benito County*: S of Hollister [36°51′N 121°24′W], Limekiln Cyn, 3.iv.1979, DDW (1♀, CAS); Limekiln Cyn, SW Paicines [36°43′N 121°16′W], 24.iv,1968, P.A. Opler (1♂, EMEC); same data except, JAP (1♀, EMEC). *San Francisco County*: San Francisco [37°46′N 122°24′W], 27.iv.1961, R. Brown (1♂, CAS); San Francisco, Golden Gate Pk [37°46′N 122°28′W], 5.viii.1974, DDW (1♀, CAS); same data except, Strybing Arboretum, California Native Plants area, 9.iv.1981, PHA, collected on lawn nr base *Alnus rhombifolia* (1♀, USNM); San Francisco, Golden Gate Pk, De Laveaga Dell, 27.iv.1992, #00708 PHA, swept foliage ivy/vegetation under *Umbellularia californica* (H. & A.) Nutt. (5♂, 3♀, USNM); same data except, 29.iv.1992, #00710 (10♂, 4♀, USNM); same data except, 18.v.1992, #00724, swept foliage ivy/vegetation (2♂, 6♀, USNM); same data except, 19.v.1992, #00725 (3♂, 3♀, USNM); same data except, 22.v.1992, #00727, swept foliage ivy/thimbleberry (4♂, USNM); same data except, 26.v.1992, #00732, swept foliage ivy/vegetation (1♀, USNM); same data except, 3.vi.1992, #00735, swept foliage ivy/thimbleberry (2♂, USNM); same data except, 5.v.1992, #00737 (1♀, USNM); same data except, 10.v.1993, 00925, sweeping ivy/vegetation under trees (4♂, 1♀, USNM); same data except, 3.iv.1995, #01290, swept low ivy and herbage, sun/shade under *Umbellularia* (1♀, USNM). *San Luis Obispo County*: 2 mi. NW Cambria [35°33′N 121°5′W], 24.iii.1980, JAP (1♂, 7♀, EMEC). *San Mateo County*: Brisbane [37°40′N 122°25′W], 14.iv.1998, JAP (3♂, 1♀, EMEC); Butano Ck, NE Cloverdale Rd [37.2156°N 122.3490°W], 12.iv.1964, PHA (3♂, 2♀, CAS); Corte de Madera Ck [37°24′N 122°14′W] near Portola, 23.v.1949 (1♂, USNM); same data except, 11.vi.1960, PHA (1♀, CAS); same data except, 20.iii.1965 (1♀, CAS); same data except, 12.v.1974 (1♂, USNM); Portola Valley, Alpine Rd, Corte de Madera Ck, 230 m, 13.iv.1971, PHA & M.M. Arnaud (3♂, 1♀, USNM); Half Moon Bay [37°27′N 122°26′W], 3.vii.1958, PHA (1♂, USNM); Huddart Co. Pk, McGarvey Gulch Ck [37.4443°N 122.2914°W], 290 m, 10.v.1980, PHA (2♂, USNM); Junipero Serra Pk [37.609°N 122.426°W], 29.iii.1964, PHA (1♂ with flower, 1♀, with flower, 1♀, CAS); same data except, 21.iii.1971 (2♂ with flowers, 2♀ with flowers, USNM); same data except, 23.iii.1986, *Empis* with possible prey (1♂ with Mycetophilidae prey, USNM); San Bruno [37°37′N 122°25′W], 28.iii.1969, P.A. Opler (2♂, EMEC); same data except, JAP (1♂, EMEC); La Honda [37°19′N 122°16′W], 18.iv.1964, PHA (2♂ with *Anthalia* Zetterstedt and Sciaridae prey, 17♂, 14♀, USNM); La Honda, 5 mi. N, 8.iii.1964, PHA (1♂, USNM); Skyline Blvd nr La Honda Rd [37°23′N 122°15′W], 20.v.1949, PHA (1♂, USNM); Purisima Ck Cyn [37.4367°N 122.3672°W], 4.iv.1995, PHA & M.M. Arnaud, Collection No. 01291 (3♂, USNM); Portola Valley SP [37.2622°N 122.1958°W], 7.v.1950, F.X. Williams (1♂, 1♀, CAS); same data except, 900 ft, 8.iii.1981, E.J. Wright (4♂, DEBU); San Francisco State Fish and Game Refuge, vicinity Trousdale Dr. [37.5794°N 122.4059°W] 30.iv–5.v.1995, PHA & M.M. Arnaud, 550 ft, #01306, Townes Flight Trap (2♂, 3♀, USNM); San Mateo [37°33′N 122°18′W], 6.iv.1906 (1♀, USNM); same data except, 12.iii.1950, R.S. Beal (1♂, USNM); San Mateo Co. Memorial Pk [37°16′N 122°17′W], 7.iv.1968, PHA (1♂, USNM); Stanford Univ. Jasper Ridge Biological Pres. [37.408°N 122.2275°W], 9.v.1982, PHA (1♂, USNM); same data except, 26.ii–12.iii.1995 (1♂, 1♀, USNM); same data except, 410 m, 23.iv.1995 (1♂, USNM); same data except, 7.v.1995, PHA & M.M. Arnaud, Field Note #01313 (1♂, 1♀, USNM); same data except, 3–4.vi.1995, PHA (1♀, USNM); same data except, 30.iv.1996, PHA & M.M. Arnaud, Field Note #01459 (1♂, USNM); Woodside [37°25′N 122°15′W], 4.iv.1906, R.W. Doane (4♂, 2♀, LACM); 2mi. N Woodside Junction, 9.vi.1962, J.T. Doyen (2♂, EMEC). *Santa Clara County*: Alma College [37.1770°N 122.0074°W], 10.v.1951, E.L. Kessel (7♂, 1♀, CAS); KPC 11–06, Monte Bello Open Space Pres., Stevens Ck Tr., 37.32575°N 122.1792°W, 16.iv.2011, K. Collins *et al.* (2♂, 4♀, CNC); Santa Cruz Mts [37°06′N 121°50′W], 21.iii.1973, in flight, D. Whitman (1♂, EMEC); same data except, on wall (1♀, EMEC); Saratoga Redwood For. [37.2363°N 122.0626°W], 14.iv.1980, S.A. Marshall (2♂, DEBU); Stanford Univ. [37°25′N 122°10′W], 13.iii.1956, PHA (1♀, CAS); same data except, Campus Experimental Area, 1969–1970, A.R. Moldenke (6♂, 9♀, CAS). *Santa Cruz County*: Bates Ck [37.0116°N 121.9305°W], 3 mi. NNE Soquel, 24–25.iv.1970, clear, cool, E.I. Schlinger (3♂, 2♀, EMEC); same data except, Redwood forest assoc., F. Shon (1♂, EMEC); Bates Ck, 3 mi. NE Soquel, 26.iv.1974, JAP, hovering & alighting on low herbs in partial shade, 1400–1500 (5♂, 3♀, EMEC); 2 mi. N Ben Lomond [37°4′N 122°5′W], 19.iii.1961, D.F. Veirs (1♂, LACM); Big Basin Redwoods SP [37.1668°N 122.2508°W], 29.v.1937, T.G.H. Aitken (1♂, CAS); same data except, 29.vi.1946, PHA (1♂, USNM); same data except, 5.vi.1971, D.G. Denning (3♂, UCDC); same data except, Opal Ck, 14.vi.1978, DDW (1♂, CAS); Felton [37°3′N 122°3′W], St. Cruz Mts, 15–19.v.1907, 300–500 ft, Bradley (1♂, USNM); Glenwood [37°6′N 121°59′W], 19.iv.1964, T.L. Erwin (1♂, USNM); Henry Cowell Redwoods SP [37.0408°N 122.0649°W], 7.vii.1976, D.G. Denning (1♂, UCDC); 3 mi. NNE Soquel [37.0116°N 121.9305°W], 24.iv.1970, JAP (3♂, EMEC); same data except, 130–400 ft, 24.iv.1971, E.I. Schlinger (2♂, EMEC); same data except, 22.iv.1972, E.J. Rogers (1♂, 1♀,

EMEC); same data except, 28.iv.1973, S. Swezey (1♂, EMEC); same data except, 26.iv.1974, R. Lem (1♂, EMEC); same data except, 27.iv.1974, M. Buegler (1♂, EMEC); same data except, M. Kirby (1♂, EMEC); same data except, T. Parisian (1♀, EMEC); same data except, D. Tilles (1♂, EMEC); Upper Zyantia Ck, 30.iv.1970, D.E. Foster (3♂, WFBM). *Shasta County*: Castle Crags SP [41°10′N 122°20′W], 18.ix.1973, D.G. Denning (1♂, UCDC). *Solano County*: Green Valley [38°15′N 122°9′W], 2.iv.1952, R.M. Bohart (1♂, 2♀, UCDC); same data except, 7.iv.1953 (2♂, UCDC); same data except, 24.iii.1954, E.I. Schlinger (4♂, 8♀, UCDC); Cazadero [38°32′N 123°5′W], 30.iii.1934 (1♂, 1♀, UCDC); 4 mi. W Plantation, 4.iv.1956 (1♂, EMEC); same data except, 21.iv.1957, D. Burdick (1♀, EMEC); same data except, 1.v.1958 (4♂, 1♀, EMEC). *Sonoma County*: Stillwater Cove [38°32′N 123°17′W], 23.v.1954, E.I. Schlinger (3♂, UCDC); same data except, J.C. Downey (1♂, UCDC); same data except, 7.v.1955 (2♂, 2♀, UCDC). *Stanislaus County*: Del Puerto Cyn, Frank Raines Pk [37°25′N 121°22′W], 1200 ft, 13.iv.1973, E. Schlinger (1♂, EMEC); same data except, M. Ross (1♂, EMEC); same data except, 5.iv.1970, 335 m, PHA, Flight trap, creek (1♂, 1♀, USNM); Del Puerto Cyn, 20 km W Patterson, 270–370 m, 4.iv.1992, JAP (1♀, EMEC). **Oregon:** *Curry County*: Timeus Ranch Rsrv nr Brookings, 464 m, 42°06′N 124°17′W, 23–27.vi.1998, M.S. Wasbauer, YPT (1♂, UCDC).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *manca* species group by the male hind femur with a straight sickle-shaped process, base arising obliquely from femur, hind femur only with row of strong setae opposite sickle-shaped process, and male hind tibia usually with distinct curvature and anteroventral lobe or swelling on basal quarter (Figs 189–191).

Description. Wing length 5.2–6.5 mm. **Male.** Similar to *E.* (*En.*) *manca*, except as follows: head with postpedicel long and tapered, 3.5–4× longer than basal width.

Thorax dark brown in ground-colour, densely grey pruinescent. Scutum with pair of narrow, brown to grey vittae between setal rows. Postpronotal lobe, postalar ridge and margin of scutellum pale brown.

Legs slender; coxae yellow, remaining leg segments yellowish brown, slightly darker on apical tarsomeres (Fig. 188). Femora with white ventral pile. Fore femur with short dark setae. Fore tibia with several long anterodorsal and posterodorsal setae, 1.5× longer than width of tibia; anterior face with short appressed setae; posterior face with long, erect slender setae, similar to dorsal setae, longer apically; apex with long, ventral preapical setae. Fore tarsomere 1 swollen, subequal to width of apex of tibia; tarsomeres 1–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur with row of anteroventral and posteroventral setae, longer at base. Mid tibia with pair of anterodorsal and posterodorsal setae at base, longer than width of tibia; row of several strong ventral setae, slightly longer than width of tibia. Mid tarsomere 1 not swollen, otherwise similar to fore tarsus. Hind femur expanded apically, with slender anteroventral and posteroventral setae on proximal two-thirds, length near width of femur; straight sickle-shaped process on apical third, base arising obliquely from femur, variable in length; row of 6 or more strong posteroventral setae opposite sickle-shaped process, with apex strongly bent posteriorly; ventral swelling distal to process with short posteroventral lobe bearing appressed crown of setae; V-shaped appressed setal ridge distal to swelling; apex without preapical row of posterior setae; with strong preapical anterior and anterodorsal setae (Figs 189–191). Hind tibia usually narrowed and slightly twisted at base; distinct anteroventral tapered lobe with short, slender setae on basal quarter; tibia slightly arched to femur distal to lobe with row of thickened anteroventral setae; row of posteroventral setae divided into two parts proximal to lobe; small ridge of appressed preapical posteroventral setae opposite V-shaped ridge of setae on femur; anterodorsal and posterodorsal setae 2 times longer than width of tibia, longer distally (Figs 189–191). Hind tarsomere 1 slightly swollen, with similar long dorsal setae as on tibia, otherwise tarsus similar to fore tarsus.

Abdomen yellowish brown, with darker lateral margin and paler posterior margin; apical tergites darker; whitish pruinescence dorsally, with long, dark marginal setae on tergites and sternites. Tergite 7 with thicker cuticle posteromedially, posterior margin sculpted; sclerites of segment 8 fused laterally. Terminalia (Fig. 197): hypandrium and phallus yellowish brown; epandrium and cercus dark brown. Cercus short, pointed apically; dorsal margin straight; setae slender, shorter than width of cercus; base weakly fused to epandrial lamella. Subepandrial process extending on either side of phallus. Epandrial lamella narrow, linear, longer than height; posterior margin strongly upturned; bearing long setae ventrally, subequal to width of lamella. Hypandrium short, apical margin rounded, not prolonged laterally; without setae. Phallus with basal half expanded, gradually tapered, arched apically; internal endophallus strongly constricted beyond apex of hypandrium; apex emerging beyond cercus; apex narrow, with elongate opening; spiculate opposite epandrium; ejaculatory apodeme elongate, more than half-length of epandrium, T-shaped, with lateral apodemes on lower third.



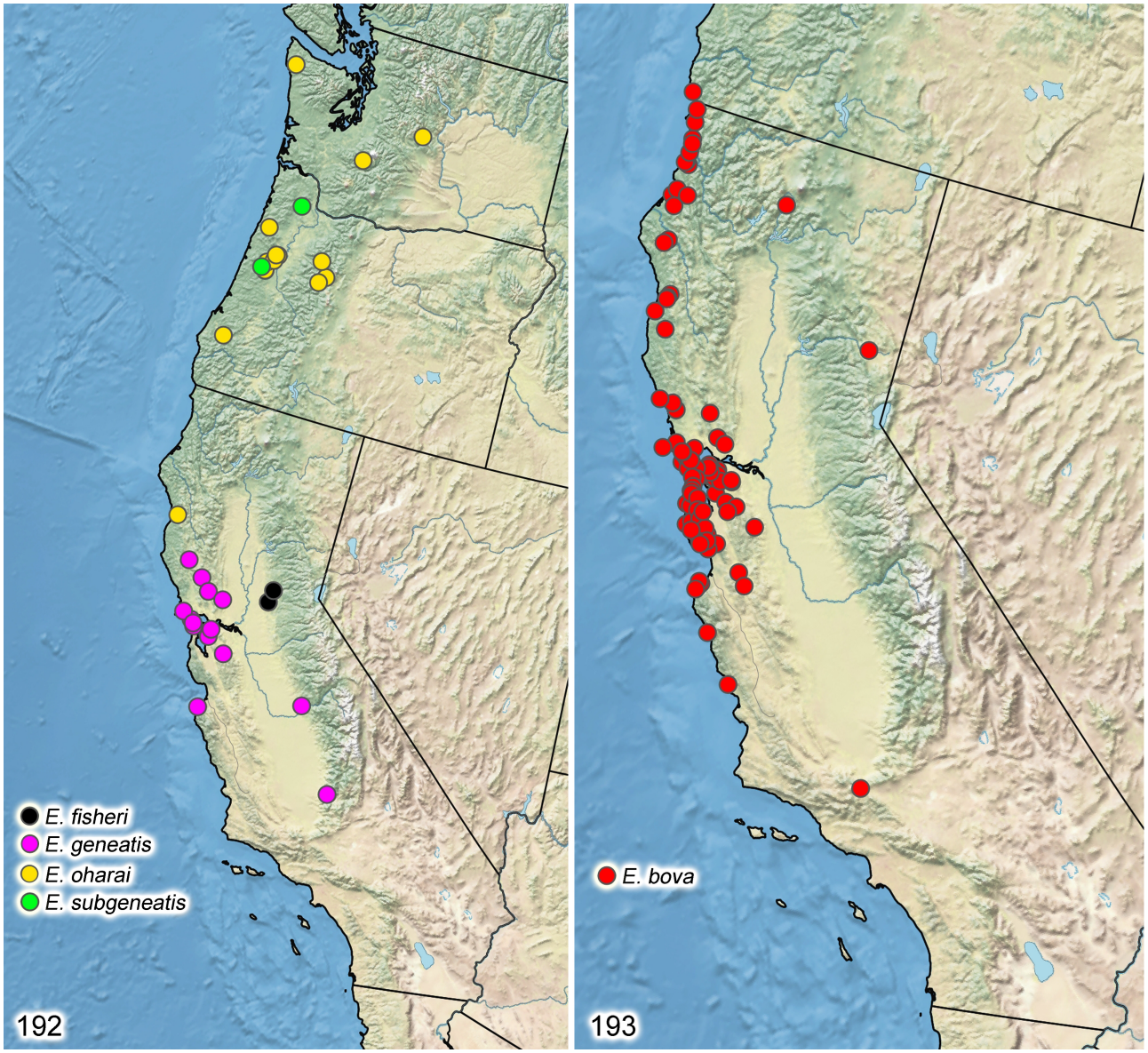
FIGURES 188–191. Male habitus and hindleg of *E.* (*Enoplempis*) *bova* **sp. nov. 188,** habitus, lateral view; **189,** hindleg (holotype), anterior view; **190,** hind femur tibia joint (holotype), anterior view; **191,** hind femur tibia joint (holotype), posterior view.

Female. Similar to male, except as follows: frons broader, nearly as wide as ocellar triangle; hindleg without modified setae and processes; abdomen dark brown, subshiny. Abdominal pleural membrane without expanded region.

Geographical distribution and seasonal occurrence (Fig. 193). *Empis* (*En.*) *bova* **sp. nov.** is known from southern Oregon and California. Adults have been collected from March to November.

Etymology. The species name is Latin for swollen leg in reference to the modified hind femur-tibia joint in this and many other *E.* (*Enoplempis*) species.

Nuptial gift presentation. A male paratype (listed above) was examined with an unwrapped Tipulidae fly prey item pinned with the specimen, while other males (listed above) were examined with unwrapped fly (Cecidomyiidae, Chironomidae, Sciaridae, Mycetophilidae, Hybotidae) prey items pinned below each specimen. This indicates that males of this species probably present unwrapped prey to females as nuptial gifts.



FIGURES 192–193. Known geographical distribution of the *E.* (*Enoplempis*) *geneatis* and *E.* (*Enoplempis*) *manca* species groups. **192,** *E.* (*En.*) *fisheri* **sp. nov.**, *E.* (*En.*) *geneatis* (Melander), *E.* (*En.*) *oharai* **sp. nov.** and *E.* (*En.*) *subgeneatis* **sp. nov.**; **193,** *E.* (*En.*) *bova* **sp. nov.**

Empis (*Enoplempis*) *manca* Coquillett

(Figs 194–196, 198, 208)

Empis manca Coquillett, 1895: 406. Type locality: Los Angeles Co., California (USA), by lectotype designation.
Empis manca: Melander, 1902: 320 (redescription).
Empis (*Enoplempis*) *manca*: Melander, 1928: 142 (assigned to subgenus *Enoplempis*).
Empis manca: Melander, 1965: 460 (catalogue); Yang *et al*., 2007: 136 (catalogue).

Type material examined. LECTOTYPE (here designated in order to fix identity of the species) ♂, labelled: "Mar."; "LosAngeles/ Co., CAL."; "Collection/ Coquillett"; "Type/ No. 3182/ U.S.N.M. [red label]"; "Empis/ manca/ Type. Coq. [handwritten by Coquillett]"; "LECTOTYPE/ *Empis manca* Coquillett/ des. Sinclair, Brooks &/ Cumming 2025 [red label]" (USNM). **PARALECTOTYPES: USA. California:** Same data as lectotype (7♀, USNM).



FIGURES 194–196. Male habitus and hindleg of *E.* (*Enoplempis*) *manca* Coquillett. **194,** habitus, lateral view; **195,** hind femur tibia joint, anterior view; **196,** hind femur tibia joint, posterior view.

Notes on type specimens. This species was based on five males and eight females, collected by Coquillett in March, with type numbers 3182 and 3183. Only one male syntype and seven female syntypes were identified, some with type no. 3182. No specimens with type number 3183 were found in USNM.

Additional material examined. USA. California: *Los Angeles County*: Los Angeles, Beverly Glen [34.10778°N 118.44472°W], 18.iv.[no year] (1♂, LACM). *Orange County*: Cleveland NF, Trabuco Cyn, Horsethief Tr., 634 m, 33°41.01′N 117°29.937′W, 5.iii.2010, K. Collins (1♂, CNC); Trabuco Cyn, Trabuco Ck Rd, at end of road,

33.683°N 117.504°W, 6.iv.2009, E09-11d, I.S. Winkler & K.C. Collins (1♂, CNC). *Riverside County*: Sta. Rosa Plateau, 33°31′11.16″N 117°18′52.05″W, 16.iii.2005, S.I. Frommer (1♂, UCRC); same data except, 12.iii.2008, 2200 ft, in garage (2♂, 1♀, UCRC); Snow Creek [33.8900°N 116.6841°W], 1500 ft, White Water, 7.iii.1955, W.R. Richards (1♂, 2♀, CNC); same data except, 22.iii.1955, W.R.M. Mason (3♂, 1♀, CNC); same data except, 29.iii.1955 (1♂, CNC); Riverside County, T85, R1W, S20, 22.iv.1980, R.G. Little (2♂, UCRC). *San Bernardino County*: Lytle Ck, Lone Pine Cyn Rd, 34°18′ 49″N 117°29′49″W, 1016 m, 25–27.iii.2015, MT in live oak for., M.E. Irwin (2♂, CNC). *San Diego County*: San Diego [32°42′N 117°09′W], R.W. Doane (2♂, USNM); same data except, 6.iv.1915, M.C. Van Duzee (1♀, USNM); San Diego, La Jolla [32°50′N 117°16′W], 28.iii.1946, ALM. *Santa Barbara County*: Cañada del Medio, Santa Cruz Island [34°00′N 119°43′W], D.S. Horning, Jr (1♂, UCDC); same data except, 11.iii.1971, R.O. Schuster (1♂, UCDC).

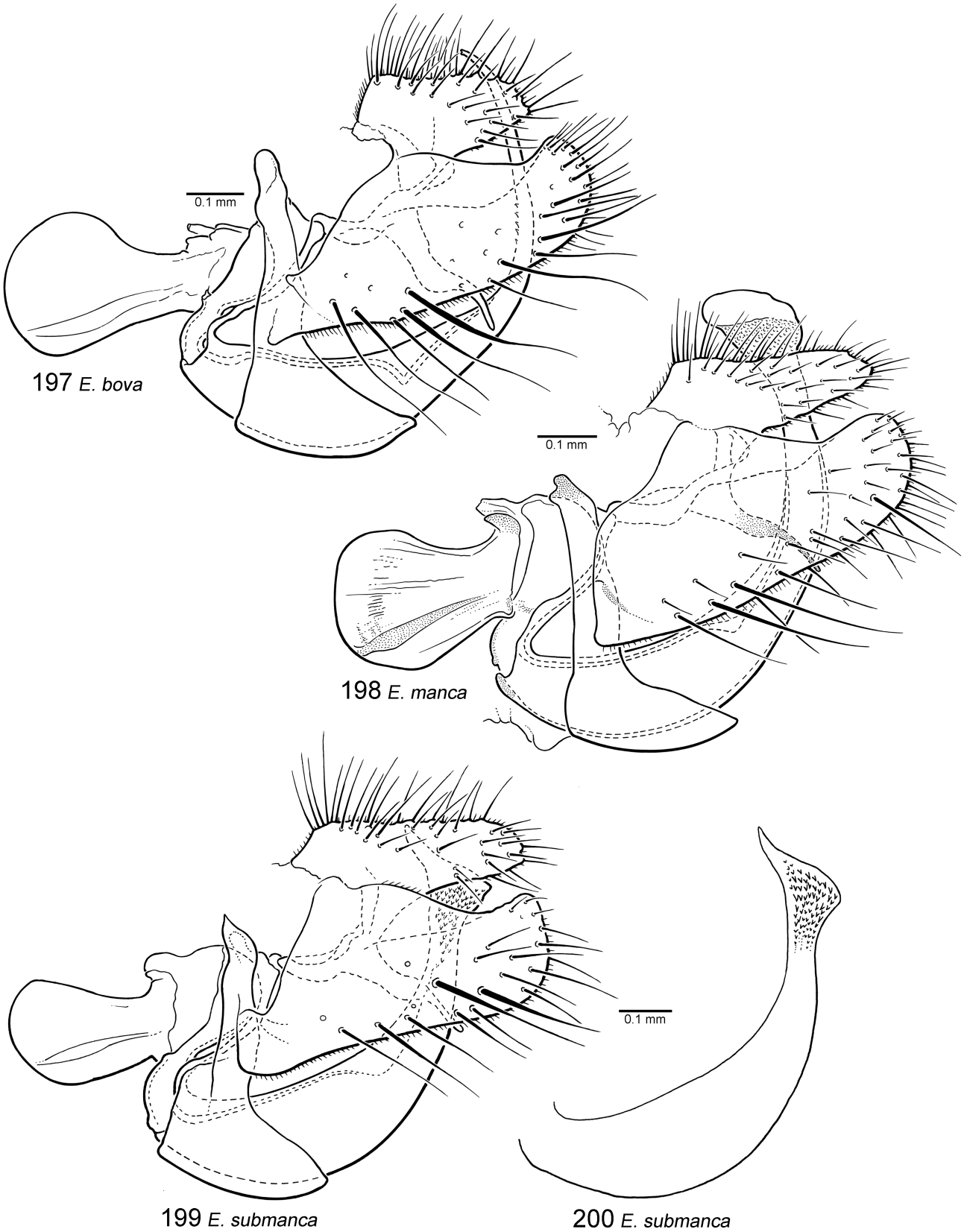
Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *manca* species group by the yellow legs, male hind femur with row of strong anteroventral setae proximal to sickle-shaped process, and male hind tibia with distinct anteroventral lobe with tuft of apical setae on basal quarter (Figs 194–196).

Redescription. Wing length 5.0–5.5 mm. **Male.** Head dark in ground-colour, with greyish pruinescence. Dichoptic, upper ommatidia not enlarged. Frons divergent towards antennae; nearly closely approximated, narrower than width of anterior ocellus; with short setulae along inner margin of eye. Face without setae; slightly divergent towards mouthparts, with oral margin dark and shiny. Ocellar triangle elevated, with thin greyish pruinescence; pair of slightly divergent ocellar setae, slightly longer than vertical setae and several pairs of short setulae. Occiput bearing single row of setae, similar in size to vertical setae, longer and finer ventrally; postocular setae similar to occipital setae, with two upper or vertical setae; postocellar region without setae. Stylus and pedicel brown; postpedicel and stylus darker brown; scape 2× longer than pedicel, with short, black setae; pedicel with ring of apical setae; postpedicel long and tapered, 4× longer than basal width; stylus 1.5× longer than basal width of postpedicel. Palpus pale yellowish-brown, with dark setulae. Proboscis reddish brown, less than twice head height; labellum with short, dark setae.

Thorax dark brown in ground-colour, densely grey pruinescent. Scutum with pair of narrow, brown vittae between setal rows; outer pair of vittae broader. Pleura dark, with grey pruinescence; postpronotal lobe, postalar ridge and margin of scutellum pale brown. Proepisternum with pale setae on lower section; upper proepisternum in front of spiracle without setae. Prosternum bare. Antepronotum with 2 pairs of slender setae. Postpronotum with 1 long seta and several short, dark setae. Scutum with short, fine uniserial acr; dc slightly longer, stronger than acr, prescutellar dc long, strong; 2 posterior npl, with 1–2 short anterior setae; 1 presut spal; 1 psut spal; 1 pal. Scutellum with 1 pair of long sctl, with outer marginal setae, half length of apical pair; disc bare. Laterotergite with patch of strong, dark setae. Anterior and posterior spiracles pale.

Legs short, stocky; yellow including coxae, slightly darker on apical tarsomeres; coxae often with thin greyish pruinescence (Fig. 194). Coxae with stiff, black setae. Hind trochanter with long setae. Femora with white ventral pile. Fore femur with short dark setae. Fore tibia with several long anterodorsal and posterodorsal setae, slightly longer than width of tibia; anterior face with short appressed setae; apex with long posterior and ventral preapical setae. Fore tarsomere 1 slender; tarsomeres 1–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur with row of anteroventral setae, shorter than femur width. Mid tibia with 3–4 anteroventral and posteroventral setae, longer than width of tibia; 3–4 short anterodorsal and posterodorsal setae, similar to ventral setae. Mid tarsus similar to fore tarsus. Hind femur with short, strongly arched, anteroventral sickle-shaped process; row of strong anteroventral setae proximal to sickle-shaped process; anteroventral ridge distal to process with inner flattened ventral surface with several flattened obliquely directed setae; row of strong posteroventral setae opposite sickle-shaped process; small semi-circular preapical posteroventral ridge with appressed crown of setae; apex without preapical row of posterior setae; with strong preapical anterior and anterodorsal setae (Figs 195, 196). Hind tibia greatly narrowed and slightly twisted at base; distinct anteroventral lobe with tuft of apical setae on basal quarter; row of strong anteroventral and posteroventral setae proximal to lobe, posteroventral setae longer; small cluster of appressed preapical posteroventral setae opposite semi-circular ridge of setae on femur; seta in posteroapical comb; anterodorsal and posterodorsal setae slightly longer than width of tibia (Figs 194–196). Hind tarsus similar to fore tarsus.

Wing faintly infuscate with dark veins with base of wing yellowish; all veins complete (except Sc), well sclerotized. Basal costal seta present. R_5 and M_1 parallel near wing margin; R_5 ending posterior to wing tip; radial fork broad. Halter yellow, often with row of dark setulae along dorsal margin near base of knob.



FIGURES 197–200. Male terminalia of the *E*. (*Enoplempis*) *manca* species group, lateral view. **197,** *E*. (*En*.) *bova* **sp. nov.**; **198,** *E*. (*En*.) *manca* Coquillett; **199,** *E*. (*En*.) *submanca* **sp. nov.**; **200,** same, phallus.

Abdomen yellowish brown, with paler posterior margin; whitish pruinescence dorsally, with long, dark marginal setae; posterior margin of tergites pruinescent; sternites with short setae. Pregenital segments unmodified, except sclerites of segment 8 weakly fused anterolaterally. Terminalia (Fig. 198): yellowish brown. Cercus slender, pointed apically; dorsal margin straight; setae slender, shorter than width of cercus; base weakly fused to epandrial lamella. Subepandrial process extending on either side of phallus. Epandrial lamella narrow, linear, longer than height; posterior margin strongly upturned; bearing long setae ventrally, subequal to width of lamella. Hypandrium short, apical margin rounded, not prolonged laterally; without setae. Phallus with basal third expanded, tapered, gently arched anteriorly; apex emerging beyond cercus; apex expanded with broad opening; roughened, spiculate apically; ejaculatory apodeme elongate, half-length of epandrium, T-shaped, with lateral apodemes on lower third.

Female. Similar to male, except as follows: frons broader, nearly as wide as ocellar triangle; hindleg without modified setae and processes; abdomen darker, subshiny; pleural membrane condition unknown.

Geographical distribution and seasonal occurrence (Fig. 208). *Empis* (*En.*) *manca* is known from southern California, including Santa Cruz Island in Santa Barbara County. Adults have been collected in March and April.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *submanca* sp. nov.

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(Figs 199–204, 208)

Type material. HOLOTYPE ♂, labelled: "USA: CA: Tulare Co./ Ash Mtn. Power Stn. 3 [36°29′N, 118°50′W] 3/ 8.iv.1993"; "CNC/ 1078373"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *submanca* Sinclair,/ Brooks & Cumming [red label]" (CNC). **PARATYPES: USA. California:** *El Dorado County*: El Dorado Hills, New York Creek, 680 ft, 38°41′43″N 121°04′38″W, 17.iii.2004, S.D. Gaimari (7♂, 2♀, CSCA); same data except, P.H. Kerr (1♂, CSCA). *Kern County*: Havilah [35°31′04″N 118°31′07″W], 3000 ft, 28.iv.1964, JAP (1♂, EMEC); same data except, 2 mi. NE, 3900 ft, C.A. Toschi (1♂, EMEC); Miracle Springs [35°34′N 118°32′W], 29.iv.1964, C.A. Toschi (1♂, EMEC); 8 mi. W Wolford Hts. [35°42′N 118°27′W], 28.iv.1964, *Coreopsis bigelovii*, P. Rude (1♂, EMEC). *Mendocino County*: NCCRP, 3 mi. N Branscomb [39°42′N 123°39′W], 5–6.v.1989, MT, S. O'Keefe (1♂, EMEC). *Stanislaus County*: Del Puerto Cyn, 1200 ft, Frank Raines Pk [37°25′N 121°22′W], 9.iv.1971, P. Loggins (1♂, EMEC). *Tulare County*: Same data as holotype (1♂, 1♀, CNC); same data as holotype except, Ash Mtn Kwh Power Sta. 3, 23.iii.1993, J.F. MacDonald (1♀, CNC); same data except, 11.iv.1993 (1♂, CNC); same data except, 27.iv.1985 (3♂, 3♀, CNC); Ash Mt. HQ [36°29′N 118°49′W], 1700 ft, 27.iv.1979, R. Coville (2♂, EMEC); same data except, 28.iv.1979, JAP (1♂, EMEC); same data except, 30.iv.1979, J.T. Doyen (1♂, EMEC); same data except, 1–2.v.1979, J.A. Chemsak (1♂, 1♀, EMEC); 0.5 mi. SE Ash Mtn Seq. NP HQ, 7.iv.1984, R.D. Haines, flume debris trap (2♂, 4♀, CSCA); same data except, 4.ii.1984 (1♀, CSCA); same data except, 25.iv.1984 (1♂, 2♀, CSCA); same data except, 3.v.1984 (2♂, 1♀, CSCA); Coffee Camp [36.1524°N 118.7464°W], 1.v.1979, J.T. Doyen, beating *Quercus wislizenii* (1♂, 1♀, EMEC); Kern River, Campgrd No. 3, 2900 ft, 11.v.1971, PHA & M. Arnaud (1♂, USNM).

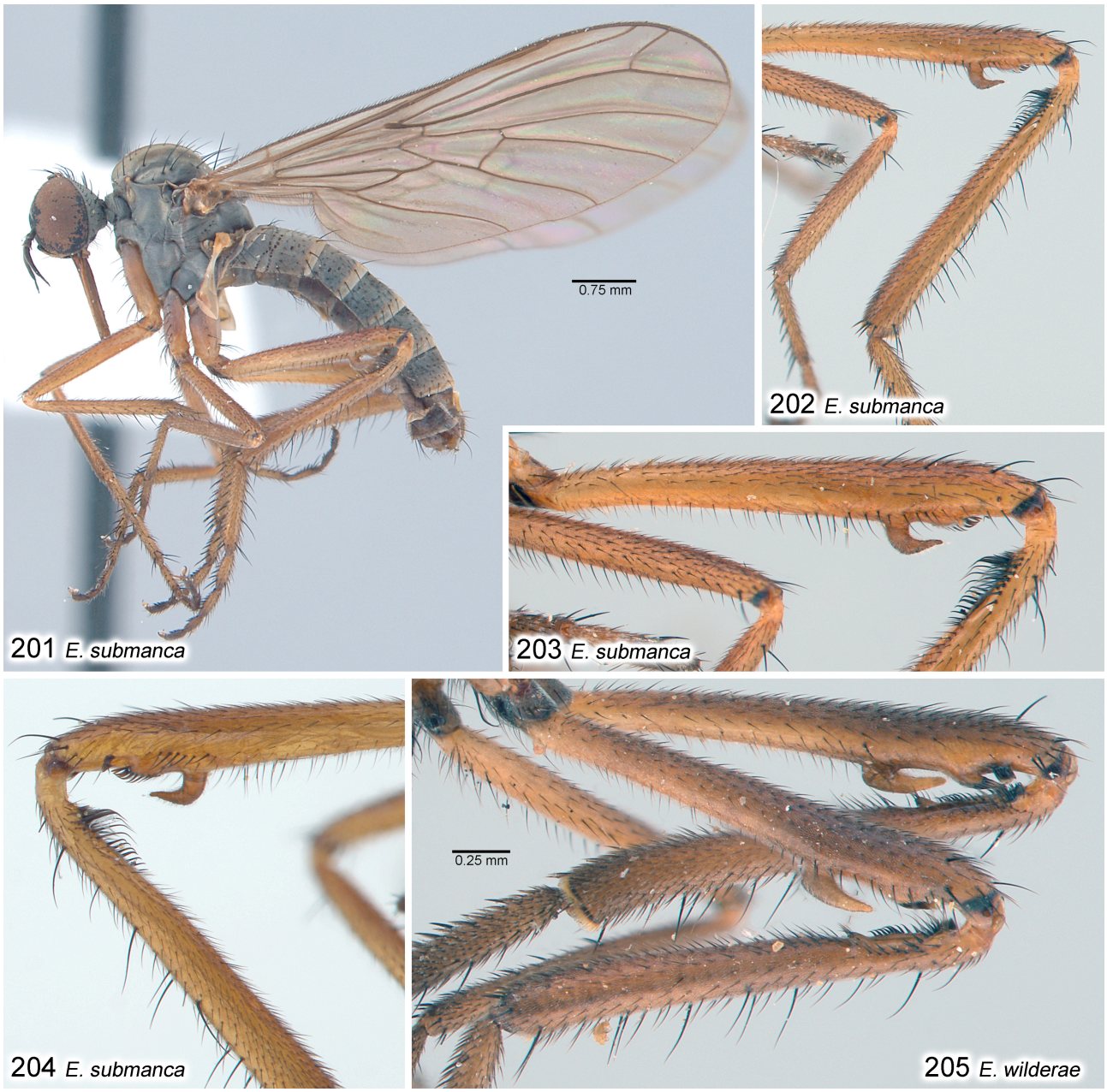
Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *manca* species group by the male hind femur with row of strong posteroventral setae opposite sickle-shaped process (Fig. 204), sickle-shaped process greatly tapered and narrowly prolonged apically, male hind tibia with low, short anteroventral lobe on basal quarter, and phallus with short, subapical projection.

Description. Wing length 5.6–6.8 mm. **Male.** Similar to *E.* (*En.*) *manca*, except as follows: head with postpedicel long and tapered, 4.25× longer than basal width.

Thorax with postpronotal lobe and postalar ridge pale brown. Scutum with dc longer, stronger than acr, increasing in length posteriorly with prescutellar dc long, strong. Scutellum with 1 pair of long sctl, with outer marginal setae, more than half length of apical pair; sometimes pair of setulae between apical pair.

Legs short, stocky; yellow to yellowish brown, including coxae, slightly darker on apical tarsomeres; coxae often with thin greyish pruinescence (Fig. 201). Hind femur with strongly arched, anteroventral sickle-shaped process, drawn out and narrowly prolonged apically; row of slender anteroventral setae proximal to sickle-shaped process; short knob-like process distal to process; row of strong posterior setae opposite sickle-shaped process; short posteroventral ridge distal to sickle-shaped process bearing row of strong, arched setae, appressed distally; small semi-circular preapical posteroventral ridge with appressed crown of setae; apex without preapical row of

posterior setae; with strong preapical anterior and anterodorsal setae (Figs 202–204). Hind tibia slightly twisted at base, not greatly narrowed; low, short anteroventral lobe with tuft of apical setae on basal quarter; row of strong anteroventral and posteroventral setae proximal to lobe, posteroventral setae longer proximally; posteroventral row curved medially to link with anteroventral row; seta in posteroapical comb; anterodorsal and posterodorsal setae slightly longer than width of tibia (Figs 201–204).



FIGURES 201–205. Male habitus and hindleg of the *E.* (*Enoplempis*) *manca* species group. **201,** *E.* (*En.*) *submanca* **sp. nov.**, habitus, lateral view; **202,** same, hindleg, anterior view; **203,** same, hind femur tibia joint, anterior view; **204,** same, hind femur tibia joint, posterior view; **205,** *E.* (*En.*) *wilderae* **sp. nov.**, hindleg (holotype), anterior and posterior views.

Terminalia (Figs 199, 200): yellowish brown. Cercus slender, rounded apically; dorsal margin straight; setae slender, shorter than width of cercus; base weakly fused to epandrial lamella. Subepandrial process extending on either side of phallus. Epandrial lamella narrow, linear, longer than height; posterior margin strongly upturned; bearing long setae ventrally, subequal to width of lamella, including 1–2 stronger setae. Hypandrium short, apical margin rounded, not prolonged laterally; without setae. Phallus (Fig. 200) with basal third expanded, tapered, gently arched anteriorly; apex emerging beyond cercus; apex expanded with broad opening, with short subapical

projection; roughened, spiculate apically; ejaculatory apodeme elongate, half-length of epandrium, T-shaped, with lateral apodemes on lower third.

Female. Similar to female of *E. manca*.

Geographical distribution and seasonal occurrence (Fig. 208). *Empis* (*En.*) *submanca* **sp. nov.** is known from northern and central California. Adults have been collected from February to May.

Etymology. The species name is in reference to the similarity of this species with *E. manca*.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *wilderae* sp. nov.

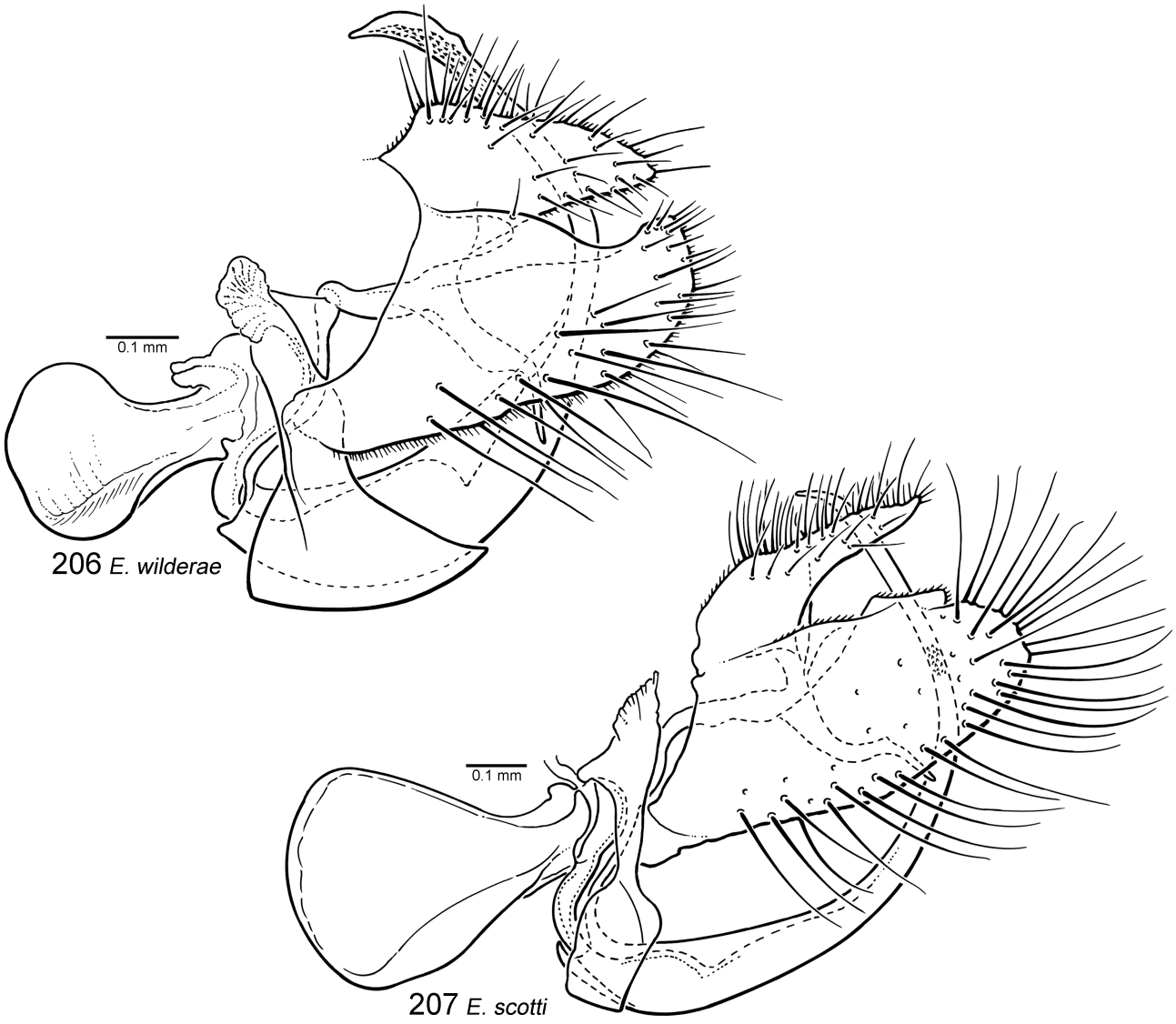
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(Figs 205, 206, 208)

Type material. HOLOTYPE ♂, labelled: "U.S.A.: CALIFORNIA:/ StanislausCo. Frank/ Raines Park [37.420°N 121.372°W], Del Pue-/ rto Cyn. 11-IV-1978/ D.D. Wilder collector"; "D. Dee Wilder/ Collection" [yellow label]; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *wilderae* Sinclair,/ Brooks & Cumming [red label]" (CAS). **PARATYPES: USA. California:** *Alameda County*: small creek at county line and Mines Rd [37°28′N 121°31′W], 11.iv.1978, DDW (1♂, CAS). *Stanislaus County*: same data as holotype (1♂, 1♀, mounted as pair *in copula*, CAS; 1♂, 1♀, mounted as pair with Cecidomyiidae prey, CAS; 1♂, 7♀, CAS); same data as holotype except, 1120 ft, 3.iv.1970, PHA, insect flight trap (3♂, 5♀, CAS); Frank Raines Pk, Del Puerto Cyn, 18 mi. W Patterson, 2.iv.1973 (1♂, UCDC), same data except, 7.iv.1973, J.C. Miller (1♀, UCDC); same data except, 10.iv.1971, R.W. Thorp (2♂, UCDC); same data except, 13.iv.1985, S.M. Normington (2♂, UCDC); Del Puerto Cyn at N Fork Del Puerto Ck [37.4386°N 121.3369°W], 900–1200 ft, 17.iv.1982, M. Hochberg (2♂, EMEC).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *manca* species group by male hind femur lacking strong anteroventral and posteroventral rows of setae proximal to and opposite to sickle-shaped process, and male hind tibia with distinct anteroventral lobe with tuft of apical setae on basal quarter and oblique row of thickened setae across ventrum at base (Fig. 205), and phallus with tapered apex.

Description. Wing length 5.0–6.2 mm. **Male.** Similar to *E.* (*En.*) *manca*, except as follows: thorax dark brown in ground-colour, densely bluish to grey pruinescent. Scutum with pair of narrow, black, or brown vittae between setal rows; outer pair of vittae weak or absent. Pleura dark, with blue or grey pruinescence; postpronotal lobe pale brownish or apex shiny yellow; postalar ridge pale brownish. Proepisternum with dark setae on lower section. Scutum with short, fine uniserial acr; dc well developed, increasing in length posteriorly; 2 long posterior npl, with 1–2 short anterior setae; 1 presut spal; 1 psut spal; 1 pal. Scutellum with 1 pair of long sctl, with 1–2 outer marginal setae, shorter than apical pair.

Legs short, stocky; yellowish brown, slightly darker on apical tarsomeres; coxae with greyish pruinescence. Femora with white ventral pile. Fore femur with short dark setae. Fore tibia with several long anterodorsal and posterodorsal setae, 1–2 posterior setae, slightly longer than width of tibia; anterior face with short appressed setae; apex with long posterior and ventral preapical setae. Mid femur with row of anteroventral and posteroventral setae, shorter than femur width. Mid tibia with 3–4 anteroventral and posteroventral setae, shorter than width of tibia; 3–4 anterodorsal and posterodorsal setae, longer than ventral setae. Hind femur with strongly arched, tapered anteroventral sickle-shaped process; without row of anteroventral setae proximal to sickle-shaped process; broad anteroventral swelling distal to process without setae; without row of strong posteroventral setae opposite sickle-shaped process; subapical posteroventral swelling with comb of appressed setae tapered to point, directed posteriorly; small semi-circular preapical posteroventral ridge with appressed crown of setae posterior to subapical swelling; apex without preapical row of posterior setae; with strong preapical anterior, posterior and anterodorsal setae (Fig. 205). Hind tibia not greatly narrowed and slightly twisted at base; distinct anteroventral lobe with tuft of apical setae on basal quarter; row of strong anteroventral and posteroventral setae proximal to lobe, posteroventral setae longer; rows joined ventrally by oblique row of strong setae; cluster of appressed preapical posteroventral setae opposite semi-circular ridge of setae on femur; 4–5 anterodorsal and posterodorsal setae slightly longer than width of tibia (Fig. 205). Hind tarsomere 1 slightly swollen, with stout ventral setae.



FIGURES 206–207. Male terminalia of the *E*. (*Enoplempis*) *manca* and *teres* species groups, lateral view. **206,** *E*. (*En*.) *wilderae* **sp. nov.**; **207,** *E*. (*En*.) *scotti* **sp. nov.**

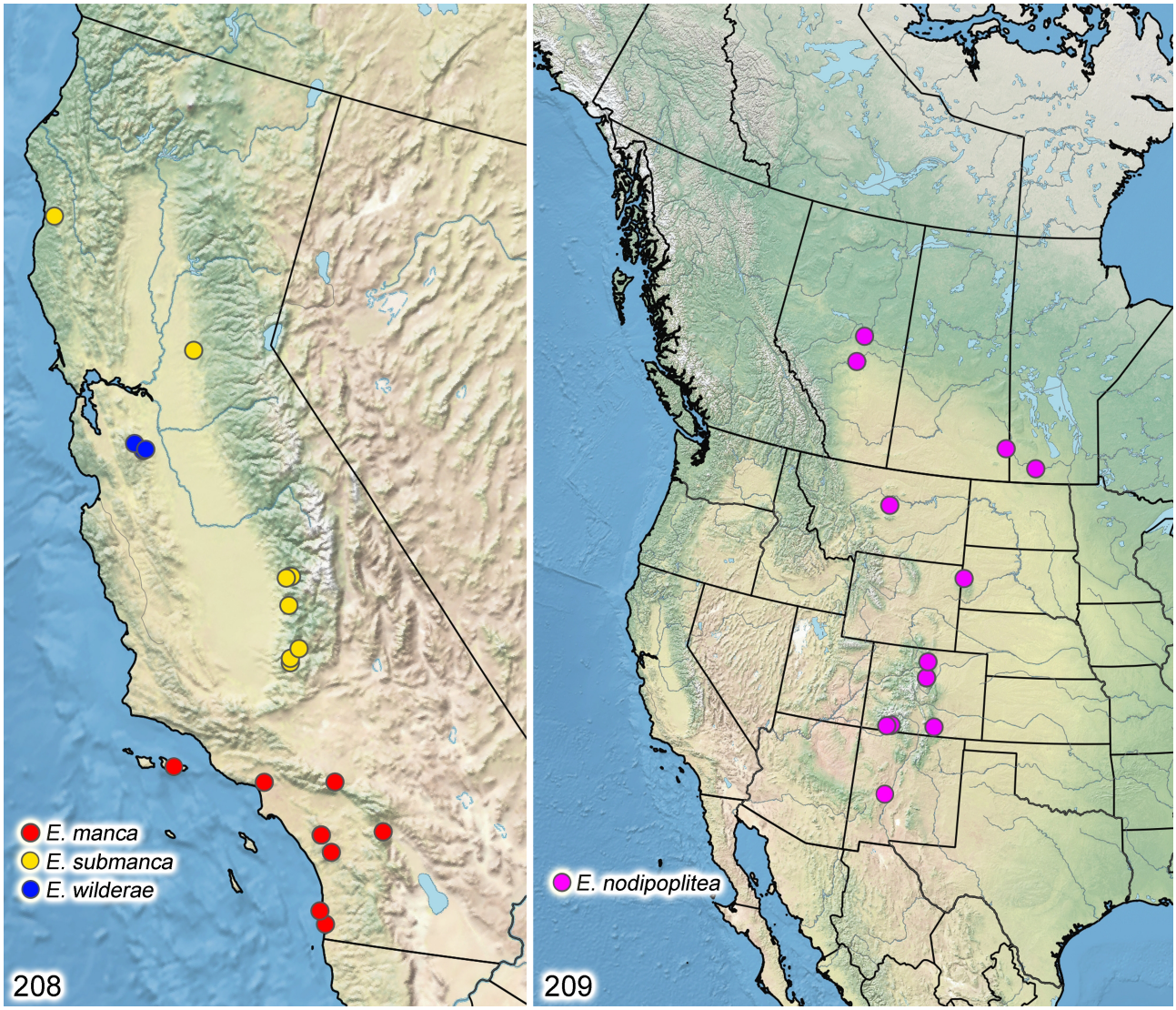
Terminalia (Fig. 206): similar colour to abdomen, hypandrium yellowish brown. Cercus slender, pointed apically; dorsal margin straight; setae slender, shorter than width of cercus; base narrowly fused to epandrial lamella. Subepandrial process extending on either side of phallus. Epandrial lamella narrow, linear, longer than height; posterior margin strongly upturned; bearing long setae ventrally, subequal to width of lamella. Hypandrium short, apical margin rounded, not prolonged laterally; without setae. Phallus with basal half expanded, tapered, gently arched anteriorly; apex emerging beyond cercus; apex narrow, pointed; roughened, spiculate apically; ejaculatory apodeme elongate, more than half-length of epandrium, Y-shaped, with lateral apodemes on lower fourth.

Female. Similar to male, except as follows: frons broader, nearly as wide as ocellar triangle; scutum with vittae brownish, with outer broad vittae clearly visible; hindleg without modified setae and processes; abdomen darker, subshiny; pleural membrane condition unknown.

Geographical distribution and seasonal occurrence (Fig. 208). *Empis* (*En.*) *wilderae* **sp. nov.** has been collected in April from central California.

Etymology. The species is named after the collector of the holotype, D. Dee Wilder.

Nuptial gift presentation. Among the material examined was a probable mating pair of specimens, mounted on the same pin, which also included an unwrapped prey item (Cecidomyiidae). This almost certainly indicates that males of this species present unwrapped prey to females as nuptial gifts.



FIGURES 208–209. Known geographical distribution of the *E*. (*Enoplempis*) *manca* and *E*. (*Enoplempis*) *nodipoplitea* species groups. **208,** *E*. (*En*.) *manca* Melander, *E*. (*En*.) *submanca* **sp. nov.** and *E*. (*En*.) *wilderae* **sp. nov.**; **209,** *E*. (*En*.) *nodipoplitea* Steyskal.

Empis (*Enoplempis*) *mira* species group

(Figs 210–217)

Five species are included in this group, *E*. (*En*.) *macdonaldi* Sinclair, Brooks & Cumming, *E*. (*En*.) *mira* (Bigot), *E*. (*En*.) *submira* Sinclair, Brooks & Cumming, *E*. (*En*.) *williamturneri* Sinclair, Brooks & Cumming and *E*. (*En*.) *winkleri* Sinclair, Brooks & Cumming), which are distinguished by the directionally asymmetrical male hind femur and tibia, geniculate female hindleg, male terminalia with pair of subepandrial processes and tarsomeres without prominent spine-like ventral setae. See Sinclair *et al*. (2021) for revision of the *E. mira* species group, although these species (Figs 210–217) are included in the identification key to males of western *Empis* (*Enoplempis*) below. The mating behaviour and form of nuptial gift presentation exhibited by this species group is currently unknown.

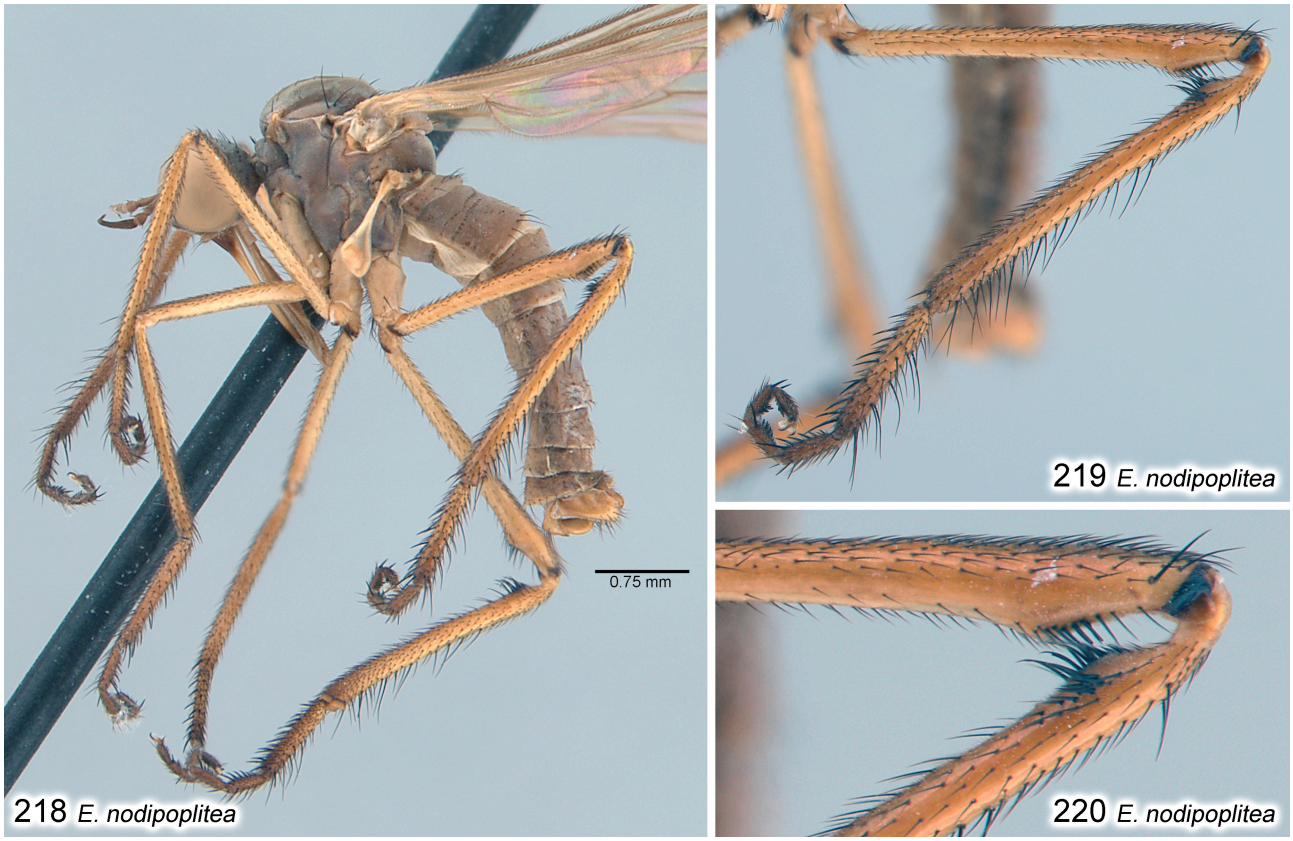


FIGURES 210–217. Male hindlegs of the *E.* (*Enoplempis*) *mira* species group. **210,** *E.* (*En.*) *mira* (Bigot), left hind femur tibia joint, anterior view; **211,** same, right hind femur tibia joint, anterior view; **212,** same, right hind femur tibia joint, posterior view; **213,** *E.* (*En.*) *williamturneri* Sinclair, Brooks & Cumming, right hind femur tibia joint, posterior view; **214,** *E.* (*En.*) *submira* Sinclair, Brooks & Cumming, right hind femur tibia joint (holotype), anterior view; **215,** *E.* (*En.*) *macdonaldi* Sinclair, Brooks & Cumming, midleg (holotype), posterior view; **216,** same, right hind femur tibia joint (holotype), anterior view; **217,** *E.* (*En.*) *winkleri* Sinclair, Brooks & Cumming, right hind femur tibia joint, anterior view.

Empis (*Enoplempis*) *nodipoplitea* species group

(Figs 209, 218–220)

This group was defined by Sinclair *et al*. (2013) on the basis of male hindleg chaetotaxy (rows of setae at base of hind tibia, Fig. 220), absence of a subepandrial process, hypoproct with inner setae, and male hind femur without row of posterior preapical setae. In addition to the nominal species, this group includes the eastern Nearctic species *E. ctenocnema* Melander and *E. pectinata* Sinclair (Appendix 2). On the basis of male terminalia (absence of subepandrial process, hypoproct setose, cercus elongate and medially narrowed), this group is closely related to the *E. canaster* species group.



FIGURES 218–220. Male habitus and hindleg of *E.* (*Enoplempis*) *nodipoplitea* Steyskal. **218,** habitus, lateral view; **219,** hindleg, anterior view; **220,** hind femur tibia joint, anterior view.

Empis (*Enoplempis*) *nodipoplitea* Steyskal

(Figs 209, 218–220)

Empis nodipes Melander, 1902: 324. Type locality: Magdalena, New Mexico, USA. [Junior primary homonym of *Empis nodipes* Fallén, 1816].
Empis nodipes: Melander, 1928: 166 (checklist).
Empis nodipoplitea Steyskal (in Melander, 1965: 460), nom. nov. for *nodipes*.
Empis nodipoplitea: Yang *et al*., 2007: 137 (catalogue).
Empis (*Enoplempis*) *nodipoplitea*: Sinclair *et al*., 2013: 428 (revision).

Type material examined. HOLOTYPE ♂, labelled: "Magdalena,/ New Mexico."; "W.M. Wheeler/ Collection."; "TYPE/ No./ A.M.N.H. [red label]"; "Am. Mus. Nat. Hist./ Dept. Invert. Zool./ No. 966"; "HOLOTYPE ♂/ nodipes Melander/ (= nodipoplitea/ Steyskal)/ teste WJ Turner '82 [red label]" [missing abdomen] (AMNH).

Additional material examined. CANADA. Alberta: Athabasca [54°43′N 113°17′W], 30.v.1961, A.R. Brooks (1♂, CNC); Edmonton [53°32′N 113°29′W], Univ. of Alberta Ecol. Res., 5–12.vi.1986, MT, spruce/ aspen forest, B.V. Brown (1♂, 1♀, CNC); N of Rocanville, Qu'Appelle R, 454 m, 50°30′30″N 101°44′30″W, 2.vi.2007, prairie, Goulet, Boudreault & Fernandez (2♂, CNC). **Manitoba:** Assiniboine & Souris River Forks [49.6657°N 99.5669°W], 9.vi.1993 (1♀, CNC); same data except, 16.vi.1993 (1♂, CNC). **USA. Colorado:** *Archuleta County*: Elk Ck, 7109 ft, 37°16′21″N 107°20′11″W, 17.vi.2017, S.H. Cumming (1♀, CNC); Horse Ck, 7447 ft, 37°17′52″N 107°19′57″W, 17.vi.2017, S.E. Brooks (1♂, CNC). *Clear Creek County*: Echo Lk. [39.6598°N 105.6046°W], 12000 ft, 15.viii.1949, R.R. Dreisbach, R.K. Schwab (1♂, CNC); Mt. Evans, Doolittle Ranch [39°40′N 105°36′W], 9800 ft, 23.vii.1961, B.H. Poole (1♂, CNC). *Huerfano County*: Mt. Shadow Falls Ranch, end 312 Rd, N Santa Clara Ck area [37.4305°N 104.8537°W], 6.vi.2007, B. Kondratieff, J. Owens (1♂, CSUC). *La Plata County*: Granite Peaks, Bayfield [37°14′N 107°35′W], Camp, 9000 ft, vii.1928, J. Bequaert (1♂, AMNH). *Larimer County*: Rocky Mtn Pk [40.4041°N 105.6208°W], 29.vi.1959, F.C. Harmston (1♂, USNM). **Montana:** *Fergus County*: Moulton

[47.3464°N 109.3543°W], 22.vi.1957, S. Van Horn (1♂, MTEC). **South Dakota:** *Lawrence County*: Spearfish Ck [44.4101°N 103.8942°W], 14.vi.1969, W.W. Wirth (1♂, USNM).

New eastern records. CANADA. Quebec: King Mountain [45.4898°N 75.8654°W], Gatineau Park, 17.v.1985, T. Saigusa (1♂, KUMF).

Description. Figs 218–220. See Sinclair *et al*. (2013).

Geographical distribution and seasonal occurrence (Fig. 209). In addition to the eastern records listed and plotted in Sinclair *et al*. (2013, fig. 14A), this species occurs in Manitoba, Alberta, South Dakota, Montana, Colorado and New Mexico. Adults have been collected from May to August in the western part of its range.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *teres* species group

(Figs 221–238)

Four species are included in this group, *E.* (*En.*) *scotti* **sp. nov.**, *E.* (*En.*) *scutica* **sp. nov.**, *E.* (*En.*) *teres* Melander, and *E.* (*En.*) *undulasetosa* **sp. nov.**, which are distinguished by the preapical rounded lobe (*e.g.*, Figs 222, 231), often with tuft of whip-like setae on the male hind femur, cluster of posteroventral setae distal to preapical swelling on the male hind femur (*e.g.*, Fig. 229), male hind tibia often with row of 2–3 short, tufted lobes and basal posteroventral lobe usually bifid (*e.g.*, Figs 229, 230), male hind femur without posterior preapical row of setae (*e.g.*, Fig. 229), male terminalia with subepandrial process present, cercus apically tapered, hypandrium short and truncate, and phallus long, slender and arched (Figs 233–236).

Empis (*Enoplempis*) *scotti* sp. nov.

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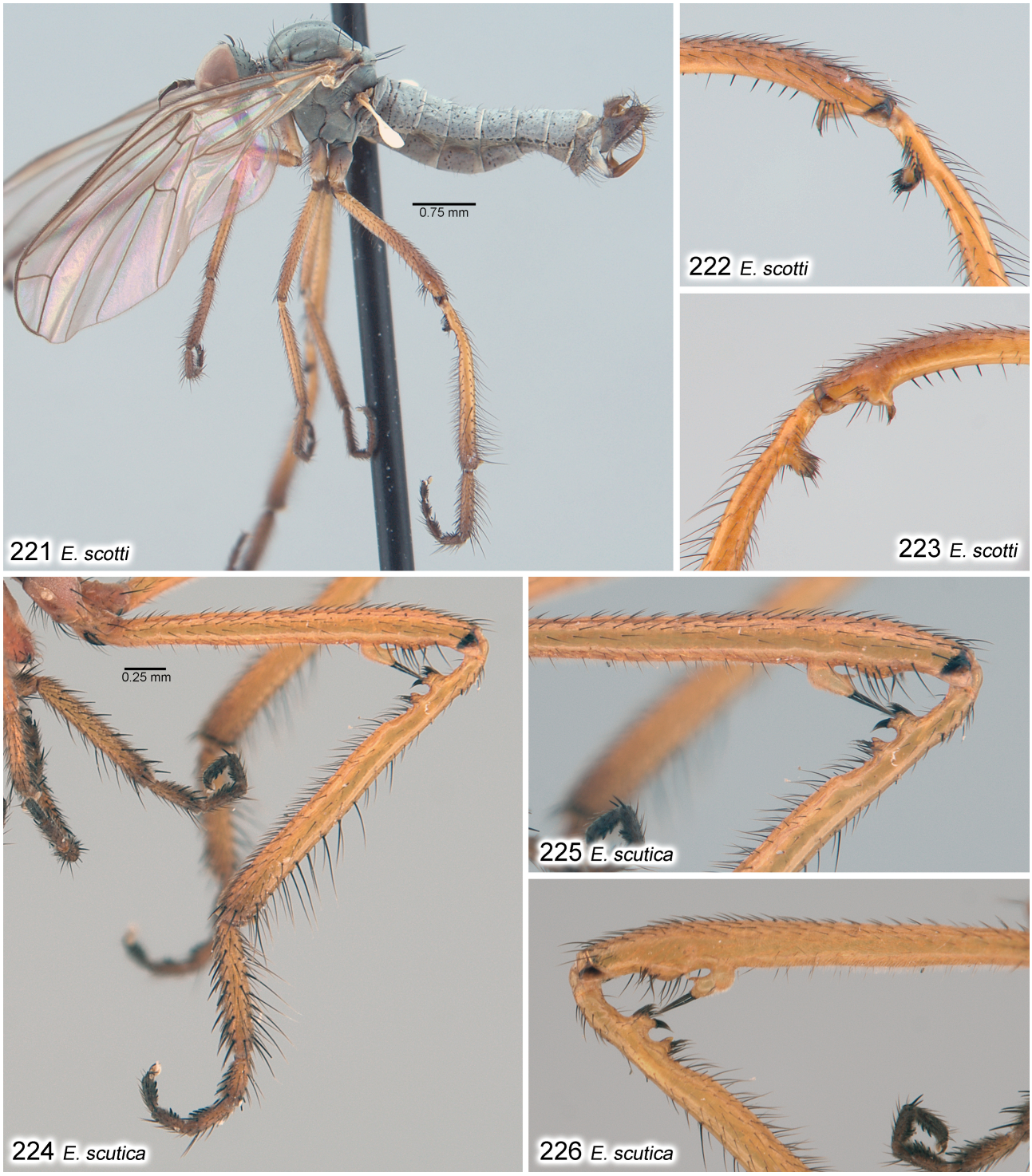
(Figs 207, 221–223, 237)

Type material. HOLOTYPE ♂ (Figs 221–223), labelled: "USA: OR: Benton Co., Corvallis,/ Lewisburg Saddle, below Old/ Growth Trail, 44°38′32.28″N/ 123°17′20.76″W, Malaise trap,/ over creek, 23.iv–6.v.2013, S. Fitzgerald, CNC350416"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *scotti* Sinclair,/ Brooks & Cumming [red label]" (CNC). **PARATYPES: USA. California:** *Humboldt County*: 2 mi. W Briceland [40°06′N 123°54′W], 21.v.1976, R. Dietz, J. Hafernik (1♂, EMEC). *Mendocino County*: Calif. Coast Range Pres., 5 mi. N Branscomb [39°42′N 123°39′W], 26.v.1976, JAP (1♂, EMEC); same data except, E. Rogers (1♂, EMEC); NCCRP, 3 mi. N Branscomb, 1400 ft, 17.v.1975, JAP (1♂, EMEC); same data except, 5–6.v.1989, MT, S. O'Keefe (1♂, EMEC). **Oregon:** *Benton County*: Corvallis, 3430 NW Deer Run St., 44°36′6″N 123°18′51″W, 20.iv–6.vi.2018, MT, SJF (1♂, 3♀, CNC); McDonald Forest, Oak Creek, 44.605623°N 123.332986°W, 20.v.2014, hillside woods and seep, SJF (1♂, CNC); Rock Ck, 5 mi. W Philomath [44.5020°N 123.4426°W], 2.v.1952, V. Roth (1♂, OSAC). *Coos County*: *ca* 3 mi. SE of Remote, Rock Ck, 42°59′27″N 123°51′41″W, 28.v.2009, SEB (1♂, CNC). *Douglas County*: *ca* 5.5 mi. SW Camas Valley, Twelvemile Ck, 42°58′41″N 123°44′29″W, 27.v.2009, J.M. Cumming (1♂, CNC); 7 mi. SW Camas Valley, Bear Ck Recreation Site, 42°58′08″N 123°45′55″W, 27.v.2009, SEB (1♂, CNC); 7 mi. SW Camas Valley, Bridge Ck at Twelvemile Ck Rd, 42°58′07″N 123°43′29″W, 27.v.2009, SEB (1♂, CNC). *Washington County*: Forest Grove [45°31′N 123°06′W], 12.iv.1919 (1♂, EMEC).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *teres* species group by the pair of dark scutal vittae, male hind femur strongly bowed on apical third with anteroventral row of strong setae, without tuft of whip-like setae at base of ventral process (Figs 222, 223), epandrium with long apical and ventral setae, and dorsal margin of male cercus straight.

Description. Wing length 4.4–5.5 mm. **Male.** Similar to *E.* (*En.*) *teres*, except as follows: head narrowly dichoptic, frons below ocellar triangle slightly narrower than width of anterior ocellus; with short setulae along inner margin of eye. Occiput bearing single row of strong setae, shorter than ocellar setae; postocular setae shorter than occipital setae. Antenna with postpedicel long and tapered, 6× longer than basal width.

Thorax with postpronotal lobe with pale shiny apex; postalar ridge yellowish. Scutum with 1–2 posterior npl. Scutellum with 1 pair of long sctl, with 1–3 pairs of marginal setulae.



FIGURES 221–226. Male habitus and hindleg of the *E.* (*Enoplempis*) *teres* species group. **221,** *E.* (*En.*) *scotti* **sp. nov.**, habitus (holotype), lateral view; **222,** same, hind femur tibia joint (holotype), anterior view; **223,** same, hind femur tibia joint (holotype), posterior view; **224,** *E.* (*En.*) *scutica* **sp. nov.**, hindleg, with tarsal spine-like setae, anterior view; **225,** same, hind femur tibia joint, anterior view; **226,** same, hind femur tibia joint, posterior view.

Legs slender, orange brown, including coxae, apex of tibiae darker, tarsi brown; coxae with greyish pruinescence (Fig. 221). Fore femur without white ventral pile. Fore tibia with several longer anterodorsal and posterodorsal setae on apical third, no longer than width of tibia; anterior face with short appressed setae; apex with long posterior and ventral preapical setae. Fore tarsomere 1 swollen, nearly subequal in width to width of apex of tibia; without

spine-like ventral setae; tarsomeres 1–3 with long dorsal setae, longer than width of tarsomere; tarsomeres 2–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur with white ventral pile; row of short posteroventral setae, shorter that femur width. Mid tibia with anteroventral and posteroventral setae, shorter than width of tibia; rows of short anterodorsal and posterodorsal setae, similar to ventral setae. Mid tarsus with all tarsomeres with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Hind femur with white ventral pile and anteroventral and posteroventral row of slender setae on basal two-thirds; apical third strongly bowed with anteroventral row of strong setae, shorter than width of femur; preapex with broad ventral expansion tapered to narrow posteroventral apex and flattened anteroventral hooked lobe; posteroventral face with row of 3 peg-like setae and upper row of long slender setae; apex without preapical row of posterior setae; strong preapical anterior seta and 2 preapical anterodorsal setae (Figs 222, 223). Hind tibia greatly narrowed and twisted at base; without anteroventral process; posteroventral process knob-like, with rounded apex crowned with dense, dark thickened setae and row of similar setae on anterior face of apex; dense row of thickened anteroventral setae extending from base of posteroventral process to near apex; long anterodorsal and posterodorsal setae, twice as long as width of tibia; anterior and ventral faces with similar shorter erect setae (Figs 221–223). Hind tarsus with long dorsal setae on tarsomeres 1–3; tarsomere 1 swollen, narrower than apex of tibia with strong ventral setae; tarsomeres 2–5 similar to fore tarsus.

Halter yellowish to whitish.

Abdomen paler than thorax, with dense whitish-grey pruinescence, with dark marginal setae. Terminalia (Fig. 207): brown with dorsal margin of cercus blackish; epandrial lamella with grey pruinescence. Cercus long, narrow, tapered to narrow apex; dorsal margin straight; dense setae along dorsal margin, shorter than width of cercus; base weakly fused to epandrial lamella. Subepandrial process extending on either side of phallus; apex narrow, downcurved. Epandrial lamella narrow, linear, longer than height; dorsal margin slightly expanded subapically; bearing long setae apically and ventrally, longer than width of lamella. Hypandrium very short, truncate, not prolonged laterally; without setae. Phallus with basal third narrow, tapered, gently arched anteriorly; apex emerging beyond cercus; apex slender and downcurved in lateral view; roughened, spiculate subapically, near dorsal margin of epandrium; ejaculatory apodeme elongate, more than half-length of epandrium, Y-shaped, with ventrally positioned lateral apodemes.

Female. Similar to male, except as follows: frons broader, slightly wider than anterior ocellus ocellar triangle; scutum with 2 pairs of broader brownish vittae; hindleg without modified setae and processes. Abdominal pleural membrane not expanded; apex of tergite 8 shiny.

Geographical distribution and seasonal occurrence (Fig. 237). *Empis* (*En.*) *scotti* **sp. nov.** is known from the Coast Range in Oregon and northern California. Adults have been collected in April and May.

Etymology. This species is named after fellow dipterist Scott J. Fitzgerald, who collected the holotype.

Nuptial gift presentation. Form unknown.

Remarks. *Empis* (*En.*) *fitzgeraldi* **sp. nov.**, *E*. (*En.*) *undulasetosa* **sp. nov.** and *E*. (*En.*) *scotti* **sp. nov.** are sympatric and were collected during the same collection event.

Empis (*Enoplempis*) *scutica* sp. nov.

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(Figs 224–226, 233, 234, 237)

Type material. HOLOTYPE ♂, labelled: "WASHINGTON: Asotin Co./ Fields' Spr SP [46°4′N 117°10′W]/ 4 mi S. Anatone, 3500-/ 4000 ft., VI-(12-23)-74"; "dry ice/ Malaise Trap"; "W.J. Turner/ Collector"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *scutica* Sinclair,/ Brooks & Cumming [red label]" (WSU). **PARATYPES: USA. Idaho:** *Latah County*: Troy [46°44′N 116°46′W], 31.v (1♂, USNM). *Nez Perce County*: Coyote Grade [46.4477°N 116.8479°W], 18.iv.1979, D.J. Schotzko (2♂, WFBM). **Oregon:** *Wallowa County*: 7 km E Minam [45°36′N 117°36′W], 9.vi.1971, D.N. Ferro (1♂, WSU). **Washington:** *Asotin County*: Fields Spring SP [46°4′N 117°10′W], 14.vi.1972, dry ice MT, WJT (1♂, WSU); same data as holotype except, 26.v.1974 (1♂, WSU); same data except, 7.vi.1973 (1♂, WSU). *Whitman County*: Almocli Ck, nr Almota [46°42′N 117°28′W], 15.v.1975, D.M. Jackson (1♂, WSU); 8 mi. SW Pullman [46°43′N 117°11′W], Lyle Grove Biol. Area, 2100 ft, 26.v.1979, sweep, WJT (8♂, 3♀, WFBM); same data

except, MT (1♂, WSU); same data except, S. Woods (1♂, WSU); same data except, 27.v.1979 (3♂, WSU); same data except, 28.v.1979 (4♂, 3♀, CNC); same data except, 30.v.1979 (1♂, 1♀, WSU); same data except, 1.vi.1979 (3♂, 2♀, WSU); same data except, 4.vi.1979 (1♂, 1♀, WSU); same data except, 4–6.vi.1979 (2♀, WSU); same data except, 6–8.vi.1979 (1♂, 1♀, WSU); same data except, 8–13.vi.1979 (1♂, WSU); same data except, 25–27.vi.1979 (1♂, WSU); same data except, 28.vi.1979 (2♂, WSU).

Additional material examined. USA. Idaho: Moscow, J.M. Aldrich (1♂, USNM; paralectotype of *E. teres*).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *teres* species group by four brown scutal vittae (outer vittae sometimes faint), male hind femur with ventral process with tuft of whip-like setae and epandrium with short, straight setae.

Description. Wing length 4.8–5.8 mm. **Male.** Similar to *E.* (*En.*) *teres*, except as follows: head with postpedicel long and tapered, 3× longer than basal width.

Thorax dark brown in ground-colour, densely grey pruinescent. Scutum with median pair of narrow brown vittae between setal rows, with outer, broader pair of brown vittae, sometimes faint; 1–2 posterior npl.

Hind femur with white ventral pile on basal three-quarters; apical fourth straight slightly swollen, ventral process digitiform, projecting posteriorly with apical whip-like tuft of black setae, subequal to length of process and pointed lobe projecting anteriorly near mid-length; preapical ventral swelling with short, clustered setae on either end, with posteroventral cluster of longer, strong setae; apex without preapical row of posterior setae; without strong preapical anterior seta (Figs 225, 226). Hind tibia narrowed and slightly twisted at base; anteroventral digitiform process with bifid apex, with appressed setae on distal tip; posteroventral process subequal in length to anteroventral process, bifid with tufts of apical, appressed setae; ventral setae distal to processes dense, erect; long anterodorsal and posterodorsal setae on apical half, nearly twice as long as width of tibia (Figs 224–226). Hind tarsus similar to fore tarsus with long dorsal setae and slightly swollen tarsomere 1.

Terminalia (Figs 233, 234): brown with phallus paler. Cercus short, triangular, tapered posteriorly; dorsal margin sculptured, uneven; dense setae basally; setae shorter than width of cercus; base weakly fused to epandrial lamella. Subepandrial process extending on either side of phallus, with apex narrowed and outturned. Epandrial lamella narrow, linear, longer than height; posterior margin strongly upturned; bearing long setae ventrally, subequal to width of lamella. Hypandrium very short, truncate, not prolonged laterally; without setae. Phallus (Fig. 234) with extreme base expanded, otherwise narrow, gently arched anteriorly; apex emerging beyond cercus; apex slender and downcurved in lateral view; roughened, spiculate on apical fifth, near dorsal margin of epandrium; ejaculatory apodeme oval, half-length of epandrium, Y-shaped, with ventrally positioned lateral apodemes.

Female. Similar to female of *E.* (*En.*) *teres*.

Geographical distribution and seasonal occurrence (Fig. 237). *Empis* (*En.*) *scutica* **sp. nov.** is known from eastern Washington, eastern Oregon and Idaho. Adults have been collected from April to June.

Etymology. The species name is Latin for whip, in reference to the elongate whip-like setal tuft on the preapical ventral lobe of the male hind femur of this species.

Nuptial gift presentation. Form unknown.

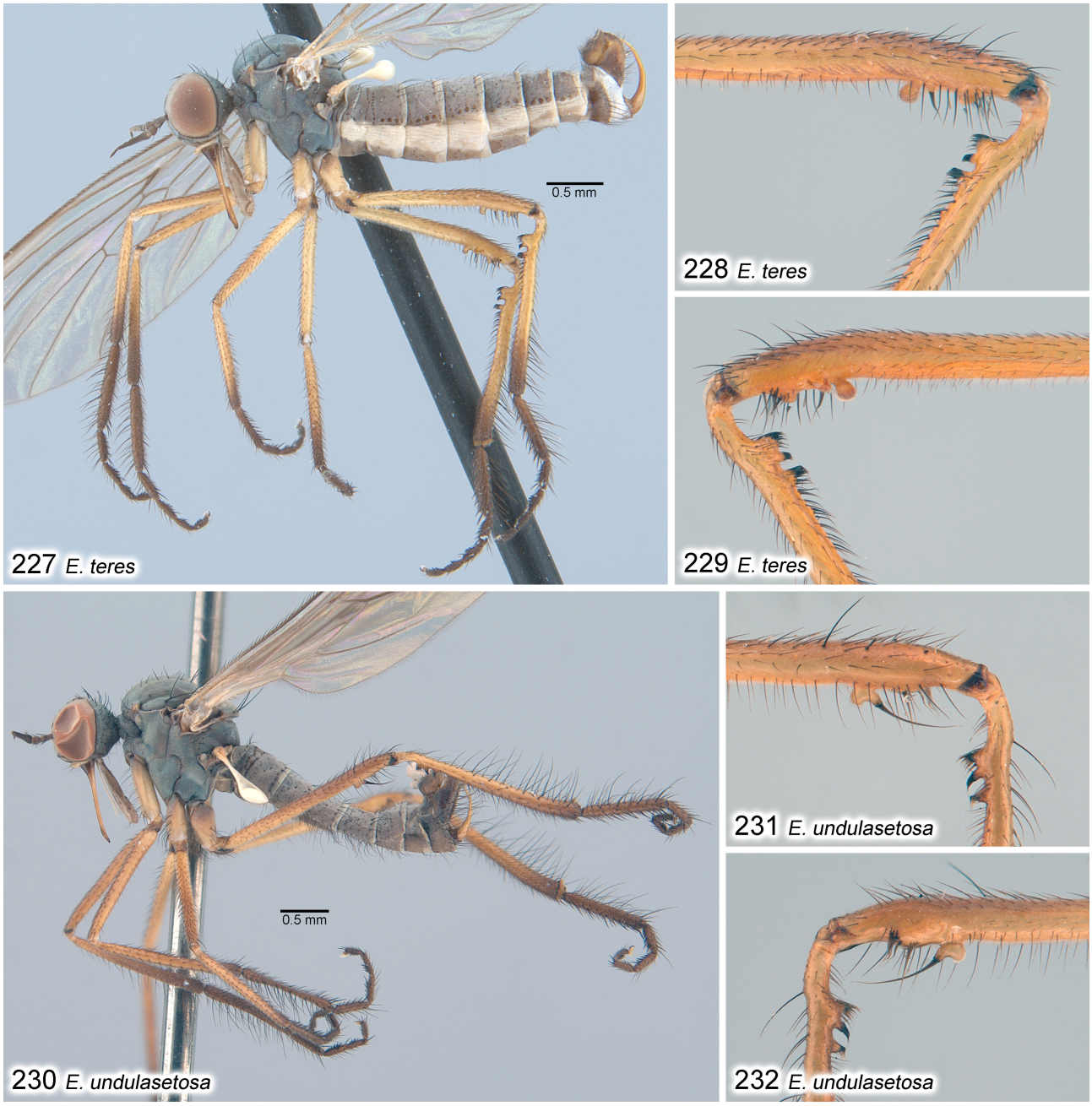
Empis (*Enoplempis*) *teres* Melander

(Figs 227–229, 235, 238)

Empis teres Melander, 1902: 315. Type locality: Juliaetta, Idaho (USA), by lectotype designation.
Empis (*Enoplempis*) *teres*: Melander, 1928: 142 (assigned to subgenus *Enoplempis*).
Empis teres: Melander, 1965: 461 (catalogue); Yang *et al*., 2007: 141 (catalogue).

Type material examined. LECTOTYPE (here designated in order to fix identity of the species) ♂, labelled: "Juliaetta [46°34′N 116°42′W]/ Idaho"; "May 12,02"; "Cotype/ No. 41828/ U.S.N.M. [red label]"; "LECTOTYPE/ *Empis teres* Melander/ des. Sinclair, Brooks &/ Cumming 2025 [red label]" (USNM). **PARALECTOTYPES: USA. Idaho:** Same data as lectotype (3♂, 2♀, AMNH; 3♂, 3♀, USNM). *Latah County*: Moscow [46°48′N 116°52′W], J.M. Aldrich (1♂, USNM = *E. scutica* **sp. nov.**).

Notes on type specimens. This species was based on nineteen male and female specimens from Idaho. Seven male syntypes and five female syntypes were located.



FIGURES 227–232. Male habitus and hindleg of the *E*. (*Enoplempis*) *teres* species group. **227,** *E*. (*En*.) *teres* Melander, habitus, lateral view; **228,** same, hind femur tibia joint, anterior view; **229,** same, hind femur tibia joint, posterior view; **230,** *E*. (*En*.) *undulasetosa* **sp. nov.**, habitus, lateral view; **231,** same, hind femur tibia joint, anterior view; **232,** same, hind femur tibia joint, posterior view.

Additional material examined. USA. Idaho: *Idaho County*: Clearwater NF, Hwy 12, Apgar Ck, 13.vi.2014, 46°12.858′N 115°32.179′W, 495 m, BJS (1♂, CNC); Clearwater NF, Hwy 12, 3 Devils Picnic Area, 2–3 mi. W Lowell, 13.vi.2014, 450 m, 46°08.155′N 115°38.681′W, small str., BJS (1♂, CNC). *Latah County*: Lost Ck, 12 mi. ENE Potlatch [46°57′N 116°41′W], 2700 ft, 22.vi.1979, sweep, WJT (14♂, 6♀, WSU). *Nez Perce County*: Lk. Waha, Flate Iron Rd, 46°12.412′N 116°49.027′W, 1040 m, 15.iv.2014, W Fk Sweetwater Ck, BJS (1♂, 1♀, CNC). **Oregon:** *Baker County*: L. Goose Ck, 36 mi. SE Union [44°56′N 117°25′W], Wallowa-Whitman NF, 4000 ft, 9.vi.1976, sweeping, WJT (2♂, 1♀, WSU); same data except, 9–12.vi.1976, MT baited with CO_2, E.J. Davis (1♂, USNM); same data except, 24–25.vi.1976, sweeping, WJT (1♂, WSU); U. Goose Ck, 34 mi. SE Union [44°56′N 117°25′W], 28.vi.1975, 4160 ft, MT baited with CO_2, E.J. Davis (1♀, WSU); same data except, 9–12.vi.1976

(3♂, WSU; 1♀, USNM); same data except, 24–25.1977, sweeping *Anaphalis* flowers, WJT (1♀, WSU). *Umatilla County*: Athena (Wild Horse Mtn) [45°48′N 118°29′W], 14.v.1938, Schuh & Gray (1♂, CUIC). **Washington:** *Columbia County*: Umatilla NF, Touchet R on Forest Rd 64, 46.157°N 117.808°W, 940 m, 8.vi.2009, I.S. Winkler, E09-56a (1♂, CNC); Tucannon Fish Hatch., 20 mi. E Dayton [46°19′N 117°39′W], 2650 ft, 15.v.1979, MT, WJT (1♂, 2♀, WFBM); same data except, 12.v.1979, sweeping (2♂, 1♀, WFBM). *Grant County*: Soap Lk. [47°23′N 119°29′W], 27.vii.1940, C.B. Philip (2♂, CAS). *Whitman County*: Almocli Ck, nr Almota [46°42′N 117°28′W], 15.v.1975, D.M. Jackson (1♂, WSU); 8 mi. SW Pullman [46°43′N 117°11′W], Lyle Grove Biol. Area, 2100 ft, 26.v.1979, sweep, WJT (1♀, WSU); same data except, 28.v.1979, MT, S. Woods (1♂, 1♀, WSU); same data except, 30.v.1979 (1♂, WSU); same data except, 1.vi.1979 (1♂, 2♀, WSU); same data except, 4.vi.1979 (1♂, WSU); same data except, 8–13.vi.1979 (1♂, WSU); same data except, 16.vi.1979 (1♀, WSU); same data except, 20–22.vi.1979 (1♂, WSU).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *teres* species group by the pair of dark scutal vittae, male hind femur with ventral knob-like process without tuft of whip-like setae (Figs 228, 229), epandrium with short, straight setae, and dorsal margin of male cercus with angled projection.

Redescription. Wing length 4.8–5.5 mm. **Male.** Head dark in ground-colour, with greyish pruinescence (Fig. 227). Dichoptic, upper ommatidia not enlarged. Frons divergent towards antennae; below ocellar triangle subequal to width of anterior ocellus; without short setulae along inner margin of eye. Face without setae; slightly divergent towards mouthparts, with oral margin dark and shiny. Ocellar triangle elevated, with thin greyish pruinescence, with pair of parallel ocellar setae, slightly longer than ocellar triangle and several pairs of short setulae. Occiput bearing single row of setae, similar in size to ocellar setae, longer and finer ventrally; postocular setae similar to occipital setae; postocellar region without setae. Antenna dark; scape 2× longer than pedicel, with short, black setae; pedicel with ring of apical setae; postpedicel long and tapered, 4× longer than basal width; stylus 1.5× longer than basal width of postpedicel. Palpus pale yellowish-brown, with dark setulae. Proboscis reddish brown, less than twice head height; labellum with short, dark setae.

Thorax dark brown in ground-colour, densely grey pruinescent (Fig. 227). Scutum with pair of narrow dark vittae between setal rows; outer pair of vittae broader, very faint or absent. Proepisternum with pale setae on lower section; upper proepisternum in front of spiracle without setae. Prosternum bare. Antepronotum with row of slender setae. Postpronotum with 1 long seta and some 10 short, dark setae. Scutum with short, fine uniserial acr; dc slightly longer, stronger than acr, increasing in length posteriorly; 1 posterior npl, with 2 shorter anterior npl; 1 presut spal; 1 psut spal; 1 pal. Scutellum with 1 pair of long sctl, with 1 pair of marginal setulae; disc bare. Laterotergite with narrow patch of strong, dark setae. Anterior and posterior spiracles pale.

Legs slender, orange brown, including coxae, apex of tibiae darker, tarsi brown; coxae often with thin greyish pruinescence (Fig. 227). Coxae with stiff, black setae. Hind trochanter with short setae. Fore femur without white ventral pile. Fore tibia with several long anterodorsal and posterodorsal setae on apical third, twice longer than width of tibia; anterior face with short appressed setae; apex with long posterior and ventral preapical setae. Fore tarsomere 1 somewhat swollen; without spine-like ventral setae; tarsomeres 1–3 with long dorsal setae, longer than width of tarsomere; tarsomeres 2–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur with white ventral pile; row of short posteroventral setae, shorter that femur width. Mid tibia with 3–4 anteroventral and posteroventral setae, longer than width of tibia; 3–4 short anterodorsal and posterodorsal setae, similar to ventral setae. Mid tarsus with all tarsomeres with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Hind femur with white ventral pile on basal three-quarters; apical fourth slightly bent with oval, knob-like ventral process without tuft of black whip-like setae; tuft of appressed setae on short swelling anteromedially to knob-like process; flattened, triangular process with narrow posterior appendix posterior to knob-like process, without setae; preapical posterior swelling with strong posteroventral setae; apex without preapical row of posterior setae; without strong preapical anterior seta (Figs 228, 229). Hind tibia greatly narrowed and slightly twisted at base; anteroventral digitiform process reduced to short swelling with oblique row of appressed setae, as long as process; posteroventral process short, bifid with tufts of apical setae; ventral setae distal to processes thickened with apex of some setae bent apically; seta in posteroapical comb; long anterodorsal and posterodorsal setae on apical half, twice as long as width of tibia (Figs 227–229). Hind tarsus similar to fore tarsus with long dorsal setae and slightly swollen tarsomere 1.

Wing faintly infuscate with dark veins with base of wing yellowish; all veins complete (except Sc and CuA+CuP),

well sclerotized. Basal costal seta absent. R_5 and M_1 parallel near wing margin; R_5 ending posterior to wing tip; radial fork broad. Halter yellowish.

Abdomen dark, with dense grey pruinescence similar to scutum, with long marginal setae, longer on basal tergites; posterior margin of tergites pruinescent; sternites with short setae. Pregenital segments unmodified, except sclerites of segment 8 weakly fused anterolaterally. Terminalia (Fig. 235): brown with dorsal margin of cercus blackish. Cercus short, rectangular, narrowly projecting posteriorly; dorsal margin expanded dorsally near mid-length as subtriangular projection; dense setae basally and on mid-length projection, shorter than width of cercus; base weakly fused to epandrial lamella. Subepandrial process extending on either side of phallus. Epandrial lamella narrow, linear, longer than height; posterior margin strongly upturned; bearing long setae ventrally, subequal to width of lamella. Hypandrium very short, truncate, not prolonged laterally; without setae. Phallus with basal third expanded, tapered, gently arched anteriorly; apex emerging beyond cercus; apex slender and downcurved in lateral view; roughened, spiculate subapically, near dorsal margin of epandrium; ejaculatory apodeme oval, half-length of epandrium, Y-shaped, with ventrally positioned lateral apodemes.

Female. Similar to male, except as follows: frons broader, nearly as wide as ocellar triangle; scutum with 2 pairs of broader brownish vittae; hindleg without modified setae and processes. Abdominal pleural membrane not expanded; tergites 7 and 8 pruinescent.

Geographical distribution and seasonal occurrence (Fig. 238). *Empis* (*En.*) *teres* is known from Washington, eastern Oregon and Idaho. Adults have been collected from April to July.

Nuptial gift presentation. Form unknown.

Remarks. The length of the dorsal setae on fore tarsomere 1 is variable, ranging from subequal to more than twice width of tarsomere.

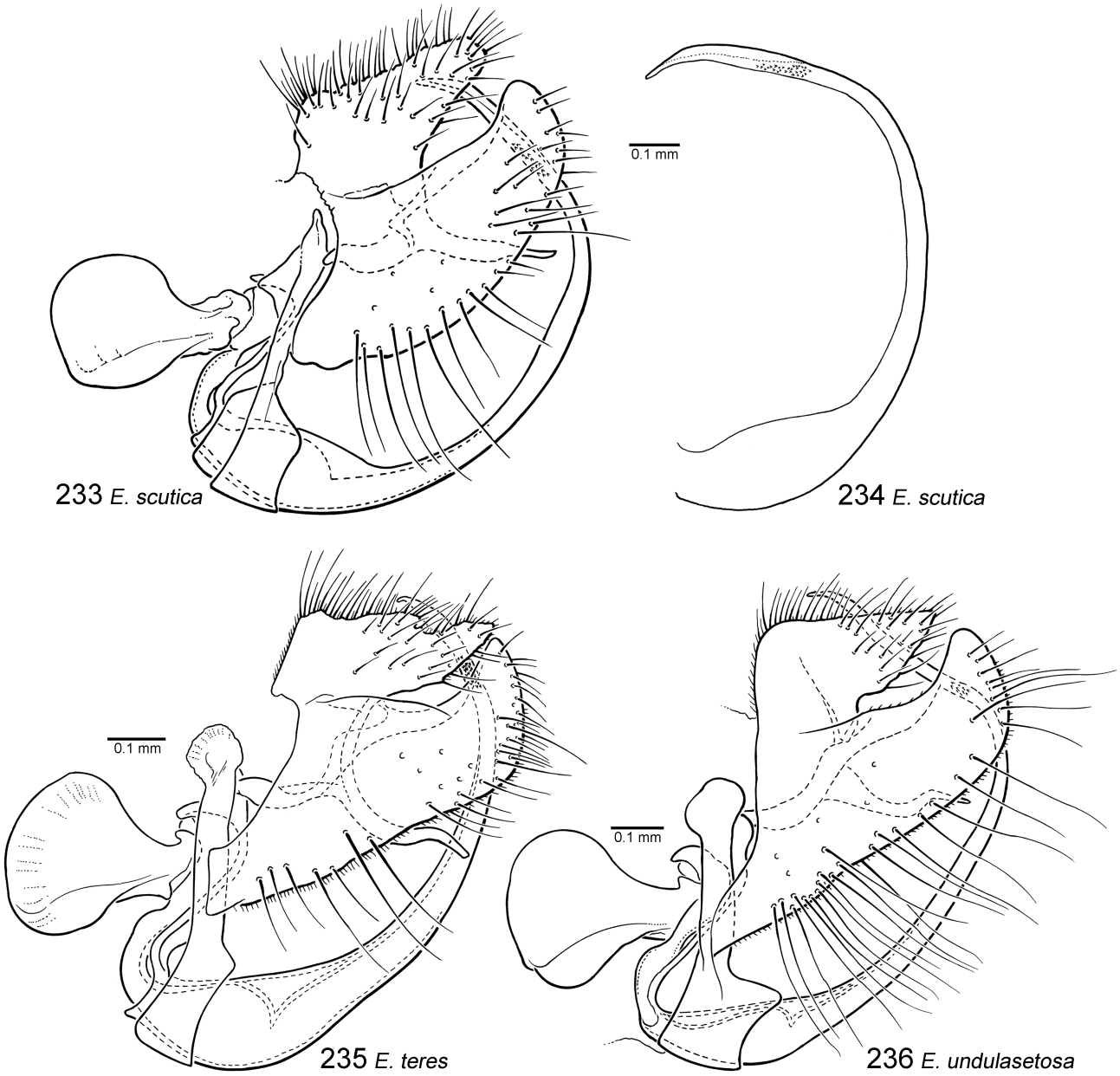
Empis (*Enoplempis*) *undulasetosa* sp. nov.

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(Figs 230–232, 236, 238)

Type material. HOLOTYPE ♂, labelled: "USA: OR: Benton Co./ Corvallis; Lewisburg Saddle/ Old Growth trail; sweeping/ woods and creek/ 44.6423°N,-123.2891°W/ 23 April 2013, S. Fitzgerald"; "CNC/ 1078370"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *undulasetosa* Sinclair,/ Brooks & Cumming [red label]" (CNC). **PARATYPES: CANADA. British Columbia:** Agassiz [49°14′N 121°46′W], 4.iv.1925, R. Glendenning (2♂, CNC). **USA. California:** *Humboldt County*: Prairie Ck Redwoods SP, Drury Pkwy at Prairie Ck tr., 41.408°N 124.031°W, 3.vi.2009, E09-43b, B.M. Wiegmann *et al.* (1♂, CNC). **Oregon:** *Benton County*: Corvallis, Lewisburg Saddle, below Old Growth Tr., 44°38′32.28″N 123°17′20.76″W, MT over creek, 23.iv–6.v.2013, SJF (9♂, 13♀, CNC); same data except, 6–31.v.2013 (2 ♀, CNC); 4 mi. up Woods Ck Rd from Hwy 20 [44.5440°N 123.5030°W], 9.v.2013, along Woods Ck, SJF (1♂, CNC); same data except, 15.v.2014, sweep banks of Woods Ck (1♂, 1♀, CNC). *Lane County*: Oakridge, 18 mi. NW [43°52′N 122°42′W], 12.v.1969, E.M. & J.L. Fisher (1♂, CAS; 2♂, CSCA); Siltcoos Lk., Camp Baker, 43°53′24″N 124°05′33″W, 54 ft, 10.v.2011, J.D. Pinto, R.L. Wescott (1♂, 1♀, UCRC); same data except, 43°53′03″N 124°05′46″W, 20 ft (1♂, UCRC). *Lincoln County*: Waldport, 44°25′36″N 124°03′05″W, 56 m, 27–31.v.2009, MT, J.D. Pinto (1♂, UCRC); same data except, 1–15.v.2010 (3♂, 3♀, UCRC); same data except, iv.2011 (1♂, UCRC). **Washington:** *King County*: 5 mi. W Skykomish [47°42′N 121°21′W], 1.v.1977 (1♂, 1♀, WSU); 10 mi. W Snoqualmie Pass [47°23′N 121°31′W], S. Fk Snoqualmie R, 15.vi.1975, N.E. Woodley (1♂, 3♀, WSU). *Pacific County*: Ft Canby SP nr Ilwaco [46°17′N 124°04′W], 13–15.vi.1973, WJT (1♀, WSU); Ilwaco, 5.v.1918, ALM (2♂, USNM); same data except, 20.v.1918, A. Spurler (6♂, 1♀, WSU); South Bend [46°39′N 123°48′W], 23.v.1917, ALM (2♂, USNM). *Whatcom County*: Glacier [48°53′N 121°56′W], 4.vi.1917, H.G. Dyer (2♂, USNM).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *teres* species group by the pair of dark scutal vittae, male hind femur with ventral knob-like process with tuft of whip-like setae (Figs 231, 232), and epandrium with long, wavy setae.

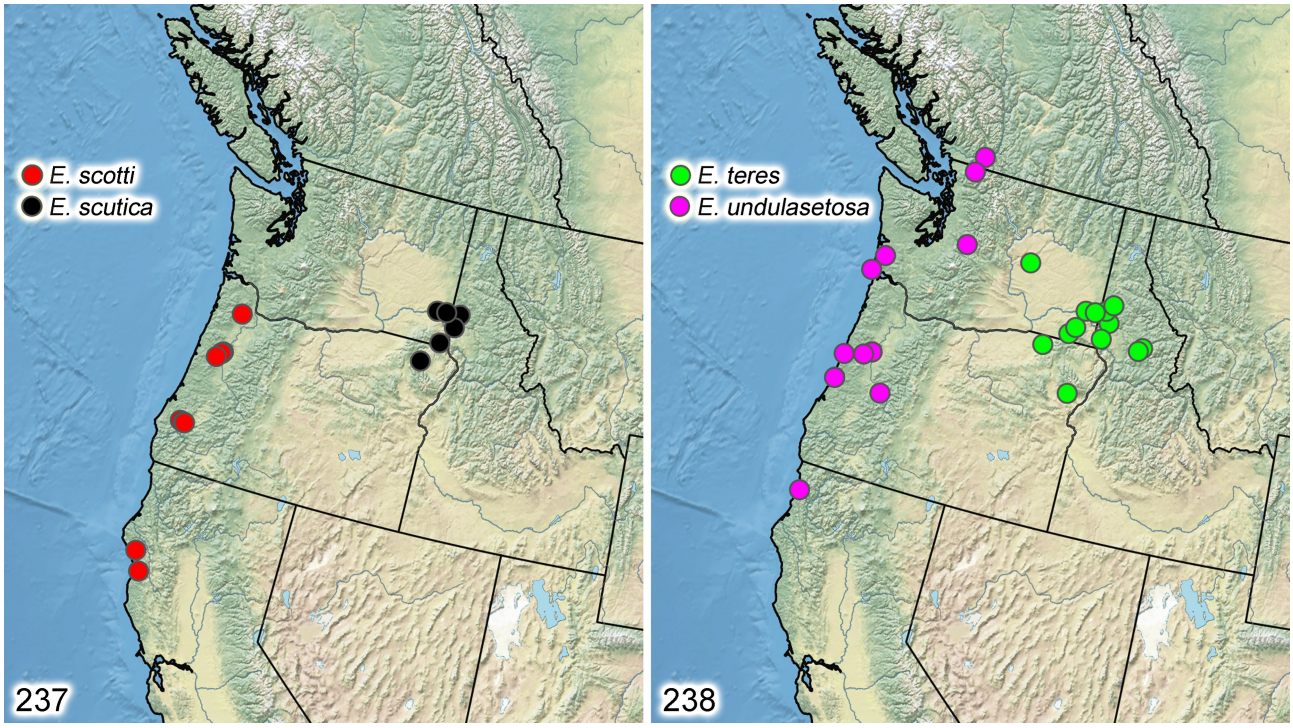
Description. Wing length 5.5–6.5 mm. **Male.** Similar to *E.* (*En.*) *teres*, except as follows: head with ocellar triangle with pair of long ocellar setae, longer than ocellar triangle.



FIGURES 233–236. Male terminalia of the *E*. (*Enoplempis*) *teres* species group, lateral view. **233,** *E*. (*En*.) *scutica* **sp. nov.**; **234,** same, phallus; **235,** *E*. (*En*.) *teres* Melander; **236,** *E*. (*En*.) *undulasetosa* **sp. nov.**

Thorax with scutum with setae increasing in length posteriorly, with posterior seta as long as npl; 3 posterior npl. Scutellum with 1 pair of long sctl, with 1 pair of marginal setae.

Hind femur with white ventral pile on basal three-quarters; apical fourth slightly curved and swollen, with oval, knob-like ventral process bearing posterior appendix bearing whip-like tuft of black setae; tuft of anteroventral setae without swelling posterior to knob-like process; cluster of short, curved posteroventral setae posterior to knob-like process, with preapical oblique rows of 4–5 wavy posteroventral setae, as long as width of femur (not homologous to preapical row of posterior setae); without strong preapical anterior seta (Figs 231, 232). Hind tibia greatly narrowed at base; anteroventral digitiform process short, triangular with oblique row of appressed setae, as long as process; posteroventral process short, bifid with tufts of apical setae widely separated; ventral setae distal to processes not thickened; long anterodorsal and posterodorsal setae on apical two-thirds, more than twice as long as width of tibia (Figs 230–232). Hind tarsus with similar long dorsal setae.



FIGURES 237–238. Known geographical distribution of the *E.* (*Enoplempis*) *teres* species group. **237,** *E.* (*En.*) *scotti* **sp. nov.** and *E.* (*En.*) *scutica* **sp. nov.**; **238,** *E.* (*En.*) *teres* Melander and *E.* (*En.*) *undulasetosa* **sp. nov.**

Abdomen with sternites with long, wavy setae (Fig. 230). Terminalia (Fig. 236): brown with paler phallus. Cercus short, subtriangular, strongly tapered posteriorly to narrow apex; dorsal margin straight, with setae evenly distributed; setae shorter than half width of cercus; base fused to epandrial lamella. Subepandrial process extending to phallus. Epandrial lamella narrow, linear, longer than height; posterior margin strongly upturned; bearing long, wavy setae ventrally, longer than width of lamella. Hypandrium very short, truncate, not prolonged laterally; without setae. Phallus with basal third not greatly expanded, tapered, gently arched anteriorly; apex emerging beyond cercus; apex slender and downcurved in lateral view; with roughened, spiculate surface opposite dorsal margin of epandrium; ejaculatory apodeme oval, half-length of epandrium, Y-shaped, with ventrally positioned lateral apodemes.

Female. Similar to female of *E. teres*, except setae of scutum and scutellum longer.

Geographical distribution and seasonal occurrence (Fig. 238). *Empis* (*En.*) *undulasetosa* **sp. nov.** is known from southern British Columbia, Washington, Oregon and northern California, primarily along the Coast Range. Adults have been collected from April to June.

Etymology. The species name is Latin for wavy bristles, in reference to the long, wavy setae on the epandrium of this species.

Nuptial gift presentation. Form unknown.

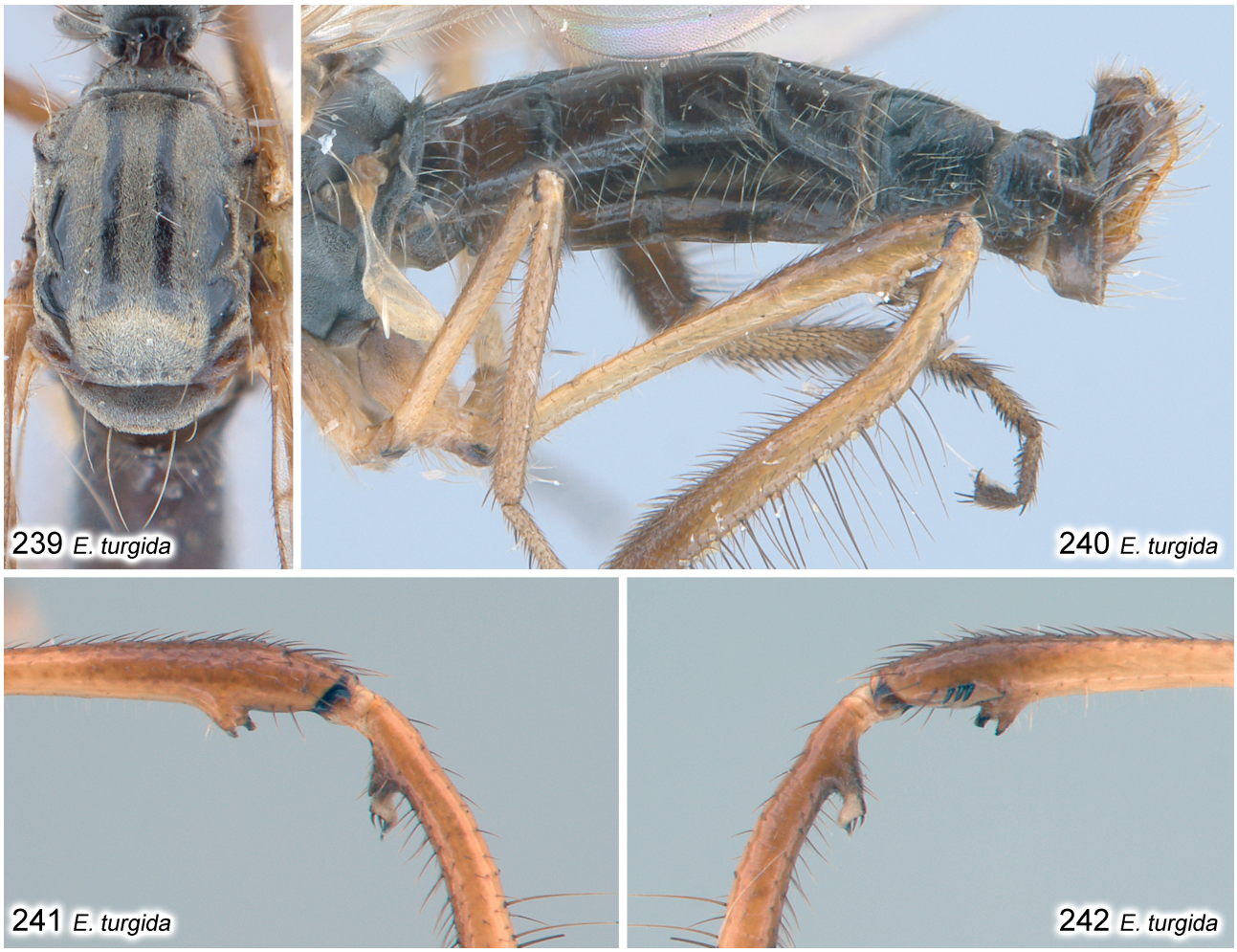
Empis (*Enoplempis*) *turgida* species group

(Figs 239–249)

This group includes two species, *E.* (*En.*) *turgida* **sp. nov.** and *E.* (*En.*) *woodleyi* **sp. nov.**, which are distinguished by the shiny vittae on the scutum (Fig. 239), male hind femur with row of thickened preapical posterior setae (Fig. 242), male abdomen shiny (Fig. 240) with modified pregenital abdominal tergites (Figs 243, 246), subepandrial process short and blade-like (Figs 244, 247), and phallus with teeth-like marginal projections (Figs 245, 248).

***Empis* (*Enoplempis*) *turgida* sp. nov.**
urn:lsid:zoobank.org:act:CF87B0E0-261B-4388-9AB4-6D6809C698D3
(Figs 239–245, 249)

Type material. HOLOTYPE ♂, labelled: "Wetmore Campground [44°31′N 118°18′W]/ Baker Co., Ore.[USA: Oregon] 4500′/ 29.VI.-5VII.1965"; "Malaise trap/ Mounted from/ alcohol"; "CNC/ 1078380"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *turgida* Sinclair,/ Brooks & Cumming [red label]" (CNC). **PARATYPES: USA. California:** *Siskiyou County*: Ash Ck Rgr Sta., 9 mi. E McCloud [41°15′N 121°57′W], 3500 ft, 10–12.vi.1974, J. Doyen (1♂, EMEC). **Idaho:** *Latah County*: Moscow Mtn [46°48′N 116°52′W], 23.vi–3.vii, MT, H.S. Telford (1♂, LACM). **Oregon:** *Baker County*: 9 mi. W Unity [44°27′N 118°11′W], 4500 ft, 2.vii.1965 (1♂, CNC). **Washington:** *Asotin County*: 4 mi. S Anatone [46°4′N 117°10′W], 3600 ft, 25.v.1976, MT, WJT (2♀, WSU); Fields Spring SP, 4 mi. S Anatone, 3500–4000 ft, 7.vi.1974, WJT (1♂, WSU); same data except, 12–13.vi.1974, Dry Ice MT (1♀, WSU). *Spokane County*: Valleyford [47°31′N 117°14′W], 19.vi.1919, ALM (1♂, USNM). *Whitman County*: Almota [46°42′N 117°28′W] (2♂, USNM); same data except, 25.v.1913 (1♂, USNM); same data except, 20.v.1923, ALM (2♂, USNM); Lyle Grove [46°43′N 117°11′W], Pullman, 3.vi.1969, H.S. Telford (3♂, WSU); 8 mi. SW Pullman, Lyle Grove Biol. Area [46°43′N 117°11′W], 2100 ft, 25.v.1979, MT, S. Woods (1♂, WSU); same data except, 30.v.1979 (1♀, WSU); same data except, 4.vi.1979 (1♀, WSU); same data except, 4–6.vi.1979 (1♂, WSU); same data except, 6.vi.1979 (5♂, WSU); same data except, 6–8.vi.1979 (2♂, 2♀, WSU); same data except, 8–13.vi.1979 (3♂, 1♀, WSU); same data except, 13.vi.1979 (1♀, WSU); same data except, 16.vi.1979 (1♂, 2♀, WSU); same data except, 16–20.vi.1979 (1♂, WSU); same data except, 29.vi.1979 (1♂, WSU); same data except, 4.vii.1979 (1♀, WSU); Yakawawa Cyn, 7 mi. NW Colton [46.5761°N 117.2884°W], 2500 ft, 11–12.vi.1977, MT, WJT (1♂, 1♀, CNC; 1♂, 3♀, WFBM); same data except, 25–27.vi.1977 (1♂, WFBM).



FIGURES 239–242. Male thorax, abdomen and hindleg of *E.* (*Enoplempis*) *turgida* **sp. nov. 239,** thorax, dorsal view; **240,** abdomen and hindleg, lateral view; **241,** hind femur tibia joint, anterior view; **242,** hind femur tibia joint, posterior view.

Diagnosis. This species is distinguished from *E.* (*En.*) *woodleyi* **sp. nov.** by the male tergite 7 with pair of rounded, membranous lateral lobes (Fig. 243), subepandrial process long, extending beyond epandrium, and phallus with 4–5 teeth-like, marginal projections in posterior view.

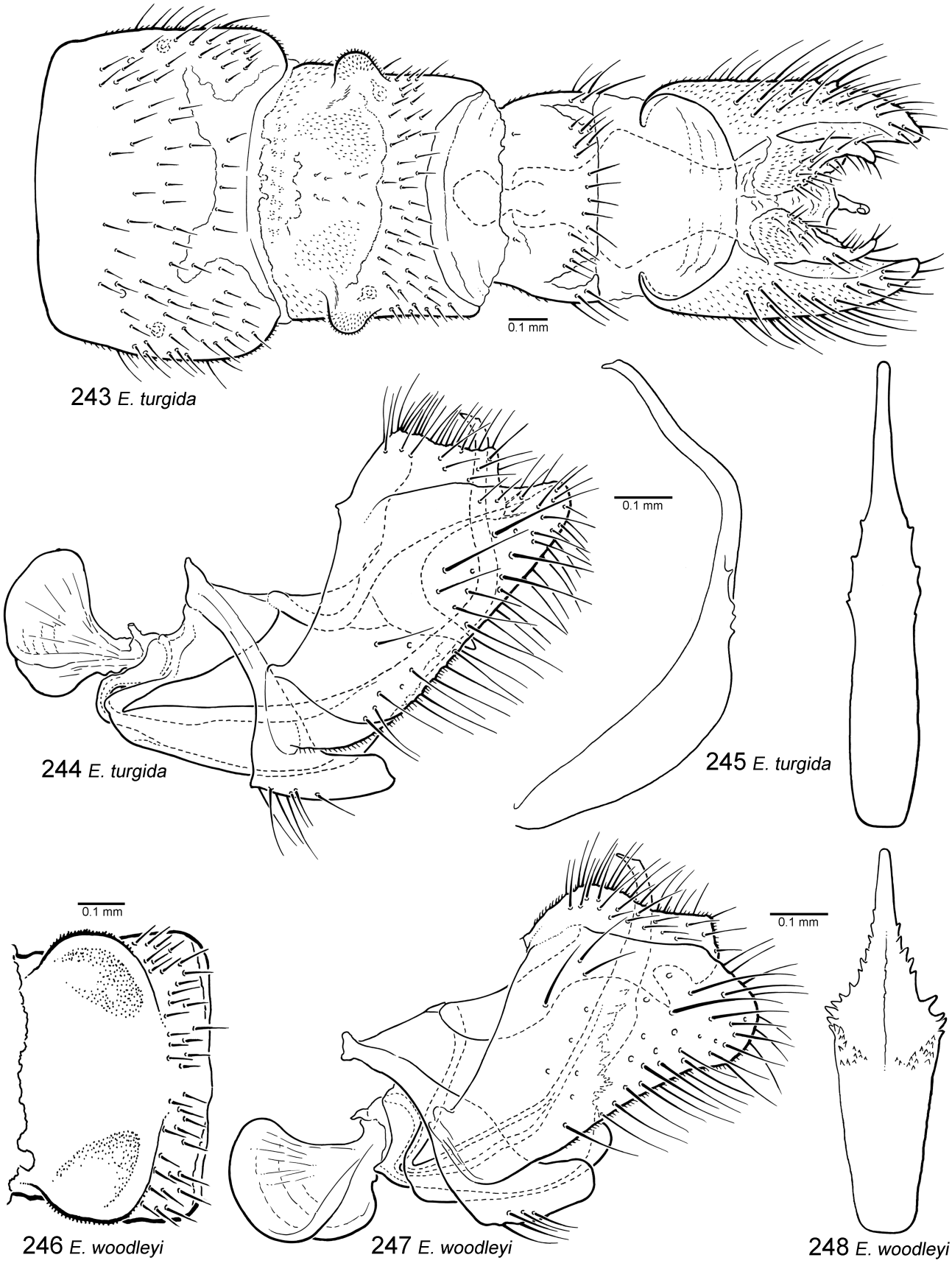
Description. Wing length 3.7–4.4 mm. **Male.** Head dark in ground-colour, with greyish pruinescence. Eyes holoptic, upper ommatidia slightly enlarged. Frons forming small triangular plate above antennae; without short setulae along inner margin of eye. Face without setae; short, parallel-sided towards mouthparts, with oral margin dark and shiny. Ocellar triangle elevated, with thin greyish pruinescence, with pair of parallel ocellar setae and several pairs of short setulae. Occiput bearing single row of setae, slightly shorter than ocellar setae, longer and finer ventrally; postocular setae shorter than occipital row; postocellar region without setae. Antenna dark brown; scape 2× longer than pedicel, with short, black setae; pedicel with ring of apical setae; postpedicel long, tapered, 4× longer than basal width; stylus 2× longer than basal width of postpedicel. Palpus pale brown, with dark setulae. Proboscis reddish brown, length less than 2× head height; labellum with short, dark setae.

Thorax dark brown in ground-colour, densely grey pruinescent, with pair of narrow shiny vittae between acr and dc rows, ending at prescutellar depression and pair of broader outer vittae extending to posterior margin of postalar ridge; apex of postpronotal lobe and postalar ridge yellowish brown (Fig. 239). All thoracic setae pale brown. Proepisternum with several pairs of short setae on lower section; upper proepisternum in front of spiracle without setae. Prosternum bare. Antepronotum with row of short setae. Postpronotum with 1 long seta and several short setae. Scutum with short, fine uniserial acr; dc slightly longer, stronger than acr, increasing in length posteriorly; 2–3 posterior npl, with several shorter anterior npl; 1 presut spal; 1 psut spal; 1 pal. Scutellum with 1 pair of long, widely separated apical sctl, with 1 pair of outer marginal setae; disc bare. Laterotergite with narrow patch of setae. Anterior and posterior spiracles pale.

Legs slender, shiny yellowish brown, with apex of tibiae and tarsi darker; coxae, especially fore coxa with thin greyish pruinescence (Fig. 240). Coxae with thin pale setae. Hind trochanter with numerous setulae. Fore femur sparely clothed in short, pale setae. Fore tibia similarly sparsely setose, with several short anterodorsal setae; several weakly differentiated dorsal and ventral preapical setae. Fore tarsomere 1 slightly swollen, with long dorsal setae, longer than width of tarsomere; all tarsomeres with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment, except pair on tarsomere 4 shorter than width. Mid femur with dense whitish ventral pile; posteroventral row of fine setae, longer distally. Mid tibia with 2–3 pairs of short anterodorsal and posterodorsal setae and several preapical setae; ventral face with erect setulae, shorter than half width of tibia. Mid tarsus slender, with ventral setae similar to fore tarsus. Hind femur slightly expanded apically, with flattened, knob-like anteroventral preapical process, posterior margin of process with short, pointed projection and posterior margin with ridge of 3 flattened, truncate setae with tuft of black setae directed posteriorly; apex with preapical row of 2–3 flattened, black, short, blunt posterior setae; preapical anterior seta developed, shorter than width of femur (Figs 241, 242). Hind tibia clavate, slightly twisted proximally; dorsal setae long, more than twice width of tibia; ventral margin with dense setae shorter than tibial width; posteroventral digitiform process with whitish faces, strongly curved to anterior margin of tibia; lower margin with short black setae, increasing in length apically; with seta in posteroapical comb (Figs 240–242). Hind tarsus with tarsomere 1 slightly inflated, with long dorsal setae, similar to tibia; remaining tarsomeres similar to mid and fore tarsi.

Wing infuscate with dark veins; all veins complete (except Sc, CuA+CuP), well sclerotized, except CuA+CuP rather weak not reaching wing margin. Basal costal seta absent. R_5 and M_1 slightly divergent near wing margin; R_5 ending at or slightly beyond wing tip; radial fork acute. Halter pale, yellowish brown.

Abdomen dark, shiny, without pruinescence, reddish brown with pale, golden setae, especially longer laterally. Pregenital segments modified: tergite 6 desclerotized medially in broad X-shape pattern along posterior margin; tergite 7 with anterior two-thirds thinly sclerotized medially with small, rounded lateral lobe, clothed in pruinescence (Fig. 243); sclerites of segment 8 narrowly fused anterolaterally. Terminalia (Figs 244, 245): shiny, dark reddish brown with hypandrium and phallus paler; anterolateral corner of epandrium with thin pruinescence. Cercus linear, truncate apically, shorter than epandrium; setae shorter than width of cercus. Subepandrial process broad basally, tapered to narrow, downcurved apex; extending to either side of phallus. Epandrial lamella subtriangular, tapered dorsolaterally to narrowed apex; broadly fused with cercus anteriorly; setae longer than cercal setae, mostly concentrated along posterior margin. Hypandrium short, truncate, several short setae basally. Phallus (Fig. 245) with expanded base, tapered apically, with strong bend on apical third; posterolateral margin expanded 4–5 teeth-like, marginal projections in posterior view; apex emerging beyond cercus; ejaculatory apodeme less than half-length of epandrium, T-shaped, with lateral apodemes near lower margin.



FIGURES 243–248. Male postabdomen and terminalia of the *E*. (*Enoplempis*) *turgida* species group. **243,** *E*. (*En*.) *turgida* **sp. nov.**, postabdomen, dorsal view; **244,** same, terminalia, lateral view; **245,** same, phallus, lateral and posterior views; **246,** *E*. (*En*.) *woodleyi* **sp. nov.** (holotype), tergite 7, dorsal view; **247,** same, terminalia (holotype), lateral view; **248,** same, phallus (holotype), posterior view.

Female. Unknown.

Geographical distribution and seasonal occurrence (Fig. 249). *Empis* (*En.*) *turgida* **sp. nov.** is known from eastern Washington, eastern Oregon, western Idaho and northern California. Adults have been collected from May to July.

Etymology. The species name is Latin for swelling, in reference to the two membranous lateral lobes on tergite 7 in this species.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *woodleyi* sp. nov.

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(Figs 246–249)

Type material. HOLOTYPE ♂, labelled: "WASH: Yakima County/ Wenas Creek Forest/ Camp [46°52′N 120°48′W], 20 mi NW Selah/ 25 May 1986 2550 ft./ N. E. Woodley"; "N.E. Woodley/ Collection/ Donated 2001"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *woodleyi* Sinclair,/ Brooks & Cumming [red label]" [dissected] (USNM).

Diagnosis. This species is distinguished from *E*. (*En.*) *turgida* **sp. nov.** by the male tergite 7 without pair of rounded, membranous lateral lobes (Fig. 246), subepandrial process very short, not extending beyond epandrium, and phallus with more than 10 teeth-like marginal projections in posterior view.

Description. Wing length 4.7 mm. **Male.** Similar to *E.* (*En.*) *turgida* **sp. nov.**, except as follows: head with proboscis very long, at least twice as long as head height.

Thoracic setae mostly dark brown, acrostichals biserial, pale; 2 posterior npl. Laterotergite with narrow patch of pale setae.

Legs very similar to *E. turgida* **sp. nov.**, but highly shrunken and twisted during preservation making comparison difficult. Apex of hind femur with preapical row of 4–5 flattened, black, short, tapered posterior setae.

Pregenital abdominal segments modified: tergite 6 with broad rectangular desclerotized area on medial posterior half; tergite 7 with anterior two-thirds thinly sclerotized medially with lateral, divergent concavity and posterior ridge; sclerites of segment 8 narrowly fused anterolaterally. Terminalia (Figs 247, 248): cercus linear, truncate apically, shorter than epandrium, somewhat concave medially; setae shorter than width of cercus. Subepandrial process very short, not reaching epandrial margin or bracing phallus. Epandrial lamella subtriangular, tapered dorsolaterally to broadly rounded apex; broadly fused with cercus anteriorly; setae longer than cercal setae, mostly concentrated along posterior margin. Hypandrium short, truncate; apical margin concave; several short setae basally. Phallus with expanded base; tapered and bent anteriorly at apex of hypandrium; posterolateral margin broadly expanded beyond hypandrium, with more than 10 teeth-like marginal projections; apex emerging beyond cercus; ejaculatory apodeme less than half-length of epandrium, T-shaped, with lateral apodemes near lower margin.

Female. Unknown.

Geographical distribution and seasonal occurrence (Fig. 249). *Empis* (*En.*) *woodleyi* **sp. nov.** is known only from the holotype collected in May from Yakima County, Washington.

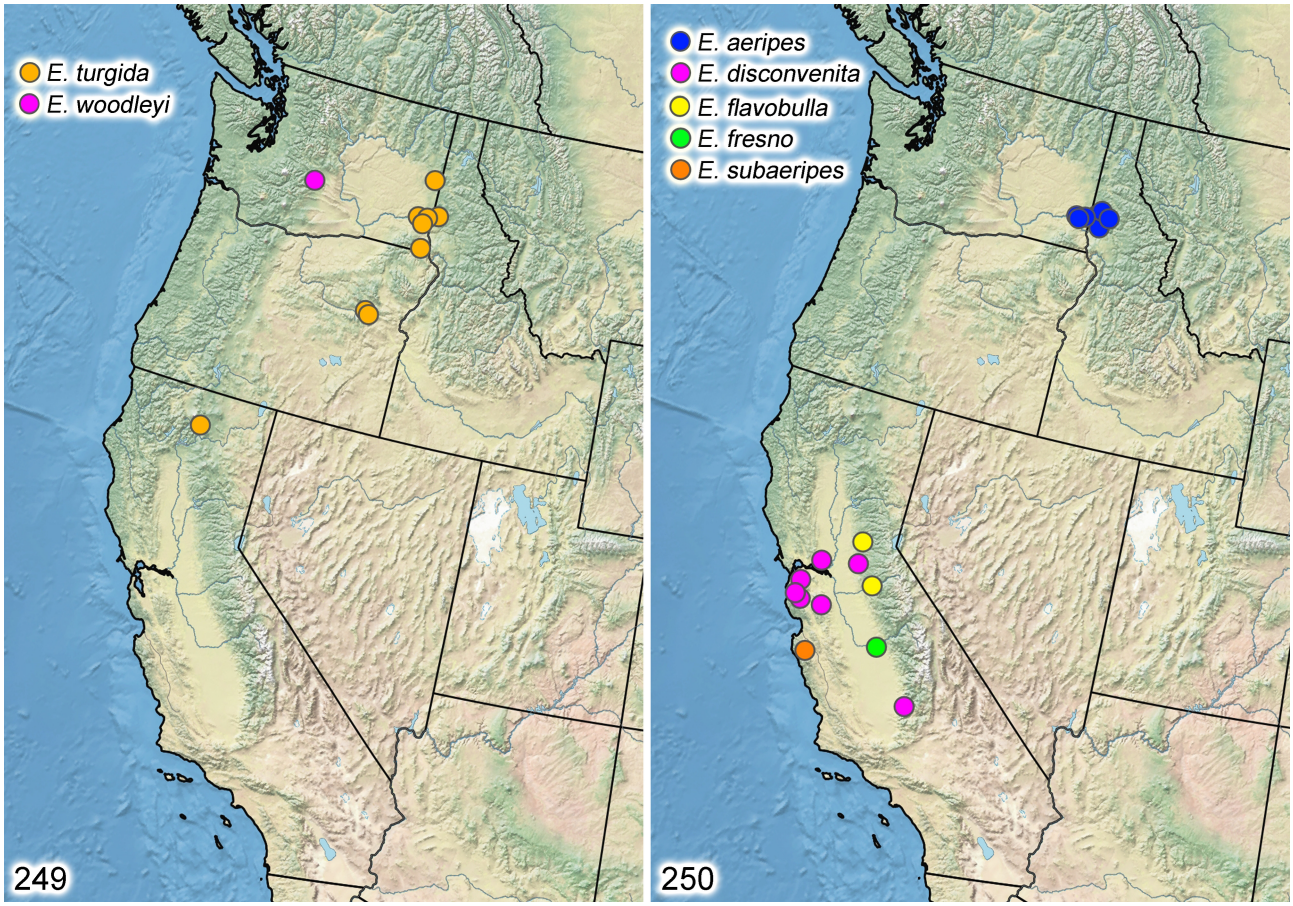
Etymology. This species is named in honour of Norman E. Woodley, formerly of the United States National Museum of Natural History (USNM), who collected the holotype.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *valentis* species group

(Figs 250–285)

Nine species are included in this group, *E.* (*En.*) *aeripes* Melander, *E.* (*En.*) *disconvenita* Melander, *E.* (*En.*) *dolabraria* Melander **stat. rev.**, *E*. (*En.*) *flavobulla* **sp. nov.**, *E*. (*En.*) *fresno* **sp. nov.**, *E.* (*En.*) *mixopolia* Melander, *E*. (*En.*) *paraeripes* **sp. nov.**, *E*. (*En.*) *subaeripes* **sp. nov.** and *E.* (*En.*) *valentis* Coquillett, which are distinguished by the dorsally notched male cercus (also in *E*. (*En*.) *loripedis* group), dorsoapical process on epandrium (*e.g.*, Figs 262–265, also in *E*. (*En*.) *loripedis* group), base of male hind tibia with lower anterior lobe and upper posterior lobe (*e.g.*, Figs 253–256), male hind femur with preapical row of thickened posterior setae (*e.g.*, Fig. 254) and terminalia without subepandrial process (*e.g.*, Figs 262–265).



FIGURES 249–250. Known geographical distribution of the *E*. (*Enoplempis*) *turgida* and *E*. (*Enoplempis*) *valentis* species groups. **249,** *E*. (*En*.) *turgida* **sp. nov.** and *E*. (*En*.) *woodleyi* **sp. nov.**; **250,** *E*. (*En*.) *aeripes* Melander, *E*. (*En*.) *disconvenita* Melander, *E*. (*En*.) *flavobulla* **sp. nov.**, *E*. (*En*.) *fresno* **sp. nov.** and *E*. (*En*.) *subaeripes* **sp. nov.**

Empis (*Enoplempis*) *aeripes* Melander

(Figs 250–254, 262)

Empis aeripes Melander, 1902: 328. Type locality (by lectotype designation): Moscow, Idaho (USA).
E. (*Enoplempis*) *aeripes*: Melander, 1928: 142 (assigned to subgenus *Enoplempis*).
Empis aeripes: Melander, 1965: 458 (catalogue); Yang *et al*. (2007): 130 (catalogue).

Type material examined. LECTOTYPE (here designated in order to fix identity of the species) ♂, labelled: "Moscow [46°48′N 116°52′W]/ Idaho"; "E. aeripes/ TYPE Mel."; "ALMelander/ Collection/ 1965"; "LECTOTYPE/ *Empis aeripes* Melander/ des. Sinclair, Brooks &/ Cumming 2025 [red label]" (USNM). **PARALECTOTYPES: USA. Idaho:** same data as lectotype (2♂, 2♀, AMNH; 3♂, 1♀, USNM). *Latah County*: Juliaetta [46°34′N 116°42′W], J.M. Aldrich (2♀, USNM).

Notes on type specimens. This species was described from an unspecified number of male and female specimens collected by J.M. Aldrich. Six syntypes (3 males, 3 females) were found in the USNM. There are additional specimens with similar locality labels and red "Type" labels but labelled "W.M. Wheeler collection". Despite the latter label, they are also assumed to be syntypes. In addition, there are a number of specimens in the USNM labelled as "types" but are not viewed as from the original type series since they were collected after 1902 (publication date). One male and one female paralectotype are also present in OUMNH.

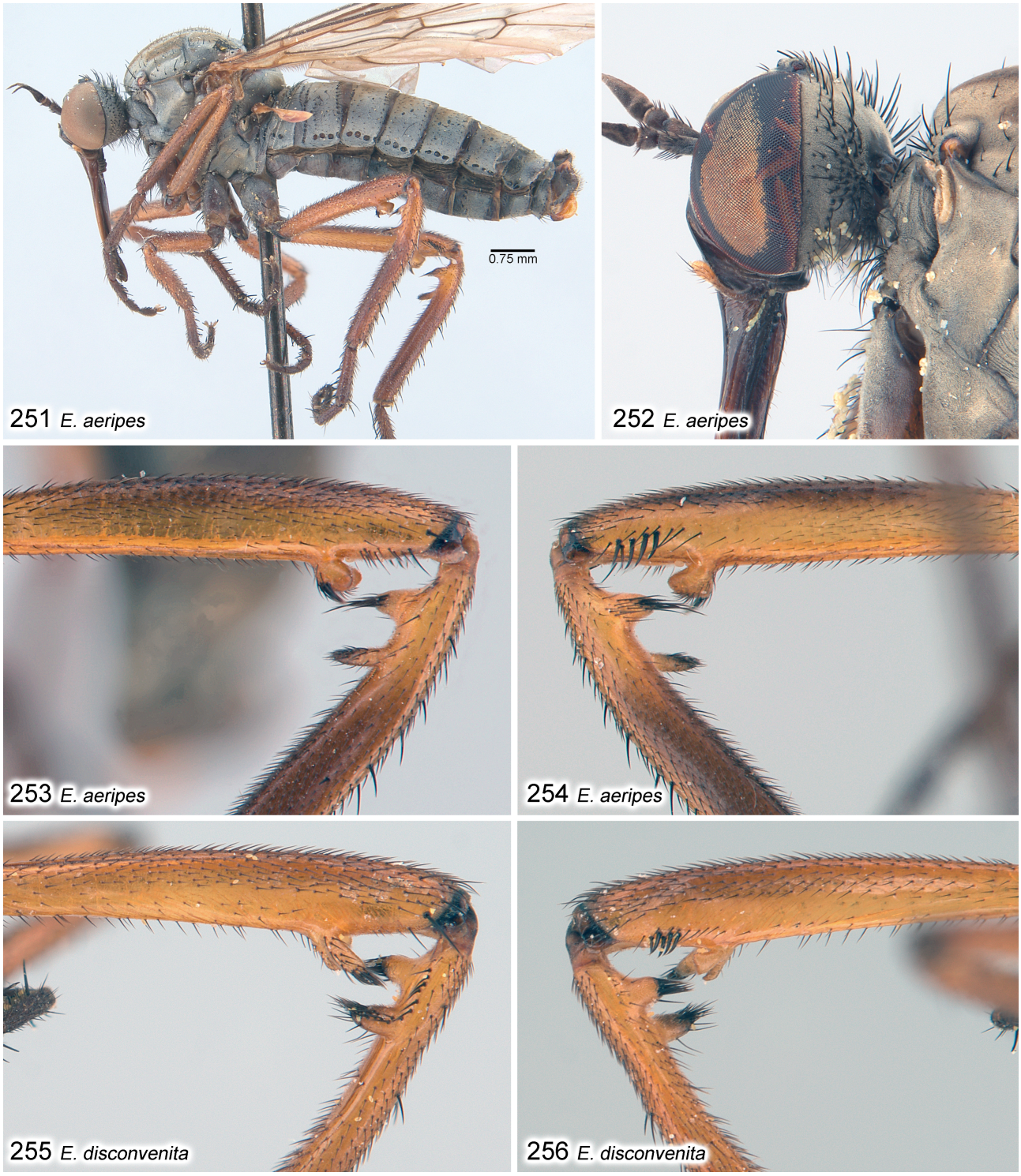
Additional material examined. USA. Idaho: *Latah County*: 3 mi. E Harvard [46.917°N 116.73°W], 17.v.1966, WFB (1♀, WFBM); 3 mi. S Helmer [46°48′N 116°28′W], along Little Boulder Ck, 10.vi.1984, J. Jenkins (3♂, 5♀, WSU); same data except, 10.vi.1984 (1♂, WSU); 3 mi. S Helmer [46°48′N 116°28′W], Potlach R nr Lk. Boulder

Cpgd, 2600–2800 ft, 15.vi.1991, P. McLelland (2♂, CUIC); 1 mi. W Moscow [46°48′N 116°52′W], 27.v.1964, E.R. Logan (1♂, WFBM); 5 mi. S Moscow [46°48′N 116°52′W], 18.v.1961 (1♀, WFBM); 3 mi. N Moscow [46°48′N 116°52′W], 24.v.1969 (1♀, WFBM); Moscow [46°48′N 116°52′W], J.M. Aldrich (2♂, WFBM); same data except, 21.v.1904 (1♂, 1♂ with Bibionidae prey, 1♀ with Bibionidae prey, USNM); same data except, 17.v.1910 (1♀, USNM); same data except, 30.v.1911 (1♀, USNM); same data except, 24.iv.1912 (2♀, USNM); same data except, 30.v.1912 (1♂, USNM); same data except, 5.vi.1912 (2♂, 3♀, USNM); same data except, 22.v.1913 (3♀, USNM); same data except, 5.vi.1912, on flowers of *Polygonum* (3♂, USNM); same data except, 27.v.1964, D.S. Horning, Jr. (2♂, 2♀, WFBM); Moscow Mtn [46°48′N 116°52′W], 4.v.1966, E.J. Allen (1♀, WFBM); Paradise Ridge, 46°39′36.7″N 117°22′19.3″W, 7.vi.2022, A. Hawse, *ex Lomatium triternatus* (1 ♂, CNC); same data except, 24.v.2022 (1♂, 1♀, CNC); same data except, 31.v.2022 (3♀, CNC); same data except, 7.v.i.2022 (1♀, CNC); same data except, 17.v.2022, *ex Lithophragma parviflorum* (1♂, CNC); same data except, 31.v.2022, *ex Balsamorhiza sagittata* (2♂, CNC); same data except, 15.vi.2022, *ex Geranium vissocossimum* (1♂, 1♀, CNC). **Washington:** *Whitman County*: Almota [46°42′N 117°27′W], 19.iv.1973, D.L. England (1♂, WSU); Pullman [46°43′N 117°11′W] (1♀, USNM); same data except, April 30 (1♀, USNM); same data except, May (1♂ CAS; 1♀, CUIC; 3♂, USNM); same data except, 30 May (1♂, CUIC; 1♂, USNM); same data except, June (2♂, CUIC); same data except, June 1 (3♀, USNM); same data except 1.vi.1904 (1♂, CAS); same data except, 1.v.1907 (1♀, USNM); same data except, 7.v.1907 (3♂, USNM); same data except, 14.v.1907 (2♂, USNM); same data except, 16.v.1907 (2♂, 1♀, USNM); same data except, 24.v.1907 (2♂, USNM); same data except, 30.v.1913 (3♂, USNM); same data except, 23.v.1918, ALM (1♀, USNM); same data except, 6.vi.1918 (12♂, 18♀, USNM; 3♂, 3♀, CNC); same data except, 4.vi.1964, N.M. Jorgensen (2♀, LACM); same data except, 5.vi.1964 (1♀, LACM); same data except, 21.v.1971, J.F. MacDonald (1♀, CNC); 8 mi. SW Pullman [46°43′N 117°11′W], Lyle Grove, 22.v.1973 (1♂, WSU); same data except, Lyle Grove Biol. Area, 10.v.1979, E.A. Beck (1♂, 2♀, WSU); same data except, 3.vi.1979, S. Woods (1♂, WSU); same data except, R.S. Bekey (1♂, WSU); same data except, 2.v.1981, R.H. Miller (1♀, MTEC); same data except, 14.v.1981 (1♀, MTEC); same data except, 2100 ft, MT, 25.v.1979, S. Woods (1♂, 1♀, WSU); same data except, 27.v.1979 (1♀, WSU); same data except, 28.v.1979 (2♂, WSU); same data except, 30.v.1979 (1♀, WSU); same data except, 1.vi.1979 (2♂, 1♀, WSU); same data except, 4–6.vi.1979 (1♀, WSU); same data except, 6.vi.1979 (1♀, WSU); same data except, 6–8.vi.1979 (1♀, WSU); same data except, sweep, 26.v.1979, WJT (1♀, WFBM).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *valentis* species group by the occiput bearing multiple irregular rows of strong setae, especially dense ventrally (Fig. 252), usually six or more marginal scutellar setae, male hind femur with tuft of setae arising directly from inflated anteroventral process and without additional lobes (Figs 253, 254), and wing length usually greater than 7 mm.

Redescription. Wing length 6.9–8 mm. **Male.** Head dark in ground-colour, with greyish pruinescence. Dichoptic, upper ommatidia not enlarged. Frons divergent towards antennae; below ocellar triangle subequal to width of ocellar triangle; with short setulae along inner margin of eye. Face without setae; slightly divergent towards mouthparts, with oral margin dark and shiny. Ocellar triangle elevated, with thin greyish pruinescence, with pair of parallel ocellar setae and several pairs of short setulae. Occiput bearing multiple irregular rows of strong setae, similar in size to ocellar setae, rather dense, longer and finer ventrally (Fig. 252); postocular setae not differentiated; postocellar region without setae. Antenna dark; scape 2× longer than pedicel, with short, black setae; pedicel with ring of apical setae; postpedicel long and tapered, 4× longer than basal width; stylus 1.5× longer than basal width of postpedicel. Palpus dark brown, apically orange brown, with dark setulae. Proboscis reddish brown, length 2× or less head height; labellum with short, dark setae.

Thorax dark brown in ground-colour, densely grey pruinescent (Fig. 251). Scutum with 2 pairs of brownish vittae, extending beyond transverse suture; lateral pair broader than narrow and darker medial pair of vittae. Proepisternum with long, wavy dark setae on lower section; upper proepisternum in front of spiracle without setae. Prosternum bare. Antepronotum with row of dark setae, longer laterally. Postpronotum with 1 long seta and some 10 short, dark setae. Scutum with short, fine uniserial acr; dc slightly longer, stronger than acr, increasing in length posteriorly; 2 posterior npl, with 1–3 shorter anterior npl; 1 presut spal; 1 psut spal; 1 pal. Scutellum usually with 2–3 pairs of long sctl, with 1–2 pairs of marginal setae; disc bare. Laterotergite with narrow patch of strong, dark setae. Anterior and posterior spiracles pale.



FIGURES 251–256. Male habitus, head and hindleg of the *E.* (*Enoplempis*) *valentis* species group. **251,** *E.* (*En.*) *aeripes* Melander, habitus, lateral view; **252,** same, head, posterolateral view; **253,** same, hind femur tibia joint, anterior view; **254,** same, hind femur tibia joint, posterior view; **255,** *E.* (*En.*) *disconvenita* Melander, hind femur tibia joint, anterior view; **256,** same, hind femur tibia joint, posterior view.

Legs stocky, orange to reddish brown, apex of tibiae darker, tarsi brown; coxae clothed in dense greyish pruinescence, concolourous with pleura (Fig. 251). Coxae with stiff, black setae. Hind trochanter with short setulae. Fore femur clothed in short, black setae. Fore tibia with 3–4 short posteroventral setae, one-third width of femur; one long, ventral preapical seta, slightly longer than apical width of femur. Fore tarsomere 1 slender, not swollen;

all tarsomeres with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur clothed in short, black setae. Mid tibia with 3–4 short posteroventral setae, one-third width of femur; one long, ventral preapical seta, slightly longer than apical width of femur; 3–4 short anterodorsal and posterodorsal setae, similar to ventral setae, one-third width of femur; one long, ventral preapical seta, slightly longer than apical width of femur. Mid tarsus similar to fore tarsus. Hind femur with inflated anteroventral process with tuft of black setae arising directly; inflated process usually with several black, ventral setae; apex with preapical row of 4–5 flattened, black posterior setae; preapical anterior seta strong, shorter than width of femur (Figs 253, 254). Hind tibia with narrow, anteroventral digitiform process on basal quarter, slightly proximal to process of femur (when legs folded), with appressed black setae on dorsal half; posteroventrally with broad, triangular process opposite inflated process of femur, with long appressed, black lateral and apical setae, longer than on anteroventral process; without seta in posteroapical comb; 6–7 strong, black anterodorsal and posterodorsal setae, shorter than half width of tibia (Figs 251, 253, 254). Hind tarsus similar to fore tarsus.

Wing infuscate with dark veins; all veins complete (except Sc), well sclerotized. Basal costal seta absent. R_5 and M_1 divergent near wing margin; R_5 ending anterior to wing tip; radial fork acute. Halter pale, reddish brown.

Abdomen dark, with dense greyish pruinescence, similar to scutum with long setae on tergites 1 and 2; setae sparse on distal tergites; posterior margin of tergites slightly to distinctly glossy. Pregenital segments unmodified, except sclerites of segment 8 narrowly separated. Terminalia (Fig. 262): dark brown with dorsal margin of epandrium and phallus orange brown. Cercus short, rectangular; dorsal margin with distinct notch at mid-length, posteriorly with short, dorsal knob-like projection; setae shorter than width of cercus. Subepandrium without process or setae. Epandrial lamella oval, higher than long; posterior margin with short, knob-like projection, bearing long seta ventrally; setae longer than cercal setae. Hypandrium short, truncate, prolonged laterally; without setae. Phallus with basal half strongly expanded, tapered, mostly straight apically; apex not emerging beyond epandrium; ejaculatory apodeme more than half-length of epandrium, Y-shaped, with ventrally positioned lateral apodemes.

Female. Similar to male, except as follows: frons slightly broader; scutum with bluish pruinescence; vittae narrower, dark grey; hindleg without modified setae and processes; abdominal pleural membrane with darkened, expanded region; tergites 7 and 8 shiny, without pruinescence.

Geographical distribution and seasonal occurrence (Fig. 250). *Empis* (*En.*) *aeripes* is known from Idaho and eastern Washington. Adults have been collected from April to June.

Nuptial gift presentation. A male and female specimen listed above were pinned with an unwrapped male *Bibio* sp. (Bibionidae) fly prey item mounted below the specimens. This almost certainly indicates that males of this species present unwrapped prey to females as nuptial gifts.

Remarks. *Empis* (*En.*) *aeripes* is very similar to *E.* (*En.*) *mixopolia*, with male terminalia and male hind legs seemingly identical. The number of scutellar setae that Melander (1902) used appears to generally hold to help distinguish the two species. The multiple rows of occipital setae in *E.* (*En.*) *aeripes* (fewer setae in *E.* (*En.*) *mixopolia*) and larger size assist to further distinguish this species.

The female abdominal pleural membrane appears to have a darkened, expanded region in less shrunken specimens, which likely indicates that pleural sacs may be inflated during mating (Table 1).

Empis (*Enoplempis*) *disconvenita* Melander stat. rev.

(Figs 250, 255, 256, 263)

Empis dolabraria disconvenita Melander, 1902: 326. Type locality: Mt. View, California (USA).
Empis dolabraria disconvenita: Melander, 1965: 459 (catalogue); Yang *et al*. (2007): 133 (catalogue).

Type material examined. LECTOTYPE (here designated in order to fix identity of the species) ♂ from Mountain View, California, labelled: "Mt. View [37°23′N 122°4′W], Cal./ March '92"; "Ehrhorn"; "W.M. Wheeler/ Collection,"; "TYPE/ No. A.M.N.H. [red label]"; "Am. Mus. Nat. Hist./ Dept. Invert. Zool./ No. 973"; "Empis dol./ disconvenita"; "LECTOTYPE/ *Empis dolabraria*/ *disconvenita* Melander/ des. Sinclair, Brooks &/ Cumming 2025 [red label]" [dissected] (AMNH).

Notes on type specimens. This species was described from one male and one female specimen. The female syntype was not located.

Additional material examined. USA. California: *Alameda County*: Melrose [37°46′N 122°12′W], 2.iv.1922,

E.P. Van Duzee (3♂, CAS). *Amador County*: Drytown [38°26′N 120°51′W], 28.ii.1963, R.P. Allen (9♂, 4♀, CSCA). *San Mateo County*: Redwood City [37°28′N 122°14′W], 28.ii.1943, PHA (1♂, 4♀, USNM); same data except, 6.iii.1943 (1♀, USNM); same data except, 3.iii.1951, at flrs *Brassica* (4♂, 7♀, USNM). *Santa Clara County*: San Antonio Vy. at Jct Del Puerto Cyn Rd [37°23′N 121°29′W], 14.iii.1965, JAP (1♂, 1♀, EMEC). *Solano County*: 11 mi. S Dixon [38°17′N 121°49′W], 19.iii.1969, D.S. Horning, Jr (1♂, UCDC); Dozier [38°17′N 121°49′W], nr Dixon, 3.iv.1971, R.W. Thorp (1♂, UCDC). *Tulare County*: 1 mi. NE Posey [35°48′N 118°41′W], 14.v.1963, C.A. Toschi (2♀, EMEC).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *valentis* species group by the occiput bearing several irregular rows of strong setae, four marginal scutellar setae, halter with pale knob, anteroventral digitiform process of male hind femur without short basal lobe and with pair of short lobes medial to digitiform anteroventral process (Figs 255, 256), and wing length usually less than 7 mm.

Redescription. Wing length 6.0–6.8 mm. **Male.** Similar to *E.* (*En.*) *aeripes*, except as follows: head with occiput bearing several irregular rows of strong setae, similar in size to ocellar setae. Postpedicel long and tapered, 3× longer than basal width; stylus slightly longer than basal width of postpedicel. Palpus orange brown.

Scutum with two pairs of broad brownish vittae. Scutum with 1 long and 1 shorter posterior npl, with 1–3 shorter anterior npl. Scutellum usually with 2 pairs of long sctl, widely separated medially; occasionally with short, slender setulae.

Hind femur with anteroventral process digitiform with tuft of black apical setae and numerous setae on stalk, without short basal lobe; pair of short knob-like lobes medial to digitiform anteroventral process; apex with preapical row of 4–5 flattened, black posterior setae; preapical anterior seta strong, nearly as long as width of femur (Figs 255, 256). Hind tibia slightly incurved at base, with broad, somewhat flattened anteroventral digitiform process on basal quarter, with appressed black setae on outer margin; posteroventrally with similar broad process, not flattened dorsally, with crown of black apical setae, similar to setae on anteroventral process (Figs 255, 256).

Wing with R_5 ending at wing tip. Halter pale, orange brown.

Abdomen without posterior margin of tergites glossy. Terminalia (Fig. 263): cercus without knob-like projection in apical cleft; posterior lobe with tooth-like projection apically. Hypandrium not prolonged laterally.

Female. Similar to male, except as follows: hindleg without modified setae and processes; abdominal pleural membrane with darkened, expanded region.

Geographical distribution and seasonal occurrence (Fig. 250). *Empis* (*En.*) *disconvenita* is known only from central California and adults have been collected from February to May.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *dolabraria* Melander

(Figs 257, 258, 264, 284)

Empis dolabraria Melander, 1902: 325. Type locality: California (USA).
E. (*Enoplempis*) *dolabraria*: Melander, 1928: 142 (assigned to subgenus *Enoplempis*).
Empis dolabraria: Melander, 1965: 459 (catalogue); Yang *et al*. (2007): 133 (catalogue).

Type material examined. LECTOTYPE (here designated in order to fix identity of the species) ♂, labelled: "Cal./ Baron [right hindleg glued to label]"; "W.M. Wheeler/ Collection,"; "TYPE/ No. A.M.N.H. [red label]"; "Am. Mus. Nat. Hist./ Dept. Invert. Zool./ No. 971"; "Empis/ dolabraria"; "LECTOTYPE/ *Empis dolabraria* Melander/ des. Sinclair, Brooks &/ Cumming 2025 [red label]" [dissected] (AMNH).

Notes on type specimens. This species was described from one male and one female specimen, collected by Baron. The female syntype was not located.

Additional material examined. USA. California: *Alameda County*: Sunol Reg. Wilderness, along Indian Joe Ck [37°30′N 121°49′W], 29.iii.1979, DDW (13♂, 33♀, CAS). *Amador County*: 4 mi. E Fiddletown [38°30′N 120°45′W], 12.iii.1970, E.E. Grissell, R.F. Denno, (1♀, UCDC); same data except, 13.iii.1970, *Ranunculus* (8♂, 16♀, UCDC); same data except, 1 mi. E, 23.iii.1965, JAP (1♂, 1♀, EMEC); same data except, R.L. Langston (1♀, EMEC). *Contra Costa County*: 4 mi. N Orinda [37°52′N 122°10′W], Russell Property, 27.iii.1964, H.V. Daly (1♂, 2♀, EMEC). *El Dorado County*: Coloma [38°48′N 120°53′W], 4 mi. W, 21.iii.1962, *Salix*, JAP (1♂, EMEC); Cool [38°53′N 121°1′W], 23.iii.1965, JAP (1♀, EMEC); Placerville [38°43′N 120°47′W], 3 mi. N, 23.iii.1965, R.L.

Langston (1♀, EMEC). *Mariposa County*: Miami Ranger Sta. [37°26′N 119°38′W], 24.v.1942, sweeping (1♀, EMEC). *Solano County*: 8 mi. W Winters [38°30′N 122°5′W], 14.iii.1964, E.J. Montgomery (1♂, UCDC). *Tulare County*: Ash Mtn, Kwh Power Station #3 [36°29′N, 118°50′W], 23.iii.1993, J.F. MacDonald, CNC1732703 (1♂, CNC); Camp Wishon [36°11′N 118°39′W], 12 mi. NE Springville, 1.v.1979, J.T. Doyen (1♂, EMEC). *Tuolumne County*: 1 mi. NW Soulsbyville [37°59′N 120°15′W], 1.v.1961, JAP (1♀, EMEC); 3 mi. E Hardin Flat [37°48′N 119°56′W], 12.vi.1964, A. Gillogly (1♂, UCRC).



FIGURES 257–261. Male habitus and hindleg of the *E.* (*Enoplempis*) *valentis* species group. **257,** *E.* (*En.*) *dolabraria* Melander, hindlegs, lateral view; **258,** same, hind femur tibia joint, anterior and posterior views; **259,** *E.* (*En.*) *flavobulla* **sp. nov.**, habitus, lateral view; **260,** same, hind femur tibia joint, oblique anterior view [arrow pointing to basal lobe]; **261,** same, hind femur tibia joint, posterior view.

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *valentis* species group by the occiput bearing several irregular rows of strong setae, usually four marginal scutellar setae, halter with dark knob, male hind femur with single inner medial knob, separate from anteroventral process (Figs 257, 258), and wing length less than 7 mm.

Redescription. Wing length 5.9–6.8 mm. **Male.** Similar to *E.* (*En.*) *aeripes*, except as follows: head with occiput bearing several irregular rows of strong setae, similar in size to ocellar setae. Postpedicel long and tapered, 3× longer than basal width; stylus slightly longer than basal width of postpedicel. Palpus orange brown.

Thorax with scutum with two pairs of broad, well-separated brownish vittae. Scutum with 1 long and 1 shorter posterior npl, with 1–3 shorter anterior npl. Scutellum usually with 2 pairs of long sctl, widely separated medially.

Hind femur with anteroventral process digitiform with tuft of black apical setae and numerous setae on stalk, without short basal lobe; single short knob-like lobe medial to digitiform anteroventral process; apex with preapical row of 3–5 flattened, black posterior setae; preapical anterior seta weakly differentiated (Figs 257, 258). Hind tibia straight at base, with broad, somewhat flattened anteroventral digitiform process on basal quarter, with appressed black setae on outer margin, reduced to stub-like setae apically; posteroventrally with similar broad, rounded process, not flattened dorsally, with crown of black apical setae, longer than setae on anteroventral process (Figs 257, 258).

Wing with R_5 ending anterior to wing tip. Halter with dark knob.

Abdomen without posterior margin of tergites glossy. Terminalia (Fig. 264): cercus without knob-like projection in apical cleft. Hypandrium not prolonged laterally.

Female. Similar to male, except as follows: hindleg without modified setae and processes; abdomen with posterior margins of tergite 5 and 6 glossy; tergites 7 and 8 entirely glossy; abdominal pleural membrane with darkened, expanded region.

Geographical distribution and seasonal occurrence (Fig. 284). *Empis* (*En.*) *dolabraria* is known only from central California. Adults have been collected from March to June.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *flavobulla* sp. nov.

urn:lsid:zoobank.org:act:2F5FA587-0538-4C3D-866A-18067878972D
(Figs 250, 259–261, 265)

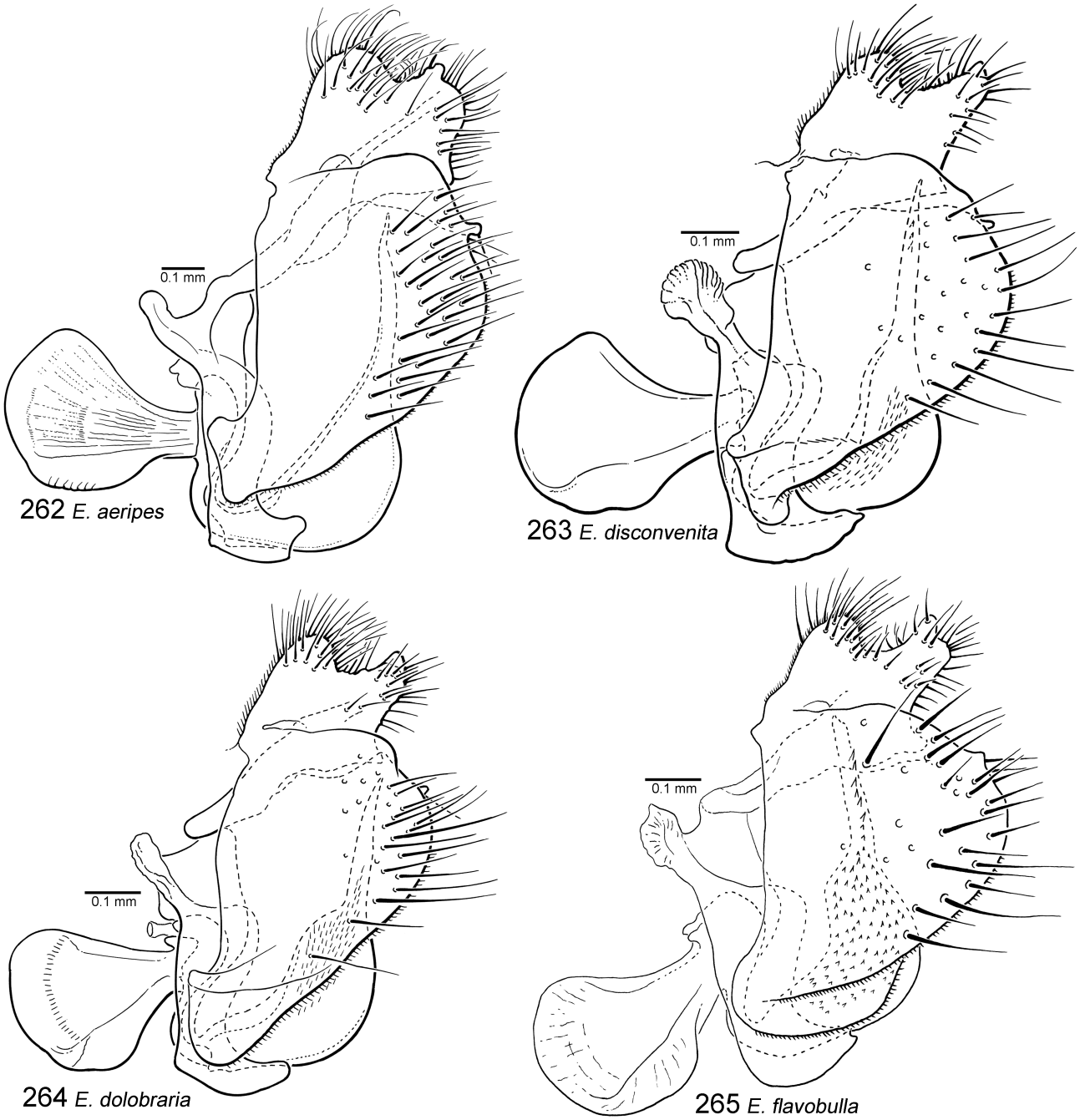
Type material. HOLOTYPE ♂, labelled: "CALIF:Tuol. Co., S./ fork StanislausRiv.,/ 4airline mi. NE./ Columbia [38°04′N 120°20′W] III-25-65"; "R.L. Langston/ Collector"; "Empis/ (Enoplempis)/ ?dolabraria/ Melander/ det/ WJ Turner '78"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *flavobulla* Sinclair,/ Brooks & Cumming [red label]" (EMEC). **PARATYPES: USA. California:** Same data as holotype (1♂, 1♀, EMEC); same data except, 3.iv.1964, JAP (3♂, 1♀, EMEC). *El Dorado County*: 8 mi. E Auburn, Greenwood Ck [38°54′N 120°54′W], 10.iii.1997, M.S. Caterino (2♂, 1♀, EMEC).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *valentis* species group by the occiput bearing a pair of irregular rows of strong setae (Fig. 259), four marginal scutellar setae, halter with pale knob (Fig. 259), male hind femur with narrow inner basal knob on anteroventral digitiform process (Fig. 260), and wing length less than 7 mm.

Description. Wing length 6.5 mm. **Male.** Similar to *E.* (*En.*) *aeripes*, except as follows: head with occiput bearing pair of irregular rows of strong setae, similar in size to ocellar setae. Postpedicel long and tapered, 4× longer than basal width; stylus 1.5× longer than basal width of postpedicel. Palpus not visible.

Thorax with postpronotum with 1 long seta and some 4–5 pairs of shorter, dark setae. Scutum with 2 posterior npl, with 1 shorter anterior npl. Scutellum with 2 pairs of strong sctl, widely separated medially.

Hind femur with anteroventral process digitiform longer than apical width of femur, with tuft of black apical setae and several setae on stalk, with narrow basal lobe bearing several thin apical setae; one knob-like lobe medial to digitiform anteroventral process, straight, parallel-sided; one short knob-like posteroventral lobe proximal to preapical row of 4 flattened, black posterior setae; preapical anterior seta strong, slightly longer than width of femur (Figs 260, 261). Hind tibia with stout anteroventral digitiform process on basal quarter, slightly proximal to process of femur (when legs folded), with appressed black marginal setae; posteroventrally with broad, rounded process, with short marginal setae and tuft of long, subapical setae, subequal to length of process (Figs 259–261).



FIGURES 262–265. Male terminalia of the *E*. (*Enoplempis*) *valentis* species group, lateral view. **262,** *E*. (*En*.) *aeripes* Melander; **263,** *E*. (*En*.) *disconventia* Melander (lectotype); **264,** *E*. (*En*.) *dolabraria* Melander (lectotype); **265,** *E*. (*En*.) *flavobulla* **sp. nov.**

Wing with R_5 ending posterior to wing tip. Halter pale, yellowish brown.

Abdomen without posterior margin of tergites glossy. Terminalia (Fig. 265): dark brown. Cercus short, rectangular; dorsal margin with distinct notch at mid-length, posteriorly with distinct, dorsal knob-like projection; setae shorter than width of cercus. Subepandrium without process or setae. Epandrial lamella oval, higher than long; posterior margin with very short, knob-like projection; posterior margin with short setae. Hypandrium short, truncate, slightly prolonged laterally; without setae. Phallus with basal half strongly expanded; tapered apically, mostly straight apically; apex not emerging beyond epandrium; lateral face of phallus with thickened spicules; ejaculatory apodeme more than half-length of epandrium, Y-shaped, with ventrally positioned lateral apodemes.

Female. Similar to male, except as follows: frons slightly broader; hindleg without modified setae and processes; abdominal pleural membrane with darkened, expanded region; tergites 7 and 8 shiny.

Geographical distribution and seasonal occurrence (Fig. 250). *Empis* (*En.*) *flavobulla* **sp. nov.** is known from March and April in central California.

Etymology. The species name is derived from Latin *flavos* for yellowish and *bulla* for knob, in reference to the pale yellowish halter of this species.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *fresno* sp. nov.

urn:lsid:zoobank.org:act:91BF4A9C-9716-473C-AE81-41FE95448FA0
(Figs 250, 266, 267, 275)

Type material. HOLOTYPE ♂, labelled: "Bluffs, Fresno [36°51′N 119°47′W]/ 17 Mar.'23, Cal"; "M.E. Phillips/ Collector"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *fresno* Sinclair,/ Brooks & Cumming [red label]" (CUIC). **PARATYPES: USA. California:** Same data as holotype (1♀, CUIC).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *valentis* species group by the occiput bearing a pair of irregular rows of strong setae, four marginal scutellar setae, halter with pale knob, male hind femur without inner basal knob on anteroventral digitiform process, medial lobe to digitiform anteroventral process strongly arched, sickle-shaped (Figs 266, 267), and wing length less than 7 mm.

Description. Wing length 5.5 mm. **Male.** Similar to *E.* (*En.*) *aeripes*, except as follows: head with occiput bearing pair of irregular rows of strong setae, similar in size to ocellar setae. Postpedicel long and tapered, 4× longer than basal width; stylus 1.5× longer than basal width of postpedicel. Palpus not visible.

Thorax with postpronotum with 1 long seta and some 4–5 pairs of shorter, dark setae. Scutum with 2 posterior npl, with several very short anterior npl. Scutellum with 2 pairs of strong sctl, widely separated medially.

Hind femur with anteroventral process digitiform, longer than apical width of femur, with tuft of black apical setae and several setae on stalk, without basal lobe; one knob-like lobe medial to digitiform anteroventral process, strongly arched, sickle-shaped; one very short posteroventral swelling proximal to preapical row of 3 flattened, black posterior setae; preapical anterior seta strong, slightly longer than width of femur (Figs 266, 267). Hind tibia with stout anteroventral digitiform process on basal quarter, slightly proximal to process of femur (when legs folded), with appressed black marginal setae; posteroventrally with broad, rounded process, with short marginal setae and tuft of long, subapical setae, subequal to length of process (Figs 266, 267).

Wing with R_5 ending posterior to wing tip. Halter pale, yellowish brown.

Abdomen without glossy posterior margin of tergites. Terminalia (Fig. 275): dark brown. Cercus short, rectangular; dorsal margin with distinct notch at mid-length, posteriorly with distinct, dorsal knob-like projection; setae shorter than width of cercus. Subepandrium without process or setae. Epandrial lamella oval, higher than long; posterior margin with very short, knob-like projection; posterior margin with short setae. Hypandrium short, truncate, slightly prolonged laterally; without setae. Phallus with basal half strongly expanded; tapered apically, mostly straight apically; apex not emerging beyond epandrium; lateral face of phallus with thickened spicules; ejaculatory apodeme more than half-length of epandrium, Y-shaped, with ventrally positioned lateral apodemes.

Female. Similar to male, except as follows: frons slightly broader; hindleg without modified setae and processes; abdominal pleural membrane with darkened, expanded region; tergites 7 and 8 shiny.

Geographical distribution and seasonal occurrence (Fig. 250). *Empis* (*En.*) *fresno* **sp. nov.** is only known from March at the type locality in Fresno, California.

Etymology. The species name is in reference to the type locality, Fresno, California and is a noun in apposition.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *mixopolia* Melander

(Figs 268–270, 276, 284)

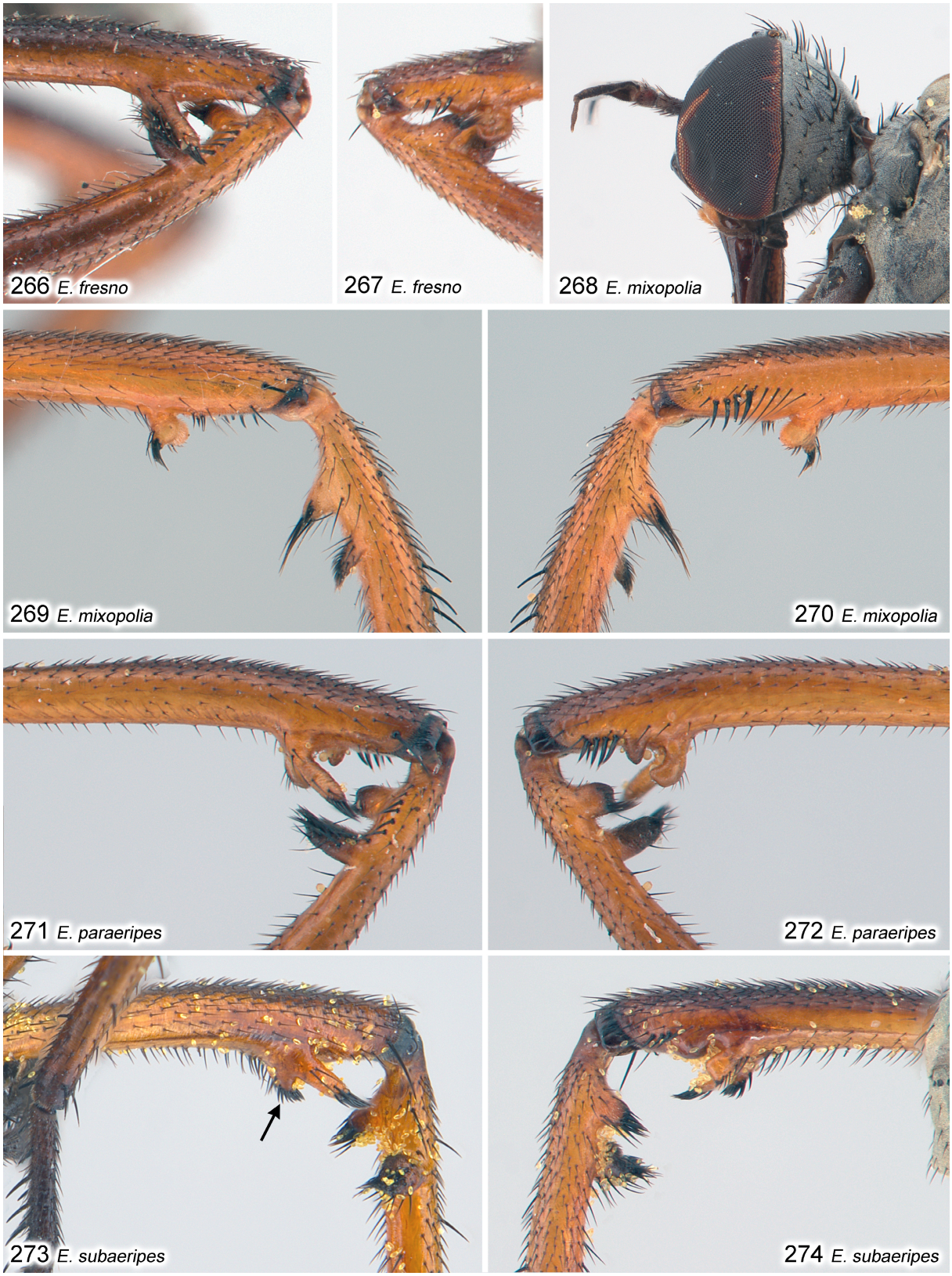
Empis mixopolia Melander, 1902: 327. Type locality (by lectotype designation): Kendrick, Idaho (USA).
E. (*Enoplempis*) *mixopolia*: Melander, 1928: 142 (assigned to subgenus *Enoplempis*).
Empis mixopolia: Melander, 1965: 460 (catalogue); Yang *et al*. (2007): 137 (catalogue).

Type material examined. LECTOTYPE (here designated in order to fix identity of the species) ♂, labelled: "Kendrick [46°36′N 116°39′W]/ Idaho"; "JM Aldrich/ Coll"; "Cotype/ No. 41823/ U.S.N.M. [red label]"; "LECTOTYPE/ *Empis mixopolia* Melander/ des. Sinclair, Brooks &/ Cumming 2025 [red label]" (USNM). **PARALECTOTYPES: USA. Idaho:** Same data as lectotype (2♂, AMNH; 7♂, 1♀, USNM). *Latah County*: Juliaetta [46°34′N 116°42′W], J.M. Aldrich (1♂, 1♀, USNM); Moscow [46°48′N 116°52′W] (2♀, AMNH; 3♂, USNM); Troy [46°44′N 116°46′W], 4.v.1899, J.M. Aldrich (1♂, 1♀, USNM).

Notes on type specimens. This species was described from an unspecified number of male and female specimens collected by J.M. Aldrich deposited in the AMNH and USNM. Two male and two female paralectotypes are also present in OUMNH.

Additional material examined. USA. Idaho: *Latah County*: 3 mi. S Helmer [46°48′N 116°28′W], 22.v.1971, WJT (2♂, 1♀, WFBM); Juliaetta [46°34′N 116°42′W] (1♀, USNM); Kendrick [46°36′N 116°39′W] (2♀, USNM); Moscow [46°48′N 116°52′W] (1♀, USNM); same data except, 10.v.1936, 2560 ft, R.E. Miller (1♂, WFBM); Moscow Mtn [46°48′N 116°52′W], 17.vi.1904 (1♀, USNM); same data except, 26.v.1918, ALM (1♂, USNM); Paradise Ridge, 46°39′36.7″N 117°22′19.3″W, 24.v.2022, A. Hawse, *ex Lomatium multiflorum* (1♂, CNC); same data except, 24.v.2022, *ex Lomatium triternatus* (1♂, 1♀, CNC); same data except, 31.v.2022, *ex Lithophragma parviflorum* (1♀, CNC); same data except, 31.v.2022, *ex Lomatium triternatus* (1♀, CNC); Troy, Hwy 8 at mm [milemarker] 15, West Fk Ck, 747 m, 46.733°N 116.757°W, 9.vi.2009, E09-62b, I.S. Winkler (1♂, CNC). *Nez Perce County*: Craig Mts [46°09′N 116°44′W], 8.vi.1918, ALM (1♂, USNM); Lk. Waha [46°12′N 116°50′W], 9.vi.1918, ALM (1♀, USNM). *Owyhee County*: Givens Springs [43°24′N 116°42′W], 3 mi. E, *Stanleya pinnata*, 30.v.1962, A.R. Gittens (1♂, 3♀, WFBM). *Washington County*: 2 mi. N Mann's Ck [44°26′N 116°55′W], 31.v.1962, A.R. Gittens (1♂, WFBM). **Oregon:** *Baker County*: L. Goose Ck, 36 mi. SE Union [44°56′N 117°25′W], Wallowa-Whitman NF, 4600 ft, 9.vi.1977, WJT (1♂, WSU); U. Goose Ck, 34 mi. SE Union [44°56′N 117°25′W], 4160 ft, 24–25.vi.1977, sweeping *Anaphalis* flowers, WJT (13♂, 4♀, WSU). *Umatilla County*: 10 mi. E Weston [45°47′N 118°15′W], 24.v.1969, yarrow bloom, K. Goeden (1♂, 2♀, ODAC). *Union County*: Jordan Ck, 28 mi. SSW La Grande, 4840 ft, Wallowa-Whitman NF, 16.vi.1977, WJT (1♂, 1♀, WSU). *Wallowa County*: Minam SP [45°47′N 117°43′W], 9.vi.1971, WJT (5♂, 2♀, WFBM). **Washington:** *Asotin County*: 5 mi. S Anatone, Fields Spring SP [46°4′N 117°10′W], 17.vi.1984, J. Jenkins (7♂, 5♀, WSU); same data except, J.M. Sirota (1♂, 2♀, WSU); Fields Spring SP, 31.vii.1971, MT dry ice, WJT, W.B Garnett (1♂, WSU); same data except, 14.vi.1972, dry ice MT trap, WJT (8♂, 1♀, WSU); same data except, 15.vi.1972 (4♂, 3♀, WSU); same data except, 26.vi.1972 (1♂, 1♀, WSU); same data except, 27.vi.1972 (1♂, WSU); Fields Spring SP, 4 mi. S Anatone, 3500–4000 ft, 7.vi.1973, WJT (2♂, 2♀, WSU); same data except, D. Corredor (2♂, 2♀, WSU); same data except, M. Jackson (1♂, WSU); same data except, 12–13.vi.1974, MT with dry ice, WJT (10♂, 6♀, WFBM); same data except, 26.v.1974 (1♂, WSU); same data except, ex: flowers *Taraxicum*[sic] *officinale* (1♂, 1♀, USNM; 2♂, 16♀, WSU). *Columbia County*: Tucannon Fish Hatch., 20 mi. E Dayton [46°19′N 117°39′W], 2650 ft, 15.v.1979, MT, WJT (5♂, WSU); same data except, 12.v.1979, sweeping (1♀, WSU). *Whitman County*: Almota [46°42′N 117°28′W], 25.v.1913 (1♂, USNM); same data except, 6.v.1972, dry ice MT, WJT (11♂, 5♀, WSU); same data except, 27.vi.1972 (2♂, WSU); Colton [46°34′N 117°7′W], 24.v.1952, S.E. Knapp (1♂, USNM); Kamiak Butte, 46°53′02.8″N 117°09′04.4″W, 20.v.2022, A. Hawse, *ex Lomatium triternatus* (1♂); same data except, 11.v.2023 (1♀, CNC); same data except, *Lomatium multiflorum* (2♀, CNC); Kramer Strip Nat. Palouse, 7 mi. NW Colton [46°36′N 117°14′W], 16.v.1987, sweep, WJT (1♂ WSU); Palouse Nat. Area [46.73°N 117.16°W], 5 mi. N Colton, 16.v.1987, J.B. Johnson (1♀, WFBM); Pullman nr SCS Pond-WSU [46°43′N 117°9′W], 29.v.1971, WJT (1♀, WSU); Pullman [46°43′N 117°10′W], 19.v.1912 (1♂, 2♀, USNM); same data except, 30.v.1913 (1♀, USNM); same data except, 10.vi.1910 (1♀, USNM); same data except, 20.v.1917, ALM; same data except, 6.vi.1918 (1♂, USNM); 8 mi. SW Pullman, Lyle Grove Biol. Area [46°43′N 117°11′W], 2100 ft, 26.v.1979, sweep, WJT (1♀, WSU); same data except, 1.vi.1979, MT, S. Woods (2♀, WSU); same data except, 4.vi.1979 (2♂, WSU); same data except, 4–6.vi.1979 (1♂, WSU); same data except, 8–13.vi.1979 (1♂, WSU); Upper Union Flat Rd, 46°46′47.0″N 117°22′19.3″W, 28.v.2022, A. Hawse, *ex Balsamorhiza sagittata* (1♂, CNC); Wawawai [46°38′N 117°22′W], 2400 ft, 28.v.1922, ALM (2♂, CNC; 2♂, 2♀, USNM); 2 mi. E Wawawai [46°38′N 117°22′W], 7.v.1965, L.S. Hawkins, Jr (1♂, WFBM).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *valentis* species group by the occiput bearing two irregular rows of strong setae (Fig. 268), four marginal scutellar setae, tuft of black basal costal setae distinct from distal costal setae, male hind femur with tuft of setae arising directly from inflated anteroventral process and without additional lobes (Figs 269, 270), and wing length usually less than 7 mm.



FIGURES 266–274. Male head and hindleg of the *E.* (*Enoplempis*) *valentis* species group. **266,** *E.* (*En.*) *fresno* **sp. nov.**, hind femur tibia joint (holotype), anterior view; **267,** same, hind femur tibia joint (holotype), posterior view; **268,** *E.* (*En.*) *mixopolia* Melander, head, lateral view; **269,** same, hind femur tibia joint, anterior view; **270,** same, hind femur tibia joint, posterior view; **271,** *E.* (*En.*) *paraeripes* **sp. nov.**, hind femur tibia joint, anterior view; **272,** same, hind femur tibia joint, posterior view; **273,** *E.* (*En.*) *subaeripes* **sp. nov.**, hind femur tibia joint (holotype), oblique anterior view [arrow pointing to basal lobe]; **274,** same, hind femur tibia joint (holotype), posterior view.

Redescription. Wing length 5.8–7.0 mm. **Male.** Similar to *E.* (*En.*) *aeripes*, except as follows: head with occiput bearing two irregular rows of strong setae (Fig. 268).

Thorax with scutum with 2 pairs of broad brownish vittae, generally fading beyond transverse suture. Scutum with 1–2 posterior npl. Scutellum with 2 pairs of strong sctl, widely separated medially.

Legs with coxae clothed in dense greyish pruinescence, concolourous with pleura dorsally changing to orange brown ventrally, similar to femora. Hind femur and tibia with similar modified processes and setae as *E.* (*En.*) *aeripes* (Figs 268–270).

Wing with tuft of black basal costal setae distinct from row of distal costal setae.

Terminalia (Fig. 276): indistinguishable from *E.* (*En.*) *aeripes*.

Female. Similar to male, except as follows: hindleg without modified setae and processes; abdominal pleural membrane with darkened, expanded region.

Geographical distribution and seasonal occurrence (Fig. 284). *Empis* (*En.*) *mixopolia* is known from eastern Washington, eastern Oregon, and Idaho. Adults have been collected from May to July.

Nuptial gift presentation. Form unknown.

***Empis* (*Enoplempis*) *paraeripes* sp. nov.**

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(Figs 271, 272, 280, 285)

Type material. HOLOTYPE ♂, labelled: "CAL:Tulare Co./ S. Fork Camp [36°21′N 118°45′W], 13/ mi. SE Three/ Rivers V-3-79/ R. Coville, col."; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *paraeripes* Sinclair,/ Brooks & Cumming [red label]" (EMEC). **PARATYPES: USA. California:** Same data as holotype (3♂, EMEC); same data except, 32–3600 ft, JAP (3♂, EMUC). *Fresno County*: Dunlap [36°44′N 119°07′W], 9.iv.1953, J.C. Hall (1♂, UCD); same data except, 17.iv.1956, R.P. Allen (1♂, EMUC). *Tulare County*: Ash Mtn. Kwh. Pwr. Sta. 3 [36°29′N, 118°50′W], 23.iii.1983, J.F. MacDonald (1♂, 3♀, CNC); 1 mi. NE Posey [35°48′N 118°40′W], 14.v.1963, JAP (2♂, EMUC).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *valentis* species group by the occiput bearing several irregular rows of strong setae, four marginal scutellar setae, halter with yellowish brown knob, male hind femur with inner medial knob, separate from anteroventral process (Figs 271, 272), and wing length less than 7 mm.

Description. Wing length 5.9–6.2 mm. **Male.** Similar to *E.* (*En.*) *aeripes*, except as follows: head with occiput bearing several irregular rows of strong setae, similar in size to ocellar setae. Postpedicel long and tapered, 4× longer than basal width; stylus 1.5× longer than basal width of postpedicel. Palpus orange brown.

Thorax with postpronotum with 1 long seta and some 2 pairs of shorter, dark setae. Scutum with 2 posterior npl, with 1 shorter anterior npl. Scutellum with 2 pairs of strong sctl, widely separated medially.

Hind femur with anteroventral process digitiform, longer than apical width of femur, with tuft of black apical setae and numerous setae on stalk, without basal lobe; one knob-like lobe medial to digitiform anteroventral process slightly arched posteriorly; one short knob-like posteroventral lobe proximal to preapical row of 4–5 flattened, black posterior setae; preapical anterior seta strong, slightly longer than width of femur (Figs 271, 272). Hind tibia with stout anteroventral digitiform process on basal quarter, slightly proximal to process of femur (when legs folded), with appressed black marginal setae; posteroventrally with broad, rounded process, with short marginal setae and tuft of long subapical setae, subequal to length of process (Figs 271, 272).

Wing with R_5 ending posterior to wing tip. Halter with yellowish brown knob.

Abdomen without posterior margin of tergites glossy. Terminalia (Fig. 280): dark brown. Cercus short, rectangular; dorsal margin with distinct notch at mid-length, posteriorly with short, dorsal knob-like projection; setae shorter than width of cercus. Subepandrium without process or setae. Epandrial lamella oval, higher than long; posterior margin with very short, knob-like projection; posterior margin with short setae. Hypandrium short, truncate, slightly prolonged laterally; without setae. Phallus with basal half strongly expanded posteriorly beyond margin of epandrium; tapered apically, mostly straight apically; apex not emerging beyond epandrium; lateral face of phallus with spicules; ejaculatory apodeme more than half-length of epandrium, Y-shaped, with ventrally positioned lateral apodemes.

Female. Similar to male, except as follows: frons slightly broader; hindleg without modified setae and processes; abdominal pleural membrane with darkened, expanded region; tergites 7 and 8 shiny.

Geographical distribution and seasonal occurrence (Fig. 285). *Empis* (*En.*) *paraeripes* **sp. nov.** is known from March to May in central California.

Etymology. The species name is derived from the Greek *para* meaning near and *aeripes*, in reference to the similarity with *E*. (*En.*) *aeripes*.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *subaeripes* sp. nov.

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(Figs 250, 273, 274, 281)

Type material. HOLOTYPE ♂, labelled: "USA: California/ Monterey Co., Carmel/ Valley, Hastings Nat./ History Pres. [36°22′N 121°33′W], 7-8 Mar/ 1996 Paul H. Arnaud Jr."; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *subaeripes* Sinclair,/ Brooks & Cumming [red label]" (USNM). **PARATYPES: USA. California:** Same data as holotype (1♂, USNM).

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *valentis* species group by the occiput bearing a pair of irregular rows of strong setae, four marginal scutellar setae, halter with pale knob, male hind femur with inner basal knob on anteroventral digitiform process, bearing apical brush of thick black setae (Fig. 273), and wing length less than 7 mm.

Description. Wing length 5.5 mm. **Male.** Similar to *E.* (*En.*) *aeripes*, except as follows: head with occiput bearing pair of irregular rows of strong setae, similar in size to ocellar setae. Postpedicel long and tapered, 4× longer than basal width; stylus 1.5× longer than basal width of postpedicel. Palpus orange brown.

Thorax with postpronotum with 1 long seta and some 4–5 pairs of shorter, dark setae. Scutum with dc well developed, more than twice length of acr; 2 posterior npl, with 1 shorter anterior npl. Scutellum with 2 pairs of strong sctl, widely separated medially.

Hind femur with anteroventral process digitiform longer than apical width of femur, with tuft of black apical setae and several setae on stalk, with basal lobe with apical brush of black, thick setae; one knob-like lobe medial to digitiform anteroventral process, straight, parallel-sided with several lateral setae; one very short posteroventral swelling proximal to preapical row of 4 flattened, black posterior setae; preapical anterior seta strong, slightly longer than width of femur (Figs 273, 274). Hind tibia with stout anteroventral digitiform process on basal quarter, slightly proximal to process of femur (when legs folded), with appressed black marginal setae; posteroventrally with broad, rounded process, with short marginal setae and tuft of long, subapical setae, subequal to length of process (Figs 273, 274).

Wing with R_5 ending posterior to wing tip. Halter pale, yellowish brown.

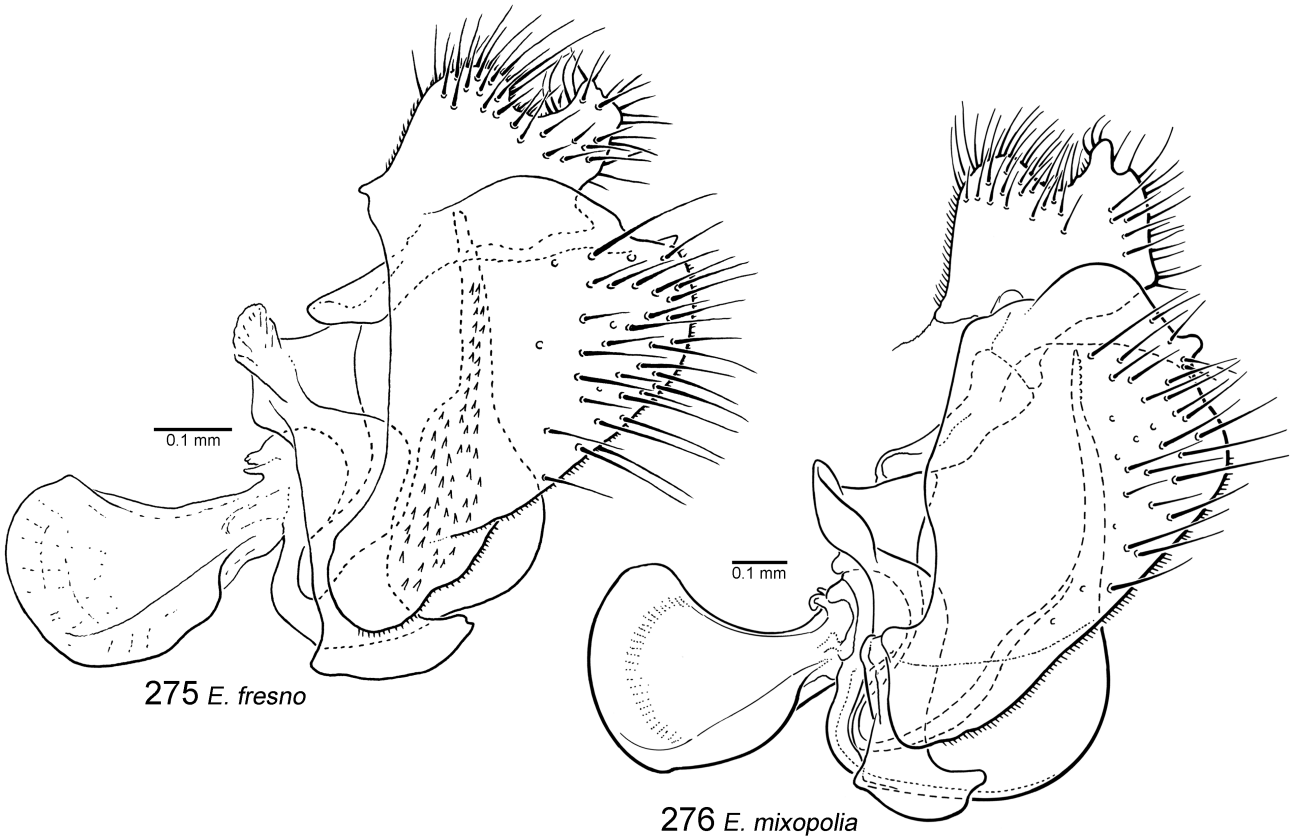
Abdomen without glossy posterior margin of tergites. Terminalia (Fig. 281): dark brown. Cercus short, rectangular; dorsal margin with distinct notch at mid-length, posteriorly with distinct, dorsal knob-like projection; setae shorter than width of cercus. Subepandrium without process or setae. Epandrial lamella oval, higher than long; posterior margin with very short, knob-like projection; posterior margin with short setae. Hypandrium short, truncate, slightly prolonged laterally; without setae. Phallus with basal half strongly expanded; tapered apically, mostly straight apically; apex not emerging beyond epandrium; lateral face of phallus with thickened spicules; ejaculatory apodeme more than half-length of epandrium, Y-shaped, with ventrally positioned lateral apodemes.

Female. Unknown.

Geographical distribution and seasonal occurrence (Fig. 250). *Empis* (*En.*) *subaeripes* **sp. nov.** is only known from March at the type locality in Monterey County, California.

Etymology. The species name is in reference to the similarity of this species with *E*. (*En.*) *aeripes*.

Nuptial gift presentation. Form unknown.



FIGURES 275–276. Male terminalia of the *E*. (*Enoplempis*) *valentis* species group, lateral view. **275,** *E*. (*En*.) *fresno* **sp. nov.**; **276,** *E*. (*En*.) *mixopolia* Melander.

Empis (*Enoplempis*) *valentis* Coquillett

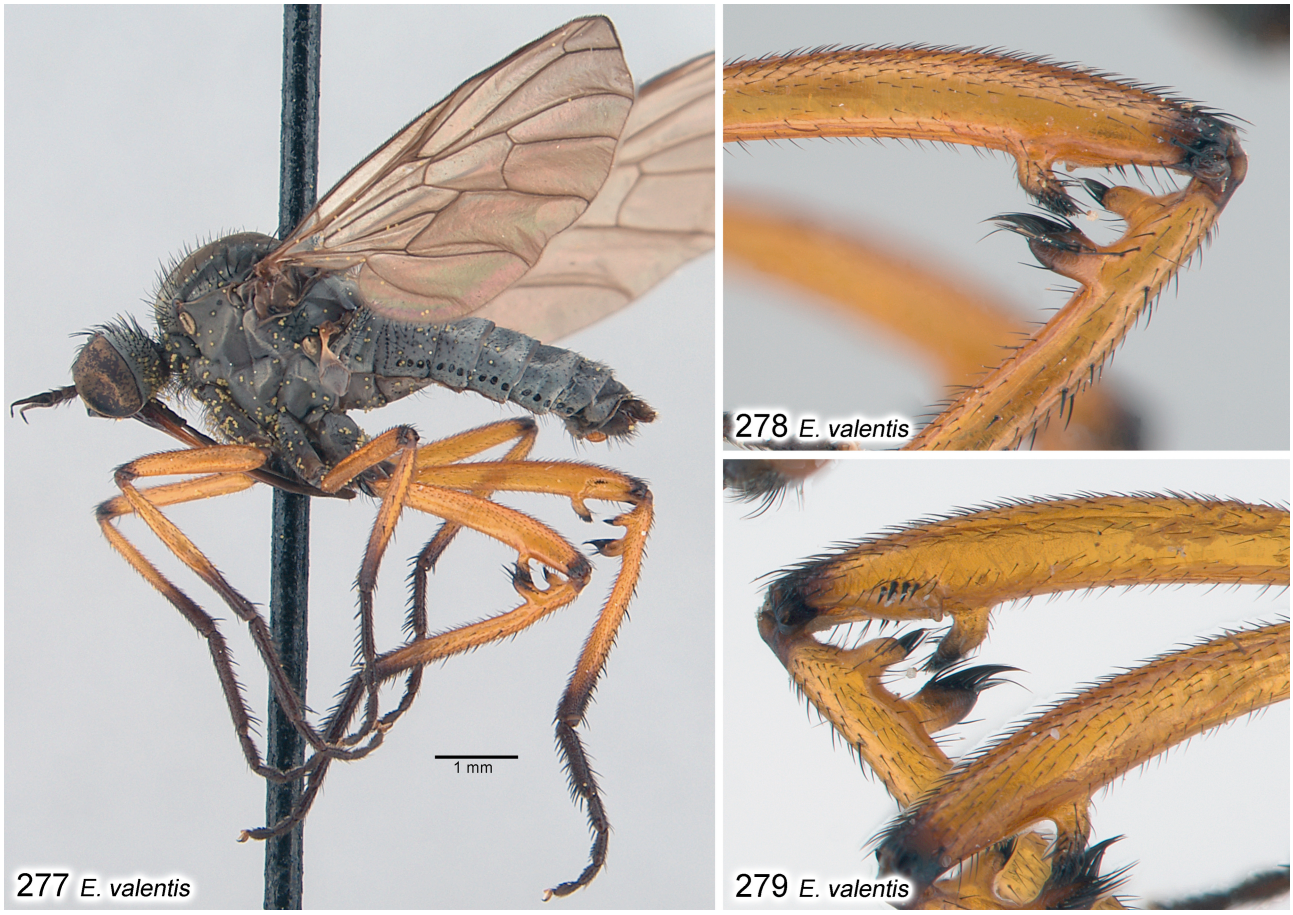
(Figs 277–279, 282, 283, 285)

Empis valentis Coquillett, 1895: 402. Type locality: Mt. View, California (USA).
E. (*Enoplempis*) *valentis*: Melander, 1928: 142 (assigned to subgenus *Enoplempis*).
Empis valentis: Melander, 1902: 320 (revision); Melander, 1965: 461 (catalogue); Yang *et al*. (2007): 142 (catalogue).

Type material examined. HOLOTYPE ♀, labelled: "Mar."; "Alameda/ Co. Cal."; "Type/ No. 3168/ U.S.N.M. [red label]"; "Empis/ valentis/ Coq [handwritten by Coquillett]" (USNM).

Additional material examined. USA. California: *Alameda County*: Berkeley [37°52′N 122°16′W], 26.iii.1897 (1♂, USNM; 1♀, AMNH); Kilkare Rd, 2.2 km N Sunol [37°36′N 121°53′W], 13.v.1979, T.W. Davies (1♂, 2♀, CAS); Sunol Reg. Wilderness, along Indian Joe Ck [37°30′N 121°49′W], 29.iii.1979, DDW (6♂, 5♀, CAS). *Contra Costa County*: Wildcat Ck, Tilden Pk [37°53′N 122°14′W], 20.iii.1951 (1♀, EMEC). *Humboldt County*: Warren Ck [40°53′N 124°2′W], 10.iv.1932 (1♀, CAS). *Marin County*: Alpine Lk. [37°56′N 122°38′W], 6.iv.1956, C.D. MacNeill (1♀, EMEC); Inverness [38°6′N 122°51′W], 23.ii–6.iii.1964, PHA (1♂, 1♀, USNM); Inverness, 1 mi. S [38°5′N 122°50′W], 17.iii.1966, C.A. Toschi (1♂, EMEC); same data except, J. Wolf (1♂, EMEC); 2 mi. SE Inverness, Inverness Ridge [38°5′N 122°51′W], 15.iii.1974, JAP (4♂, 1♀, EMEC); Lagunitas [38°0′N 122°42′W], 23.iii.1927, E.H. Nast (1♀, CAS); along Lagunitas Ck below Alpine Dam [37°56′N 122°38′W], 15.iii.1978, DDW (4♂, 3♀, CAS); Mill Valley [37°54′N 122°33′W], 6.ii.1926 (1♂, CAS); same data except, 19.ii.1926 (3♀, CAS); same data except, 13.iii.1926 (3♀, CAS); same data except, 21.iii.1926 (1♂, 1♀, CAS); 2 mi. S Olema [38°1′N 122°46′W], 27.iii.1961, D.Q. Cavagnaro (1♂, UCDC); Paradise Cove [37°53′N 122°28′W], 12.iv.1947, E.L. Kessel (1♂, 1♀, CAS); Phoenix Lk. [37°57′N 122°34′W], 19.iii.1927, H.H. Keifer (1♀, CAS); Umdhlelannyoni Novato [38°06′N 122°34′W], 21.iii.1948, E.L. Kessel (1♀, CAS). *Mendocino County*: Hopland Field Sta. [39°00′N 123°05′W], Headquarters Lk., 900–1600 ft, 27.iv.1975, S. Miyasaka (1♀, EMEC); same data except, Kelsey Cab.

Orch. area, 2500–2800 ft, 14.v.1977, M. Buegler (1♀, EMEC); McNab Ranch, Ukiah [39°08′N 123°12′W], 6.iv.1964, T.W. Fisher, UC Ag Exp Sta. Project 2037 Acc. No. AS-173 (1♂, UCRC). *Monterey County*: Big Creek Reserve [36°4′N 121°35′W], 11/13.iv.1985, J.A. Debenedictis (1♂, EMEC); Jamesburg [36°22′N 121°35′W], 22.iii.1940, E.G. Linsley (1♂, 2♀, EMEC); Pacific Grove [36°37′N 121°55′W], Mch. 21, L. S. Jr. U Lot. 132 Sub. (1♂, USNM); Paraiso Hot Spgs. [36°19′N 121°22′W], 22.iii.1956, A. Edwards, J.G. Edwards (1♂ with Bibionidae prey, CAS). *Napa County*: Napa [38°18′N 122°17′W], Cordelia, Vallejo, 2.iv.1952, R.M. Bohart (5♂, 1♀, UCDC). *San Mateo County*: La Honda [37°19′N 122°16′W], 3.iv.1956, PHA, at flr. *Myosotis sylvatica* (1♀, USNM); same data except, 8.iii.1964, at catkins *Salix* sp. (4♂, 7♀, USNM); San Bruno, Junipero Serra Co. Pk [37°36′N 122°25′W], 24.iii.1974, PHA (1♀, USNM). *Santa Clara County*: Palo Alto [37°25′N 122°8′W], 26.iii.1895, L. S. Jr. U. Lot. 44 Sub. (1♀, USNM); same data except, 28.iii.1899, Lot. 47 (1♀, USNM); same data except, 30.iii.1899, Lot. 49 (1♂, USNM); Stan U [37°25′N 122°10′W], 19.iii.1906 (1♂, USNM).

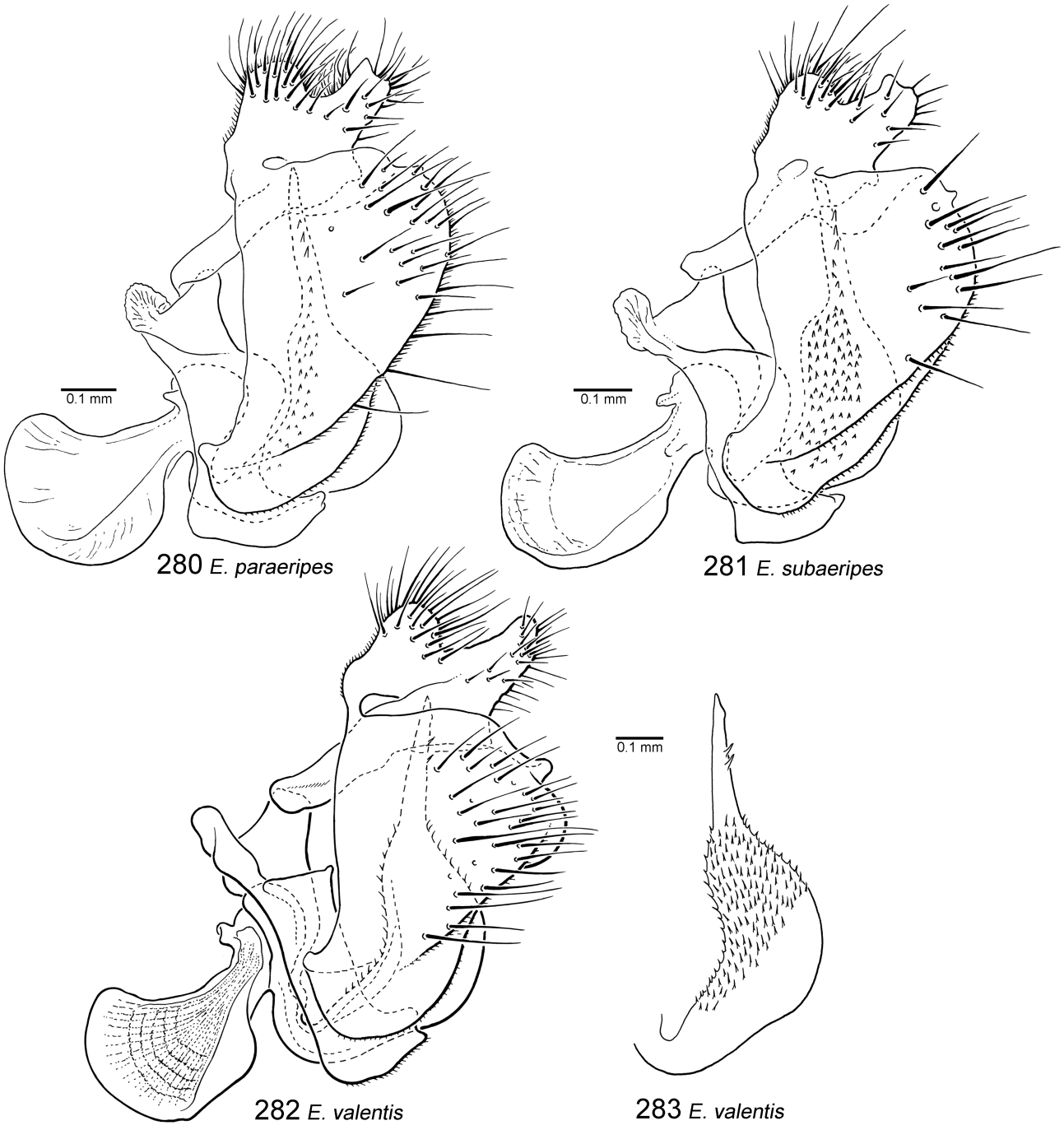


FIGURES 277–279. Male habitus and hindleg of *E.* (*Enoplempis*) *valentis* Coquillett. **277,** habitus, lateral view; **278,** hind femur tibia joint, anterior view; **279,** hind femur tibia joint, posterior view.

Diagnosis. This species is distinguished from other species of the *E.* (*En.*) *valentis* species group by the generally more setose occiput and thorax, acrostichals biserial, six or more marginal scutellar setae, halter with dark knob (Fig. 277), male hind femur with inner medial knob attached to base of anteroventral process (Figs 278, 279), and wing length greater than 7 mm.

Redescription. Wing length 7.0–7.8 mm. **Male.** Similar to *E.* (*En.*) *aeripes*, except as follows: head with occiput bearing several irregular rows of strong setae, similar in size to ocellar setae. Postpedicel long and tapered, nearly 4× longer than basal width; stylus slightly longer than basal width of postpedicel. Palpus orange brown.

Thorax rather setose, with long thin setae on pprn extending onto posthumeral region; acr biserial; dc 2–3-serial; 2 long posterior npl, with numerous long, thin anterior npl. Scutellum with 3 or more pairs of long sctl, not widely separated medially.

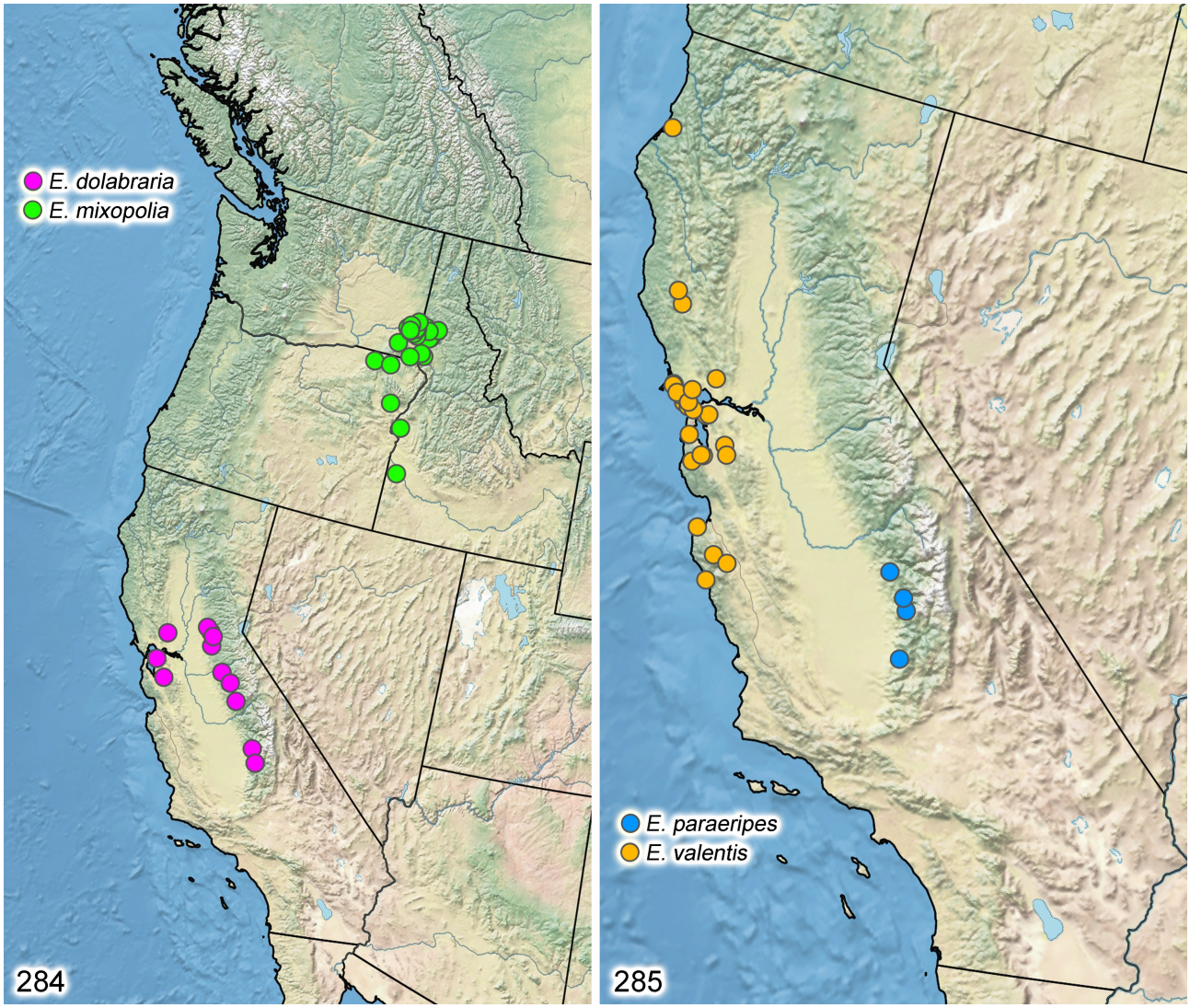


FIGURES 280–283. Male terminalia of the *E*. (*Enoplempis*) *valentis* species group, lateral view. **280,** *E*. (*En*.) *paraeripes* **sp. nov.**; **281,** *E*. (*En*.) *subaeripes* **sp. nov.**; **282,** *E*. (*En*.) *valentis* Coquillett; **283,** same, phallus.

Hind femur with anteroventral process digitiform, with tuft of black apical setae and numerous setae on stalk, with narrow, curved basal lobe; one short knob-like posteroventral lobe proximal to preapical row of 4–5 flattened, black posterior setae (Figs 278, 279). Hind tibia straight at base, with broad, somewhat flattened anteroventral digitiform process on basal quarter, with appressed black setae on outer margin; posteroventrally with similar broad, rounded process, not flattened dorsally, with crown of black apical setae, shorter than setae on anteroventral process (Figs 277–279).

Wing with R_5 ending nearly at wing tip. Halter with dark knob (Fig. 277).

Abdomen without glossy posterior margin of tergites. Terminalia (Figs 282, 283): cercus without knob-like projection in apical cleft. Hypandrium with short prolongation laterally. Lateral face of phallus with thickened spicules.



FIGURES 284–285. Known geographical distribution of the *E.* (*Enoplempis*) *valentis* species group. **284,** *E.* (*En.*) *dolabraria* Melander and *E.* (*En.*) *mixopolia* Melander; **285,** *E.* (*En.*) *paraeripes* **sp. nov.** and *E.* (*En.*) *valentis* Coquillett.

Female. Similar to male, except as follows: hindleg without modified setae and processes; abdomen with posterior margin of tergites glossy; abdominal pleural membrane with darkened, expanded region.

Geographical distribution and seasonal occurrence (Fig. 285). *Empis* (*En.*) *valentis* is known from February to May in northern and central California.

Nuptial gift presentation. A male specimen listed above was examined with an unwrapped Bibionidae fly prey item pinned below the specimen. This may indicate that males of this species present unwrapped prey to females as nuptial gifts.

Remarks. The male of *E.* (*En.*) *valentis* was described by Melander (1902).

Unplaced species

(Figs 5, 286–354)

The 17 species listed below show no species group affiliations and are left as unplaced (Appendix 2). Ten of these species have the male hindleg unmodified and comprise a recognizable albeit artificial subgroup that includes *E.* (*En.*) *aphela* **sp. nov.**, *E.* (*En.*) *blodgettensis* **sp. nov.**, *E.* (*En.*) *californica* **sp. nov.**, *E.* (*En.*) *cerina* **sp. nov.**, *E.* (*En.*) *delnortensis* **sp. nov.**, *E.* (*En.*) *holoptica* **sp. nov.**, *E.* (*En.*) *manning* **sp. nov.**, *E.* (*En.*) *oregonensis* **sp. nov.**, *E.* (*En.*)

susanae **sp. nov.** and *E.* (*En.*) *yakimensis* **sp. nov.** These species lack lobes and setal patterns other than ventral pile on the hind femur (*e.g.*, Figs 286, 288, 320), the male terminalia with hypandrium strap-like, without setae, subepandrial process present, and phallus long and slender with roughened surface near apex (*e.g.*, Figs 338–341).

The remaining seven species (*E.* (*En.*) *culcitella* **sp. nov.**, *E.* (*En.*) *dubitata* **sp. nov.**, *E.* (*En.*) *genista* **sp. nov.**, *E.* (*En.*) *missoula* **sp. nov.**, *E.* (*En.*) *poplitea* Loew, *E.* (*En.*) *richardvockerothi* **sp. nov.** and *E.* (*En.*) *sierraensis* **sp. nov.**), all have the male hindleg modified (Figs 5, 300, 309–313, 322, 334, 343–347) but could not be confidently assigned to the above-named species groups.

Empis (*Enoplempis*) *aphela* sp. nov.

urn:lsid:zoobank.org:act:5DE83A61-E5A9-4776-94B0-D0A1988A999D
(Figs 286, 292, 293, 307)

Type material. HOLOTYPE ♂, labelled: "USA: CA: Contra Costa Co./ 0.3km N Cave Point, pasture/ oak edge, ex: Malaise, 563m,/ 22.iv.2012, K.Will, 37°50′38″N/ 121°52′51″W./ [CAL.2012.iv.22.1]/ 10394, CNC/CSCA"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *aphela* Sinclair,/ Brooks & Cumming [red label]" (CSCA). **PARATYPES: USA. California:** *Alameda County*: Cedar Mtn [37.559°N 121.606°W], 3.iii.1968, P.A. Opler (1♂, EMEC). *Contra Costa County*: same data as holotype (1♂, CNC). *Tuolumne County*: Tuolumne City [37°57′N 120°14′W], 3 mi. NE, 23.iii.1966, R.L. Langston (1♂, EMEC).

Diagnosis. This species is distinguished from others of the subgenus by the grey body and males are dichoptic, with unmodified hindleg (Fig. 286), swollen hind tarsomere 1, mid tibia with biserial row of strong ventral setae, hind tibia without long, slender anterior setae and cercus not greatly expanded dorsally, posterior margin projecting and tapered (Fig. 292).

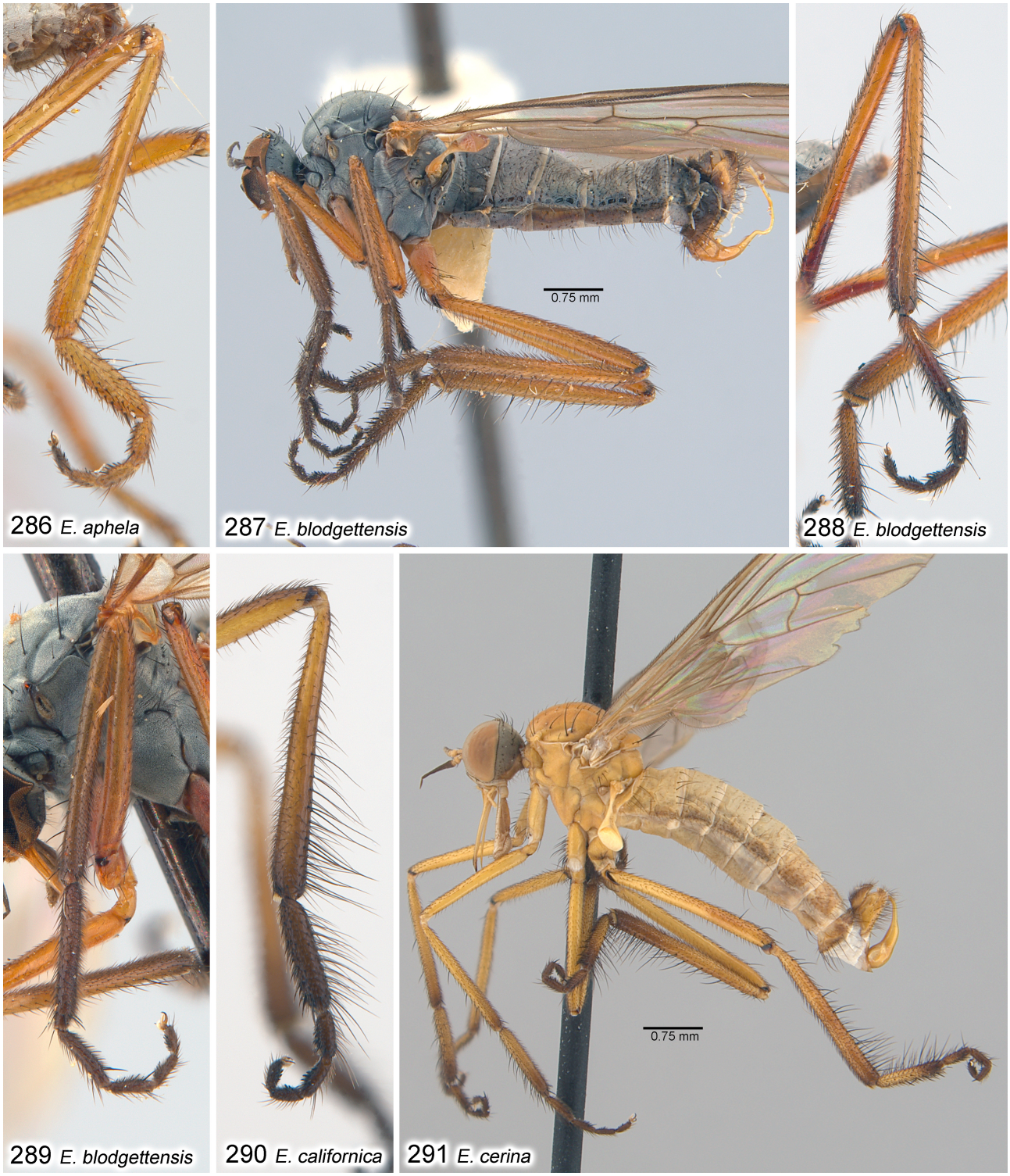
Description. Wing length 5.7–5.8 mm. **Male.** Similar to *E.* (*En.*) *californica* **sp. nov.**, except as follows: head with antennal scape and pedicel yellowish, paler than postpedicel. Frons below ocellar triangle slightly broader than width of ocellar triangle.

Thorax with antepronotum with 2–4 pairs of dark setae.

Legs short, slender, orange brown, apical segments of tarsi darker brown; coxae with or without dense greyish pruinescence. Femora with white ventral pile, longest on hind femur. Fore tibia with erect posterior setae on apical three-quarters, length subequal to width of tibia; without long dorsal and ventral setae; anterior face with short appressed setae. Fore tarsomere 1 swollen with dorsal setae, length subequal to width of tarsomere, with fine dense ventral setae; tarsomeres 2–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur similar to fore femur. Mid tibia with several long posterodorsal setae, without long apical setae; strong, spine-like biserial row of ventral setae on apical half; apex with pair of strong ventral setae. Mid tarsomere 1 without long dorsal setae; tarsomeres 1–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Hind femur slender without modified setae and processes; row of fine anteroventral setae, shorter than width of femur (Fig. 286). Hind tibia without processes or modified setae; long dorsal setae, length more than twice width of tibia on apical third; anterior face without long setae; fine erect ventral setae, length less than width of tibia (Fig. 286). Hind tarsus swollen with long dorsal setae, similar to tibia, with strong setae among finer dense ventral setae (Fig. 286); tarsomeres 2–5 similar to fore tarsus.

Terminalia (Figs 292, 293): epandrium brown, with cerci and phallus orange brown and shiny. Cercus slightly expanded dorsally, posterior margin not sloping; dorsal margin scalloped, with posteroventral elongation; setae shorter than width of cercus. Subepandrial process extending on either side of phallus. Epandrial lamella elongate, longer than height; posterior margin truncate, slightly upturned dorsally at apex; bearing long setae ventrally, longer than width of epandrium. Hypandrium expanded, width subequal to length; truncate dorsally; without setae. Phallus (Fig. 293) with basal half not strongly expanded, tapered apically, with distinct bend near mid-length; apical half gently arched, apex emerging beyond epandrium; apex with subapical flange, otherwise not expanded, with roughened subapical surface; ejaculatory apodeme more than half-length of epandrium, Y-shaped, with lateral apodemes positioned near the ventral margin with short medial apodeme.

Female. Unknown.



FIGURES 286–291. Male habitus and hindleg of the *E.* (*Enoplempis*) unplaced species. **286,** *E.* (*En.*) *aphela* **sp. nov.**, hindleg, lateral view; **287,** *E.* (*En.*) *blodgettensis* **sp. nov.**, habitus (holotype), lateral view; **288,** same, hindleg, lateral view; **289,** same, foreleg, lateral view; **290,** *E.* (*En.*) *californica* **sp. nov.**, hindleg, lateral view; **291,** *E.* (*En.*) *cerina* **sp. nov.**, habitus (holotype), lateral view.

Geographical distribution and seasonal occurrence (Fig. 307). *Empis* (*En.*) *aphela* **sp. nov.** is known from central California. Adults have been collected in March and April.

Etymology. The species name is derived from the Greek *apheles* meaning even or smooth, in reference to the unmodified hind leg of this and similar species.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *blodgettensis* sp. nov.

urn:lsid:zoobank.org:act:BC3C1563-7E3F-4830-9019-B91589C7C7B0
(Figs 287–289, 294, 295, 307)

Type material. HOLOTYPE ♂ (Fig. 287), labelled: "CALIF. El Dorado Co./ Blodgett Forest [38°54′N 120°39′W], 13/ mi. E. Georgetown, el./ 4000-4500' 2 Jun 1974/ A. Hajek"; "Univ. Calif./ Insect Survey/ Specimen #/ 191355 [missing left antenna] [with unwrapped *Macrocera* sp. (Keroplatidae) prey]"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *blodgettensis* Sinclair,/ Brooks & Cumming [red label]" (EMEC). **PARATYPE: USA. California:** Same data as holotype except, 191355 (1♂, EMEC).

Diagnosis. This species is distinguished from other species of the subgenus by the grey body (Fig. 287) and males with eyes closely approximated, unmodified hindleg (Fig. 288), slightly inflated fore and hind tarsomere 1 (Figs, 288, 289), hind tibia with long, slender dorsal setae, length nearly twice width of tibia and cercus deeply cleft along dorsal margin (Fig. 292).

Description. Wing length 6.5–6.8 mm. **Male.** Similar to *E.* (*En.*) *californica* **sp. nov.**, except as follows: head with eyes closely approximated. Frons very narrow. Antenna with postpedicel 4× longer than basal width.

Thorax with antepronotum with 2 pairs of dark setae. Postpronotum with 1 long seta and several short, dark setae. Scutum with short, fine uniserial acr; dc slightly longer, stronger than acr, increasing in length and stronger posteriorly; 2 posterior npl, with several short anterior npl setulae; 1 presut spal; 1 psut spal; 1 pal. Scutellum with 1 pair of long, convergent apical sctl, with 1 pair of long outer marginal setae.

Legs stocky, orange brown, apex of tibiae and tarsi darker brown; coxae with greyish pruinescence (Fig. 287). Femora with white ventral pile, longest on hind femur. Fore femur with anteroventral and posteroventral row of setae, shorter than half width of femur. Fore tibia without long posterior setae; 3–4 erect anterodorsal setae on apical half, length longer than width of tibia; anterior face with short appressed setae. Fore tarsomere 1 slightly inflated without long dorsal setae, with fine dense ventral setae; tarsomeres 2–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur similar to fore femur. Mid tibia with fine ventral setae, with several stronger anteroventral and posteroventral setae. Mid tarsomeres 1–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Hind femur slender without modified setae and processes; rows of fine ventral setae, length shorter than width of femur (Fig. 288). Hind tibia without processes or modified setae; long dorsal setae, length nearly twice width of tibia; fine erect ventral setae, shorter than width of tibia (Fig. 288). Hind tarsus slightly inflated with long dorsal setae, similar to tibia, otherwise similar to mid tarsus.

Wing with CuA+CuP strong, reaching wing margin. Basal costal seta absent. R_5 and M_1 divergent near wing margin; R_5 ending at or beyond wing tip; radial fork acute. Halter paler than orange-brown legs (Fig. 287).

Terminalia (Figs 294, 295): apex of epandrium and dorsal margin of cerci dark brown, phallus orange brown and shiny. Cercus deeply cleft dorsally, V-shaped; anterior lobe rounded, posterior lobe tapered; setae shorter than width of cercus. Subepandrial process extending on either side of phallus. Epandrial lamella elongate, longer than height; anterior half broad; posterior margin with somewhat expanded, truncate, bearing long setae ventrally, shorter than width of epandrium. Hypandrium narrow, strap-like; without setae. Phallus (Fig. 295) with base not strongly expanded, tapered apically, with distinct sinuous bend near mid-length; apical half gently arched, apex emerging beyond cerci; apex with long narrow opening from small, expanded margin with roughened surface; ejaculatory apodeme more than half-length of epandrium, Y-shaped, with lateral apodemes positioned near ventral margin with short medial apodeme.

Female. Unknown.

Geographical distribution and seasonal occurrence (Fig. 307). *Empis* (*En.*) *blodgettensis* **sp. nov.** is only known from the type locality in El Dorado County, California. Adults have been collected in June.

Etymology. The species is named after Blodgett Forest in El Dorado County, California, where both male specimens were collected.

Nuptial gift presentation. The holotype male is pinned with an unwrapped prey item (Keroplatidae). This may indicate that males of this species present unwrapped prey to females as nuptial gifts.

Empis (*Enoplempis*) *californica* sp. nov.

urn:lsid:zoobank.org:act:18D728E9-CCDF-4C31-B3D5-D3A9844AC13A
(Figs 290, 296, 307)

Type material. HOLOTYPE ♂, labelled: "USA: CA: Siskiyou Co.,/ Weed, Columbine Rd,/ 41°23′21″N 122°25′10″W,/ 15.ii-24.vi.2016, MT, E. Boyd,/ CNC695031"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *californica* Sinclair,/ Brooks & Cumming [red label]" (CNC). **PARATYPES: USA. California:** *Siskiyou County*: Same data as holotype except, CNC695034 (1♀, CNC). **Oregon:** *Benton County*: Mary's Peak Rd [44.4748°N 123.5287°W], waterfalls, mi. 2–5, 18.vii.1994, SJF (1♂, CSUC). *Josephine County*: 12 mi. E Cave Jct. [42°10′N 123°38′W], 24–26.v.1985, D.C. Darling (1♂, ROM). *Lane County*: H.J. Andrews Exp. For. [44°13′N 122°10′W], 1450 ft, R.S.7, 18.v.1983, sweep, D.S. Chandler (1♂, UNHC); Oakridge, 18 mi. NW [43°52′N 122°42′W], 12.v.1969, E.M. & J.L. Fisher (1♂, CSCA). **Washington:** *Pierce County*: Mt. Rainier NP, Fish Ck at West Side Rd [46°47′N 121°53′W], 910 m, 1.viii.1977, DDW (1♂, CAS); Mt. Rainier NP, 14 km ENE Paradise starting 0.8 km up Owyhigh Tr., 900–1200 m, 46°45′44″N 121°39′26″W, 16.vi.2004, C.J. Borkent (1♂, LEM). *Snohomish County*: Everett [47°58′N 122°12′W], 4.vii.1924, ALM (1♂, USNM).

Diagnosis. This species is distinguished from other species of the subgenus by the grey body and males are dichoptic, with hindleg unmodified (Fig. 290), hind tarsomere 1 swollen, hind tibia with long, slender anterior setae and cercus expanded dorsally, with sloping posterior margin and posteroventral elongation (Fig. 296).

Description. Wing length 4.5–5 mm. **Male.** Head dark in ground-colour, with greyish pruinescence. Dichoptic, upper ommatidia not enlarged. Frons divergent towards antennae; below ocellar triangle subequal to width of ocellar triangle; with short setulae along inner margin of eye. Face without setae; slightly divergent towards mouthparts, with oral margin dark and shiny. Ocellar triangle elevated, with thin greyish pruinescence, with short pair of parallel ocellar setae, shorter than pprn and 1–2 pairs of shorter setulae. Occiput bearing single row of strong setae, similar in size to ocellar setae, longer and finer ventrally; postocular setae with stronger upper setae, with weaker, shorter lower setae; postocellar region without setae. Postpedicel, stylus and scape dark, pedicel slightly paler; scape 2× longer than pedicel, with short, black setae; pedicel with ring of apical setae; postpedicel long and tapered, 4–5× longer than basal width; stylus 1.5× longer than basal width of postpedicel. Palpus pale, yellow to orange brown, with dark setulae. Proboscis reddish brown, length 1.5× or less head height; labellum with short, dark setae.

Thorax dark brown in ground-colour, densely grey pruinescent. Scutum with narrow median pair of greyish vittae and fainter, broader outer pair of greyish vittae; postpronotal lobe and postalar ridge pale brown. Pleura similar to scutum, with greyish pruinescence. Proepisternum with short dark setae on lower section; upper proepisternum in front of spiracle without setae. Prosternum bare. Antepronotum with 2–4 pairs of pale to dark setae. Postpronotum with 1 long seta and several short, dark setae. Scutum with short, fine uniserial acr; dc slightly longer, stronger than acr, increasing in length and stronger posteriorly; 1 posterior npl, with 1–2 shorter anterior npl; 1 presut spal; 1 psut spal; 1 pal. Scutellum with pair of usually long apical sctl, with 1 pair of marginal setae; disc bare. Laterotergite with narrow patch of strong, dark setae. Anterior and posterior spiracles pale.

Legs short, slender, orange brown, apical half of tibiae and tarsi darker brown; coxae without dense greyish pruinescence. Coxae with stiff, black setae. Hind trochanter with short setulae. Femora with white ventral pile, longest on hind femur. Fore femur with anteroventral and posteroventral row of setae, shorter than half width of femur. Fore tibia with long, erect posterior setae on apical three-quarters, length twice width of tibia; numerous erect dorsal setae on apical half, length twice width of tibia; long, fine erect ventral setae about as long as width of tibia; anterior face with short appressed setae. Fore tarsomere 1 swollen with long dorsal setae, length longer than width of tarsomere, with fine dense ventral setae; tarsomeres 2–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur similar to fore femur. Mid tibia with 4–5 long posterodorsal setae on apical third, apical setae nearly as long as tarsomere 1; long, fine erect ventral setae about as long as width of tibia; apex with strong ventral and anteroventral seta. Mid tarsomere 1 with

long dorsal setae, length as long as width of tarsomere; tarsomeres 1–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Hind femur slender without modified setae and processes; row of fine anteroventral setae, nearly as long as width of femur near apex (Fig. 290). Hind tibia without processes or modified setae; long dorsal setae on apical half, length more than twice width of tibia; long, erect anterior setae on apical half, length slightly longer than width of tibia; long, fine erect ventral setae about as long as width of tibia; with seta in posteroapical comb (Fig. 290). Hind tarsomere 1 swollen with long dorsal setae, similar to tibia, with strong setae among finer dense ventral setae; tarsomeres 2–5 similar to fore tarsus.

Wing infuscate with dark veins; veins mostly complete (except Sc), well sclerotized, except CuA+CuP weaker and fading out before wing margin. Basal costal seta absent. R_5 and M_1 divergent near wing margin; R_5 ending at or beyond wing tip; radial fork acute. Halter paler than orange-brown legs.

Abdomen paler than thorax, with dense greyish pruinescence, similar to scutum with long setae, one-half length of sclerites. Pregenital segments unmodified, except sclerites of segment 8 fused laterally. Terminalia (Fig. 296): epandrium dark brown, with cerci and phallus orange brown and shiny. Cercus expanded dorsally, with sloping posterior margin and posteroventral elongation; setae on posterior face mounted on short prolongations; setae shorter than width of cercus. Subepandrial process extending on either side of phallus. Epandrial lamella elongate, longer than height; posterior margin with somewhat expanded, rounded, bearing long setae ventrally, longer than width of epandrium. Hypandrium narrow, strap-like; without setae. Phallus with basal half not strongly expanded, tapered apically, with distinct bend near mid-length; apical half gently arched, apex emerging beyond epandrium; apex not expanded, with roughened subapical surface; ejaculatory apodeme more than half-length of epandrium, Y-shaped, with lateral apodemes positioned near ventral margin with short medial apodeme.

Female. Similar to male, except as follows: frons broader, wider than anterior ocellus; legs stockier, without modified setae and processes. Abdominal pleural membrane without darkened, expanded region; tergite 8 (and likely syntergite 9+10) shiny at apex.

Geographical distribution and seasonal occurrence (Fig. 307). *Empis* (*En.*) *californica* **sp. nov.** is known from Washington, Oregon, and northern California. Adults have been collected from February to August.

Etymology. The species is named after its early-known California distribution.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *cerina* sp. nov.

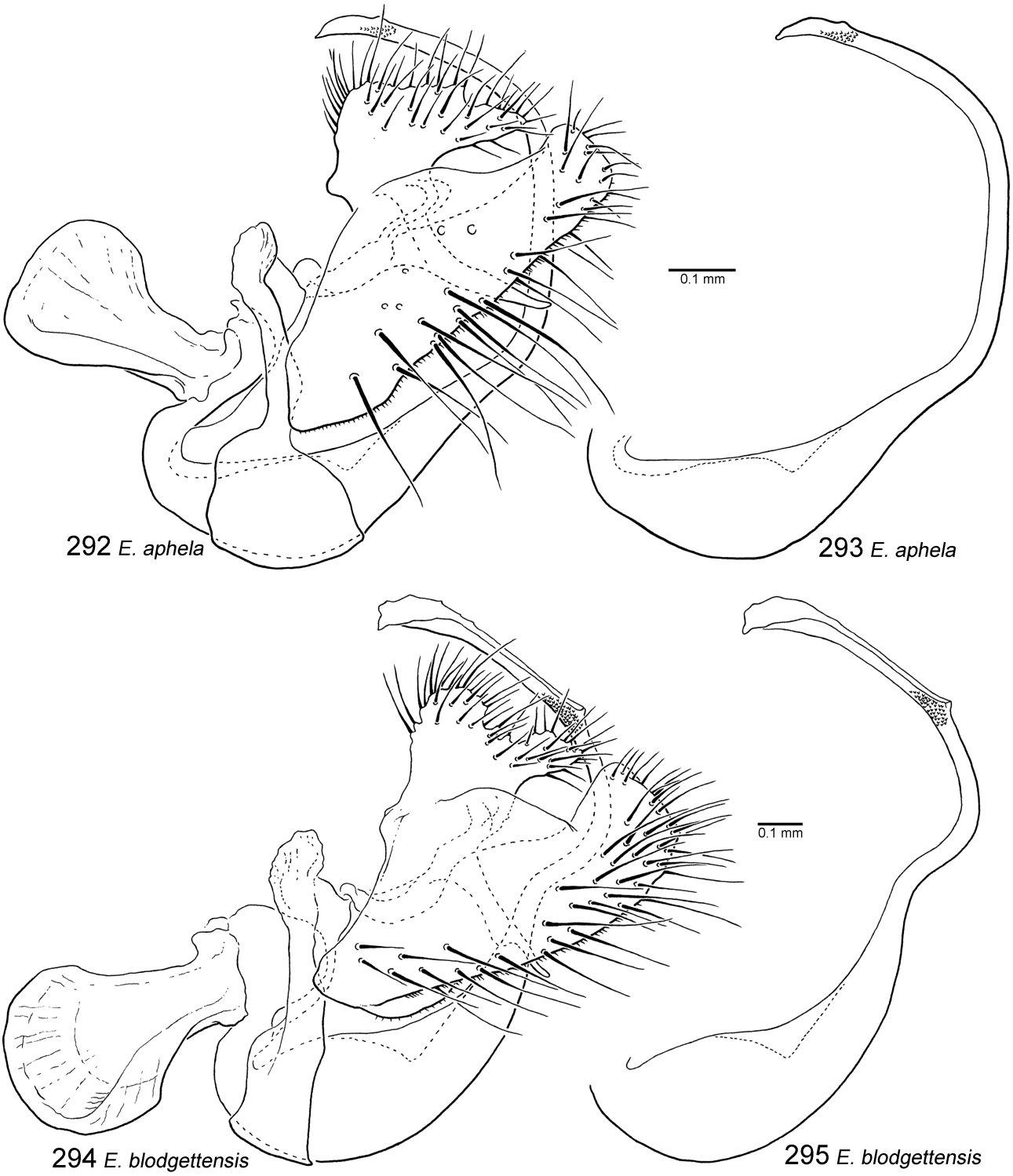
urn:lsid:zoobank.org:act:A6C23F7C-E040-4939-8423-025DAD0F60C8
(Figs 291, 297, 298, 308)

Type material. HOLOTYPE ♂ (Fig. 291), labelled: "USA: CA: Siskiyou Co.,/ Weed, Columbine Rd,/ 41°23′21″N 122°25′10″W,/ 15.ii-24.vi.2016, MT, E. Boyd,/ CNC695049"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *cerina* Sinclair,/ Brooks & Cumming [red label]" (CNC). **PARATYPES: USA. California:** *Mendocino County*: No. Cal. Coast Range Pres., 5 mi. N Branscomb [39°42′N 123°39′W], 26.v.1976, JAP (1♂, EMEC); same data except, 26–27.v.1976, R. Wharton (1♂, EMEC). *Siskiyou County*: Same data as holotype except, CNC695047 (1♂, CNC). *Trinity County*: Buttercreek Mdw, 8 mi. W Hayfork [40°34′N 123°8′W], 21.v.1973, M. Bentzien (1♀, EMEC); 4 mi. S Hayfork, 18.v.1973, JAP (1♂, 1♀, EMEC); Hayfork Rgr Sta., 2300 ft, 21.v.1973, at bl. lites, JAP (1♀, EMEC). **Oregon:** *Benton County*: Adair A.F. Sta. [44°40′N 123°13′W], 15.v.1969, E.M. Fisher (1♂, 1♀, CAS; 1♂, CSCA). *Hood River County*: Hood River [45°42′N 121°31′W], 19.v.1917, F.R. Cole (1♂, USNM). *Lane County*: Oakridge, 18 mi. NW [43°52′N 122°42′W], 12.v.1969, E.M. & J.L. Fisher (1♂, CSCA).

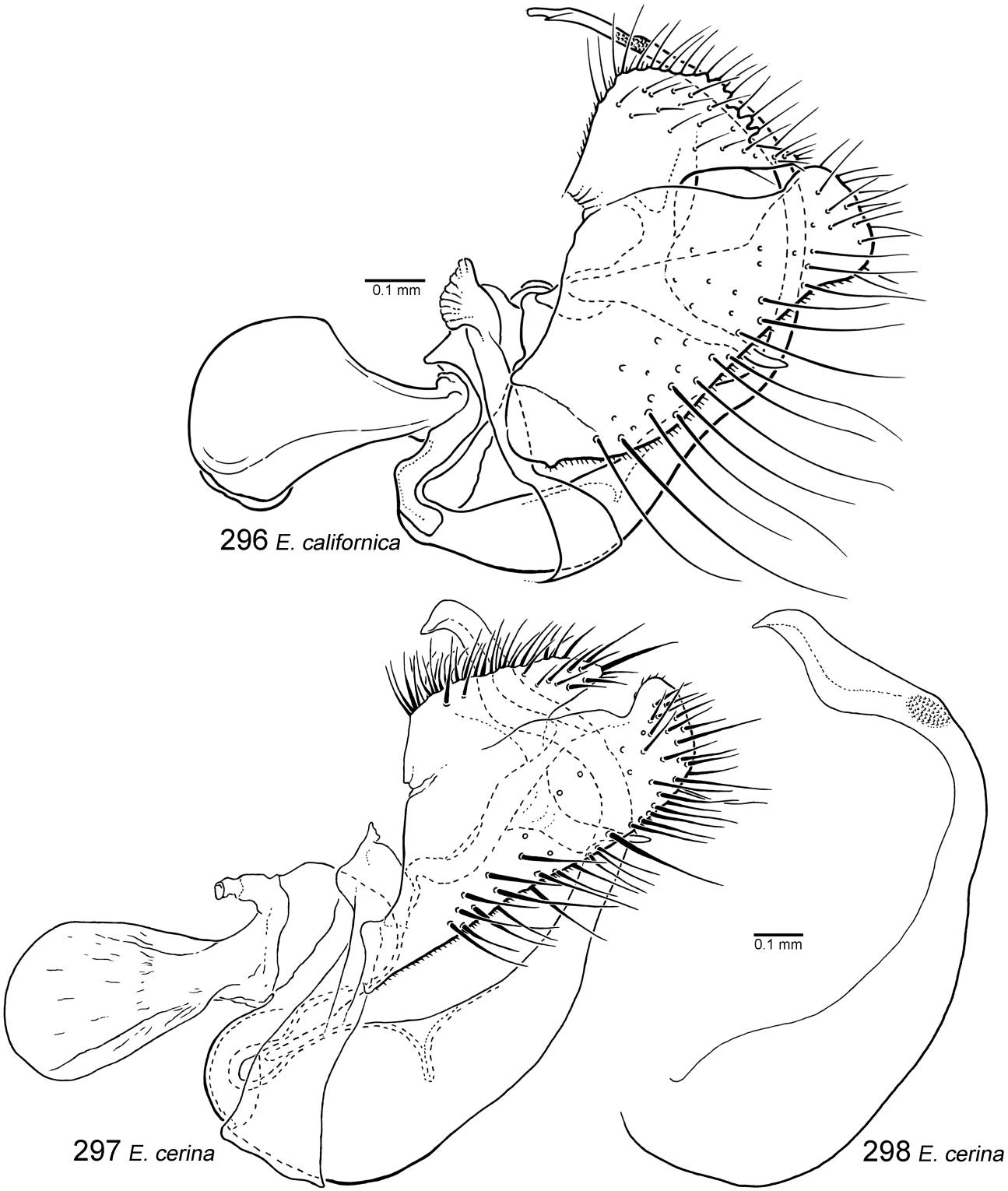
Diagnosis. This species is distinguished from other species of the subgenus by the yellow body (Fig. 291), and males are holoptic, with unmodified hindleg.

Description. Wing length 5.6–6.4 mm. **Male.** Similar to *E.* (*En.*) *californica* **sp. nov.**, except as follows: head holoptic. Postpedicel, stylus dark, scape and pedicel pale brown.

Thorax yellowish brown in ground-colour, with thin greyish pruinescence (Fig. 291). Scutum with median pair of narrow, brownish vittae; posterior face of postpronotal lobe shiny. Antepronotum with 4 or more pairs of dark setae. Postpronotum with 1 long seta and several short, dark setae. Scutum with short, fine biserial acr; dc slightly longer, stronger than acr, increasing in length and stronger posteriorly; 2 posterior npl, with several shorter anterior npl; 1 presut spal; 1 psut spal; 1–2 pal. Scutellum with pair of long apical sctl, with outer pair of marginal setae.



FIGURES 292–295. Male terminalia of the *E*. (*Enoplempis*) unplaced species, lateral view. **292,** *E*. (*En*.) *aphela* **sp. nov.**; **293,** same, phallus; **294,** *E*. (*En*.) *blodgettensis* **sp. nov.**; **295,** same, phallus.



FIGURES 296–298. Male terminalia of the *E*. (*Enoplempis*) unplaced species, lateral view. **296,** *E*. (*En*.) *californica* **sp. nov.**; **297,** *E*. (*En*.) *cerina* **sp. nov.**; **298,** same, phallus.

Legs long, stocky, yellow to orange brown, apex of tibiae, apex of tarsomere 1 and sometimes tarsomere 2 and remaining tarsomeres darker brown; coxae with thin pruinescence (Fig. 291). Mid femur with white ventral pile, absent on fore and hind femora. Fore femur with anteroventral and posteroventral row of slender setae, shorter than half width of femur. Fore tibia with 2–3 erect anterodorsal, length slightly longer than width of tibia; anterior face with short appressed setae. Fore tarsomere 1 swollen with long dorsal setae, length slightly longer than width of

tarsomere, with fine dense ventral setae; tarsomeres 2–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur similar to fore femur. Mid tibia with 3 erect posterodorsal setae and pair of anterodorsal and posteroventral basal setae, length slightly longer than width of tibia. Mid tarsomeres 1–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Hind femur slender, without modified setae and processes; rows of fine ventral setae, length shorter than half width of femur; 2–3 anterodorsal setae on apical fourth (Fig. 291). Hind tibia without processes or modified setae; long dorsal setae on apical two-thirds, length less than twice width of tibia (Fig. 291). Hind tarsus swollen with long dorsal setae, similar to tibia, with strong setae among finer dense ventral setae; tarsomeres 2–5 similar to fore tarsus.

Wing with veins complete (except Sc).

Abdomen yellow, paler than thorax, with dense whitish dorsal pruinescence. Terminalia (Figs 297, 298): yellow, with dorsal margin of cerci dark brown. Cercus linear, with straight dorsal margin; apex tapered; setae denser along dorsal margin, shorter than width of cercus. Subepandrial process extending on either side of phallus. Epandrial lamella elongate, longer than height; posterior margin with distinct upturned dorsally; apex rounded, bearing long setae ventrally, shorter than width of epandrium. Hypandrium narrow, strap-like; without setae. Phallus (Fig. 298) with basal half strongly expanded, tapered apically; apical half sinuous, with hooked apex; apex emerging beyond cerci; roughened surface proximal to apex, near opposite dorsal margin of epandrial lamella; ejaculatory apodeme elongate, length two-thirds length of epandrium, Y-shaped, with lateral apodemes positioned near ventral margin.

Female. Similar to male, except as follows: frons broader, wider than anterior ocellus; fore tarsomere not swollen; hind tibia with 4–6 strong anterodorsal and posterodorsal erect setae. Abdominal pleural membrane without darkened, expanded region; tergite 8 and syntergite 9+10 with pruinescence.

Geographical distribution and seasonal occurrence (Fig. 308). *Empis* (*En.*) *cerina* **sp. nov.** is known from Oregon and northern California. Adults have been collected from February to June.

Etymology. This species is named from the Latin for wax coloured or yellowish, in reference to the species yellowish body colouration.

Nuptial gift presentation. Form unknown.

Remarks. This yellow species keys to *E. rufescens* Loew (= *E. colonica* Walker) using the key in Melander (1902), but the latter species is confined to eastern North America and lacks the stout ventral spine-like setae on the tarsi.

Empis (*Enoplempis*) *culcitella* sp. nov.

urn:lsid:zoobank.org:act:6F2F1F59-CA7B-43AC-BCE1-0465D4D5A451
(Figs 299–303, 305, 329)

Type material. HOLOTYPE ♂, labelled: "USA: OR: Benton Co., Rock/ Crk. At end of Woods Crk. Rd./ N44°31′51.9″ W123°32′39.5″/ 546m, 6.vii.2014, swp forest,/ J.M. Cumming"; "CNC/ 1078384"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *culcitella* Sinclair,/ Brooks & Cumming [red label]" (USNM). **PARATYPES: USA. California:** *Humboldt County*: Laribee Valley [40°24′N 123°55′W], 2.vi.1935, B.P. Bliven (1♂, CAS); *ca* 17 mi. SE Orick, Schoolhouse Peak, 2480 ft, 41°9'28"N 123°53'31"W, 2.VI.2009, J.M. Cumming (1♂, 2♀, CNC); same data except, nr Orick, Bald Hills Rd nr Schoolhouse Peak, BJS (1♂, CNC). *Mendocino County*: Big Dann Ck [39.8594°N 123.6789°W], 30.v.1955, E.I. Schlinger (1♂, UCDC); Empire Camp Rest Area S of Cummings on Hwy 101 [39.8279°N 123.5946°W], 18.v.1978, DDW (1♂, CAS); UC Hopland Fld. Sta. [39°00′N 123°05′W], 1.v.1969, MT dry ice, WJT (1♂, WFBM); Hopland Field Sta. [39°00′N 123°05′W], Headquarters Lk., 900–1600 ft, 27.iv.1975, J. Benson (1♂, EMEC); same data except, 15.v.1977, R. Greenberg (1♂, EMEC); No. Cal. Coast Range Pres., 5 mi. N Branscomb [39°42′N 123°39′W], 26.v.1976, JAP (10♂, 14♀, EMEC); same data except, E. Rogers (13♂, 11♀, EMEC); same data except, 24–25.v.1976, R. Wharton (3♂, 1♀, EMEC); NCCRP, 3 mi. N Branscomb, 1400 ft, 21–23.v.1982 (1♂, EMEC); same data except, 5–6.v.1989, MT, S. O'Keefe (5♂, 2♀, EMEC); 1 mi. SE Piercy [39°58′N 123°47′W], 20–21.v.1976, JAP (1♂, EMEC); 1 mi. N Piercy, 20–22.v.1976, blacklight, R. Wharton (1♂, 1♀, EMEC). *Solano County*: Green Valley [38°15′N 122°9′W], 7.iv.1973, R.M. Bohart (1♂, UCDC). *Tulare County*: Ash Mt. HQ [36°29′N 118°49′W], 1700 ft, 28.iv.1979, at light, M. Buegler (1♀, EMEC). *Yolo County*: Putah Cn. [38.5167°N 122.0837°W], 12.iii.1951, E.I. Schlinger (1♂, UCDC). *Yuba County*: Sierra Foothill Field Sta. 5 mi. N Smartville [39.2514°N 121.3137°W], 1300–1500 ft, 4.v.1980, J.T. Doyen (1♂, EMEC). **Oregon:**

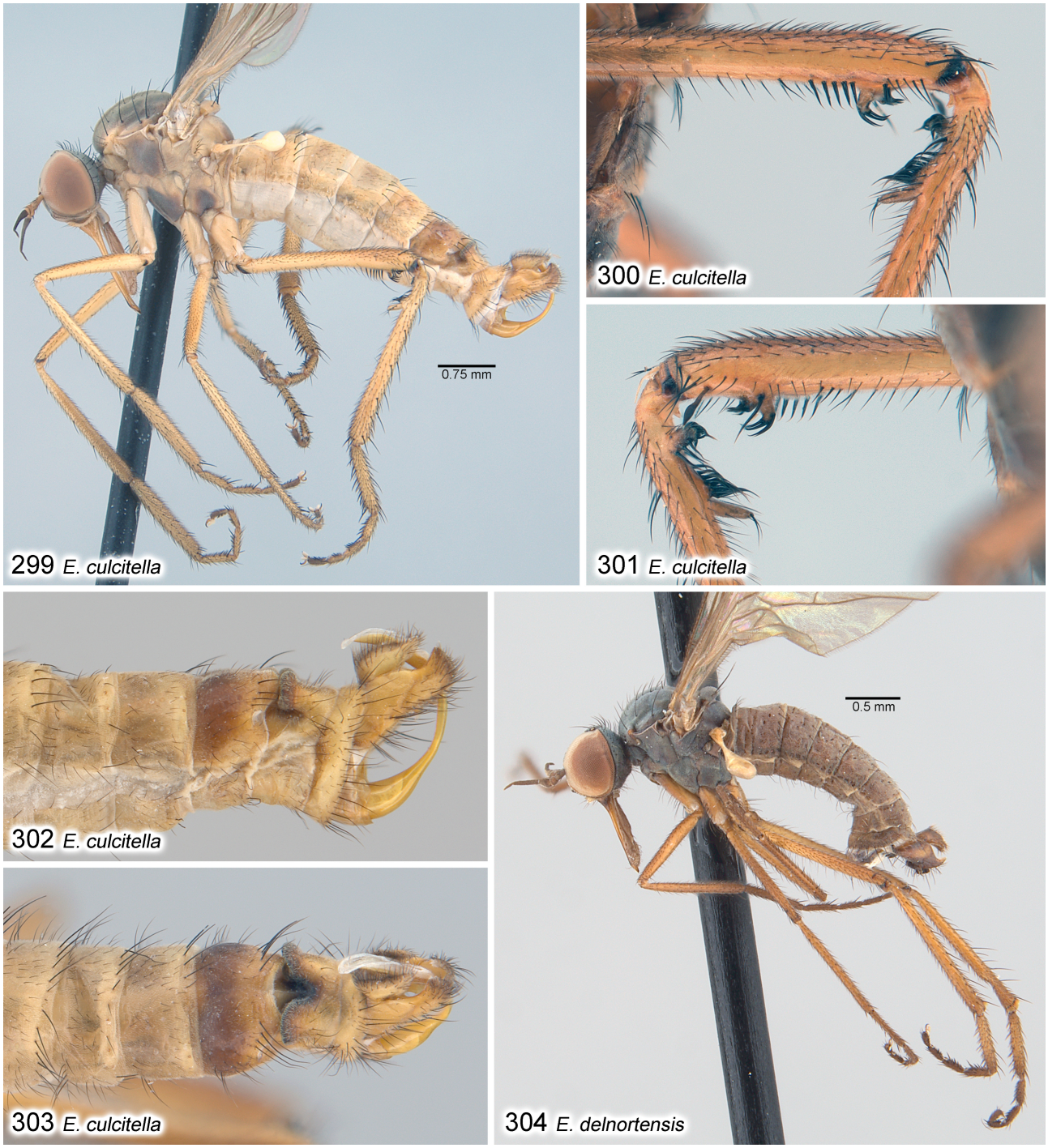
Benton County: Same data as holotype except, swp forest & creek margin, J.M. Cumming (1♀, CNC); same data except, SEB (2♂, 2♀, CNC); same data except, SJF (3♂, 3♀, CNC); Marys Peak, Lower Parker Ck at jct. Marys Peak Rd, 44.498793°N 123.569727°W, 5.viii.2016, SJF (1♂, CNC); 6.4 mi. up Woods Ck Rd from jct. Hwy 20 [44°32′N 123°31′W], MT across old road, fir/alder/maple, 24.vi–14.vii.2014, SJF (3♂, 1♀, CNC). *Marion County*: Hwy 214, Silver Falls SP E of Salem [44.8653°N 122.6259°W], 13–14.viii.1989, Stop 256, PHA (1♂, CAS). **Washington:** *Grays Harbor County*: Humptulips [47°13′N 123°58′W], Rest Area on Hwy 101, 20.vii.1978, DDW (1♂, CAS). *Lewis County*: 23 mi. W Chehalis, Rainbow Falls SP [46.6341°N 123.2340°W], 300 ft, 13–14.vii.1977, sweeping, WJT (3♂, WSU). *Pacific County*: Pluvius [46.5490°N 123.4094°W], 16.vii.1922, ALM (2♂, USNM). *Pierce County*: Sumner [47°12′N 122°14′W], vii.1929, F.J. Spruijt (1♂, CUIC).

Diagnosis. This species is distinguished from other species of the subgenus by the male with narrowly dichoptic eyes, wing with basal costal seta, modified pregenital segments (Figs 302, 303) with cushion-like lobes of tergite 7 appressed against tergite 6, hind femur with anteroventral row of strong setae proximal to preapical region (Fig. 300), posterior preapical seta on hind femur with expanded tip (Fig. 301), and phallus with elongate slit-like opening (Fig. 305).

Description. Wing length 5.8–7.0 mm. **Male.** Head dark in ground-colour, with greyish pruinescence (Fig. 299). Eyes narrowly separated on frons; frons narrower than width of anterior ocellus; short setulae along inner margin of eye. Face without setae; short, slightly divergent towards mouthparts, with oral margin dark and shiny. Ocellar triangle elevated, with thin greyish pruinescence, with pair of parallel ocellar setae, longer than occipital setae and several pairs of short setulae. Occiput bearing single row of setae, stronger than postocular setae; postocular setae shorter than occipital row; postocellar region without setae. Antenna dark brown; scape 2× longer than pedicel, with short, black setae; pedicel with ring of apical setae; postpedicel long, slightly tapered, 5× longer than basal width; stylus length 1.5× basal width of postpedicel. Palpus pale yellowish brown, with dark setulae. Proboscis yellowish brown, length less than 2× head height; labellum with short, dark setae.

Thorax dark brown in ground-colour, densely grey pruinescent (Fig. 299), with 2 pairs of brown vittae; median narrower pair between acr and dc rows, ending at prescutellar depression; faint broader outer vittae extending to postalar ridge; postpronotal lobe, lower margin of notopleuron, postalar ridge and outer margin of scutellum yellowish. Pleura often yellowish with lower portions of katepisternum and meron and anepisternum dark; often Californian specimens with dark thorax, without yellow highlights. Proepisternum with several pairs of short pale setae on lower section; upper proepisternum in front of spiracle without setae. Prosternum bare. Antepronotum with 2 pairs of lateral setae. Postpronotum with 1 long seta and several short setae. Scutum with sparse uniserial row of acr; dc uniserial, longer and stronger than acr, increasing in size posteriorly; 2 posterior npl, with 1–2 slender anterior npl; 1 presut spal; 1 psut spal; 1 pal. Scutellum with pair of long apical sctl, with pair of outer, shorter marginal setae; disc bare. Laterotergite with 3–5 long setae. Anterior and posterior spiracles pale.

Legs stocky, yellow, with apical tarsomeres darker; coxae without blue pruinescence (Fig. 299). Hind trochanter with numerous dark setulae. Femora with white ventral pile; very short on fore femur. Fore femur with anteroventral and posteroventral row of short setulae. Fore tibia with 1–2 erect anterodorsal setae, longer than width of tibia; posterior face with erect slender setae, stronger distally; anterior face with short appressed setae; apex with circlet of preapical setae. Fore tarsomere 1 expanded, slightly broader than apex of tibia, with erect dorsal, anterior and posterior setae, with row of anteroventral setae; tarsomeres 2–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur with anteroventral and posteroventral row of setae, longer at base. Mid tibia with 1–2 pairs of erect anterodorsal and posterodorsal setae not longer than width of tibia; 4–5 anteroventral and posteroventral setae not longer than width of tibia; apex with circlet of preapical setae. Mid tarsus slender, with tarsomeres 1–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Hind femur with row of slender anteroventral setae until preapical region; preapex with row of thickened anteroventral setae proximal to ventral process; ventral process, shorter than apical width of femur with posteroventrally arched thickened apical and preapical setae, longer than process; base of process with posteroventral swelling bearing 4 arched thickened setae and 1 long outer posteroventral setae, longer than width of femur; transverse row of 3 hooked thickened setae just distal to ventral process; preapical anterodorsal seta distinct; row of strong posterior preapical setae slender, with elongate, expanded tip seta (Figs 300, 301). Hind tibia with base not greatly narrowed; base with slender, anteroventral digitiform process with forked apex, inner fork with strong curved seta as long as process; base of anteroventral process with oblique row of thickened setae with curved tips, increasing in length distally; posteroventral digitiform process with crown of appressed thickened setae, with 3–4 thickened posterior setae with



FIGURES 299–304. Male habitus, postabdomen and hindleg of the *E*. (*Enoplempis*) unplaced species. **299,** *E*. (*En*.) *culcitella* **sp. nov.**, habitus, lateral view; **300,** same, hind femur tibia joint, anterior view; **301,** same, hind femur tibia joint, posterior view; **302,** same, postabdomen, lateral view; **303,** same, postabdomen, dorsal view; **304,** *E*. (*En*.) *delnortensis* **sp. nov.**, habitus (holotype), lateral view.

curved tips and 2 thickened anterior setae arched over surface of process; 4–5 erect anterodorsal and posterodorsal setae, about as long as width of tibia; 2–4 strong anteroapical setae; posteroapical comb with seta (Figs 300, 301). Hind tarsus with tarsomere 1 slightly swollen, with 1–2 erect dorsal setae; tarsomeres similar to mid tarsus.

Wing lightly infuscate with dark veins; all veins well sclerotized; veins complete (except Sc), reaching wing margin. Basal costal seta present. R_5 and M_1 divergent near wing margin; R_5 ending near wing tip; radial fork acute. Halter pale, yellowish (Fig. 299).

Abdomen paler than thorax, tergites brown to yellowish, with yellow posterior margins (Fig. 299). Pregenital segments modified (Figs 302, 303): tergite 6 more heavily sclerotized than preceding sclerites, posterior margin with pair of membranous swellings; tergite 7 with pair of pigmented, cushion-like lobes on anterior margin, appressed against expanded posterior margin of tergite 6; sclerites of segment 8 narrowly fused anterolaterally. Terminalia (Fig. 305): brown to yellow; cerci with darker dorsal margin; phallus yellowish. Cercus long and linear, tapered to narrow apex, shorter than epandrium; dorsal margin sculptured; setae shorter than width of cercus, with strong, inner subapical setae. Subepandrial process with truncate apex and narrow extension; extending to either side of phallus. Epandrial lamella linear, posterior margin rounded and expanded dorsally; fused with cercus anteriorly; apical setae short, longer setae along ventral margin, shorter than width of epandrium. Hypandrium short, apical margin truncate, without setae. Phallus expanded on lower third; tapered and arched to expanded apex; apical fourth with elongate slit; base of slit with ring of spicules; apex emerging beyond cerci; ejaculatory apodeme very small, one quarter length of epandrium, T-shaped, with lateral apodemes near lower margin.

Female. Similar to male, except as follows: frons broader, nearly as wide as ocellar triangle; hindleg without modified setae and processes. Abdominal pleural membrane not expanded; tergites 7 and 8 with pruinescence; sternite 8 slightly projected.

Geographical distribution and seasonal occurrence (Fig. 329). *Empis* (*En.*) *culcitella* **sp. nov.** is known from Washington, Oregon and California. Adults have been collected from March to August.

Etymology. Named from the Latin for small cushion, in reference to the unique cushion-like lobes found on male tergite 7 in this species.

Nuptial gift presentation. Form unknown.

Remarks. The cushion-like lobes on the male tergite 7 are very unusual and similar features are unknown among other species of *Empis*. Their function remains unknown, but possibly they are used during mating.

Empis (*Enoplempis*) *delnortensis* sp. nov.

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(Figs 304, 306, 308)

Type material. HOLOTYPE ♂ (Fig. 304), labelled: "USA: CA: Del Norte Co./ West Fork of Patrick Crk./ N41°55′03″ W123°51′28″/ 24-31.V.2009, Malaise/ J.M.Cumming& S.E.Brooks"; "CNC/ 1078381"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *delnortensis* Sinclair,/ Brooks & Cumming [red label]" (CNC). **PARATYPES: USA. California:** *Del Norte County*: Same data as holotype (1♂, 1♀, CNC).

Diagnosis. This species is distinguished from other species of the subgenus by the grey body (Fig. 304) and males are holoptic, with hindleg unmodified, hind tarsomere 1 somewhat inflated, hind tibia with several pairs of anterodorsal and posterodorsal setae, less than twice as long as tibia and cercus straight dorsally, with tapered apical half (Fig. 306).

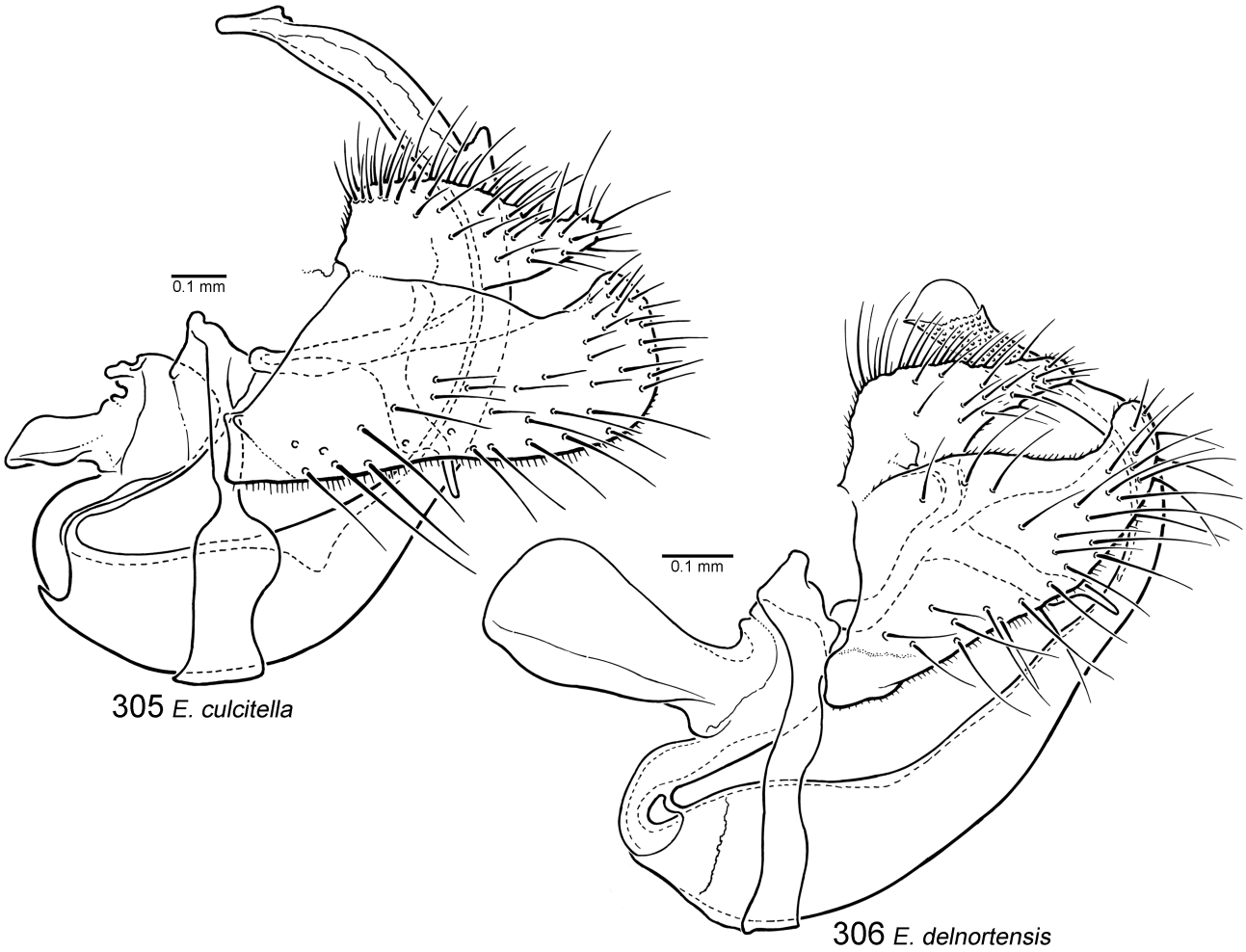
Description. Wing length 3.8–4 mm. **Male.** Similar to *E.* (*En.*) *californica* **sp. nov.**, except as follows: head holoptic. Occiput bearing single row of slender setae, similar in size to ocellar setae. Antenna with postpedicel long and tapered, 5× longer than basal width.

Thorax with antepronotum with several pairs of dark setae. Postpronotum with 1 long seta and several short, dark setae. Scutum with uniserial acr; dc slightly longer than acr, increasing in length and stronger posteriorly; 1–2 posterior npl, with 1–2 short, fine anterior npl.

Legs long, slender, yellowish brown, gradually becoming darker apically; coxae with or without dense greyish pruinescence (Fig. 304). Mid and hind femora with white ventral pile, longest on hind femur. Fore femur with anteroventral and posteroventral row of setae, shorter than half width of femur. Fore tibia with 1–2 anterodorsal setae on apical half; without erect posterior setae; dorsal and ventral preapical setae present; anterior face with short appressed setae. Fore tarsomere 1 slender without long dorsal setae, with fine dense ventral setae, with 1–2 pairs of stronger ventral setae on apical half; tarsomeres 2–5 with biserial row of strong ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur similar to fore femur. Mid tibia with 2 pairs of erect anterodorsal and posterodorsal setae on basal half; apical quarter with strong ventral setae. Mid tarsomere 1 without long dorsal setae; tarsomeres 1–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Hind femur slender without modified

setae and processes; row of fine anteroventral and posteroventral setae, length longer than width of femur; single dark anteroventral seta on apical quarter. Hind tibia without processes or modified setae; 4–5 erect anterodorsal and posterodorsal setae evenly distributed along length of tibia, length slightly longer than width of tibia; without long anterior and ventral setae. Hind tarsomere 1 somewhat inflated with several long dorsal setae, similar to tibia, otherwise similar to mid tarsus.

Wing slightly infuscate; veins mostly complete (except Sc), CuA+CuP very weak and fading out well before wing margin. Halter whitish to pale brown (Fig. 304).



FIGURES 305–306. Male terminalia of the *E*. (*Enoplempis*) unplaced species, lateral view. **305,** *E*. (*En*.) *culcitella* **sp. nov.**; **306,** *E*. (*En*.) *delnortensis* **sp. nov.**

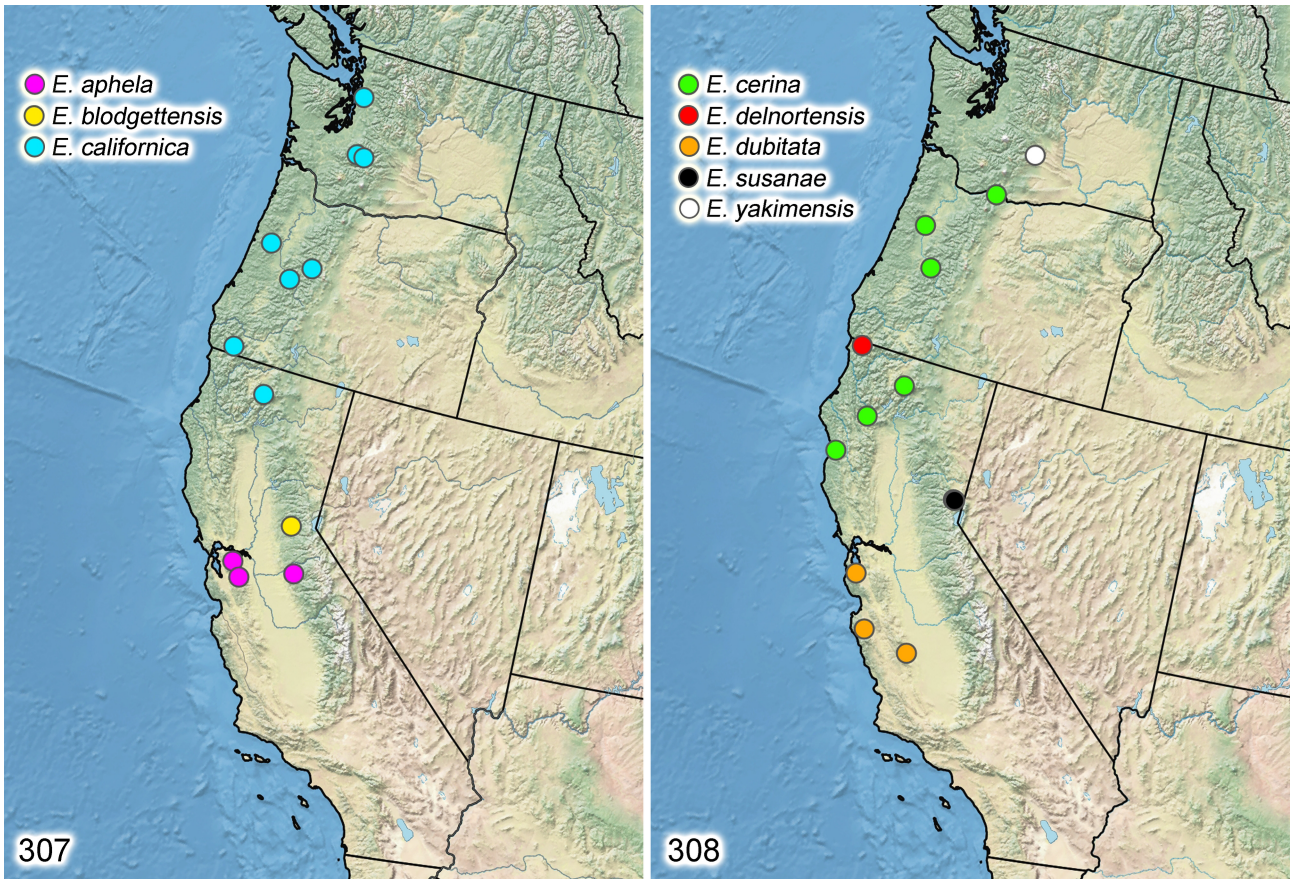
Abdomen paler than thorax, with greyish pruinescence; sclerites of segment 8 fused anterolaterally. Terminalia (Fig. 306): epandrium and cerci dark brown; phallus orange brown and shiny. Cercus subtriangular, with straight dorsal margin, tapered posteriorly with truncate apex; setae shorter than width of cercus. Subepandrial process extending on either side of phallus. Epandrium expanded on basal half, not linear, longer than height; posterior margin distinctly upcurved, bearing long setae ventrally, shorter than width of epandrium. Hypandrium narrow, strap-like; without setae. Phallus with basal half not strongly expanded, tapered apically, with distinct bend near apical quarter; apex emerging beyond cerci; phallus with broad apex, with roughened surface encircling tip; ejaculatory apodeme narrow, more than half-length of epandrium, Y-shaped, with lateral apodemes positioned near ventral margin with short medial apodeme.

Female. Similar to male, except as follows: frons broader, wider than anterior ocellus; legs stockier, without modified setae and processes. Abdominal pleural membrane without darkened, expanded region; tergite 8 (and likely syntergite 9+10) with pruinescence.

Geographical distribution and seasonal occurrence (Fig. 308). *Empis* (*En.*) *delnortensis* **sp. nov.** is known only from the type locality in Del Norte County, California. Adults have been collected in May.

Etymology. The species is named after Del Norte County in northern California, where all the type specimens were collected.

Nuptial gift presentation. Form unknown.



FIGURES 307–308. Known geographical distribution of the *E.* (*Enoplempis*) unplaced species. **307,** *E.* (*En.*) *aphela* **sp. nov.**, *E.* (*En.*) *blodgettensis* **sp. nov.** and *E.* (*En.*) *californica* **sp. nov.**; **308,** *E.* (*En.*) *cerina* **sp. nov.**, *E.* (*En.*) *delnortensis* **sp. nov.**, *E.* (*En.*) *dubitata* **sp. nov.**, *E.* (*En.*) *susanae* **sp. nov.** and *E.* (*En.*) *yakimensis* **sp. nov.**

Empis (*Enoplempis*) *dubitata* sp. nov.

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(Figs 308–311, 324)

Type material. HOLOTYPE ♂, labelled: "[USA] StanU [37°25′N 122°10′W] Cal/ 11 Apr1906"; "ALMelander/ Collection/ 1961"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *dubitata* Sinclair,/ Brooks & Cumming [red label]" [right wing, right foreleg and both midlegs missing] (USNM). **PARATYPES: USA. California:** *Fresno County*: Coalinga [36°08′N 120°21′W], 10.v.1962, 10 mi. W, R.M. Bohart (1♂, UCDC). *Monterey County:* Hastings Res. [36°22′N 121°33′W], 19.v.1938, C.D. Mich[e]ner (1♂, CSUC).

Diagnosis. This species is distinguished from other species of the subgenus by the male with narrowly dichoptic eyes, hind tibia with flattened anteroventral process with digitiform apical lobe and inner trim of black setae, hind femur with pair of nipple-like posteroventral lobes (Figs 310, 311) and tarsomeres 1 and 2 on all legs with strong ventral setae as long or longer than width of tarsomere (Fig. 309).

Description. Wing length 7.0–7.3 mm. **Male.** Head dark in ground-colour, with greyish pruinescence. Eyes narrowly separated on frons; frons as narrow as width of anterior ocellus; short setulae along inner margin of eye. Face without setae; short, slightly divergent towards mouthparts, with oral margin dark and shiny. Ocellar triangle elevated, with thin greyish pruinescence, with pair of parallel short ocellar setae, subequal to length of postocular setae and several pairs of short setulae. Occiput bearing single row of setae, stronger than postocular setae; postocular setae shorter than occipital row; postocellar region without setae. Antenna dark brown; scape 2×

longer than pedicel, with short, black setae; pedicel with ring of apical setae; postpedicel long, slightly tapered, 5.5× longer than basal width; stylus length 1.5× basal width of postpedicel. Palpus pale yellowish brown, with dark setulae. Proboscis yellowish brown, length less than 2× head height; labellum with short, dark setae.

Thorax dark brown in ground-colour, densely grey pruinescent, with 2 pairs of brown vittae; median narrower pair between acr and dc rows, ending at prescutellar depression; faint broader outer vittae extending to postalar ridge; postpronotal lobe, lower margin of notopleuron, postalar ridge and outer margin of scutellum yellowish. Proepisternum with several pairs of short setae on lower section; upper proepisternum in front of spiracle without setae. Prosternum bare. Antepronotum with several pairs of lateral setae. Postpronotum with 1 long seta and several short setae. Scutum with sparse uniserial row of acr; dc uniserial, longer and stronger than acr, increasing in size posteriorly; 1–2 posterior npl, with 1–2 slender anterior npl; 1 presut spal; 1 psut spal; 1 pal. Scutellum with pair of short to long apical sctl, with or without pair of outer, shorter marginal setae; disc bare. Laterotergite with 3–6 short to long setae. Anterior and posterior spiracles pale.

Legs long, yellowish brown, with apical tarsomeres darker; coxae without blue pruinescence. Hind trochanter with numerous dark setulae. Femora without white ventral pile. Fore femur without anteroventral and posteroventral row of short setulae. Fore tibia with 2–4 erect anterodorsal and posterodorsal setae, shorter than width of tibia; 1–3 posteroventral setae; anterior face with short appressed setae; apex with circlet of preapical setae. Fore tarsomere 1 not expanded; tarsomeres 1–5 with biserial row of spine-like ventral setae, ventral setae on tarsomere 1 longer than width of segment; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur with anteroventral and posteroventral row of short setulae. Mid tibia with 1–2 pairs of erect anterodorsal and posterodorsal setae not longer than width of tibia; 2–4 anteroventral and posteroventral setae not longer than width of tibia; apex with circlet of preapical setae. Mid tarsus similar to fore tarsus. Hind femur with rows of short, thickened anteroventral setae on apical fifth, with short distal lobe with similar apical setae; transverse brush of short, strong setae on apical fifth, longer and on slight swelling on posterior face; pair of nipple-like lobes distal to transverse brush; transverse row of 5–7 thickened posteroventral setae distal to nipple-like lobes, with row of stiff setae above; preapex with strong posterior, anterodorsal and anterior seta (Figs 310, 311). Hind tibia with base not greatly narrowed; base with flattened anteroventral process with digitiform apical lobe and inner trim of black setae; posteroventral process triangular with conical apex; 2–5 erect anterodorsal and posterodorsal setae, about as long as width of tibia; 2–4 strong anteroapical setae; posteroapical comb with seta (Figs 309–311). Hind tarsus with tarsomere 1 slightly swollen, with 1–2 erect dorsal setae; tarsomeres similar to mid tarsus.

Wing lightly infuscate with dark veins; all veins well sclerotized; veins mostly complete (except Sc), with CuA+CuP reaching wing margin. Basal costal seta absent. R_5 and M_1 divergent near wing margin; R_5 ending near wing tip; radial fork acute. Halter pale, yellowish brown.

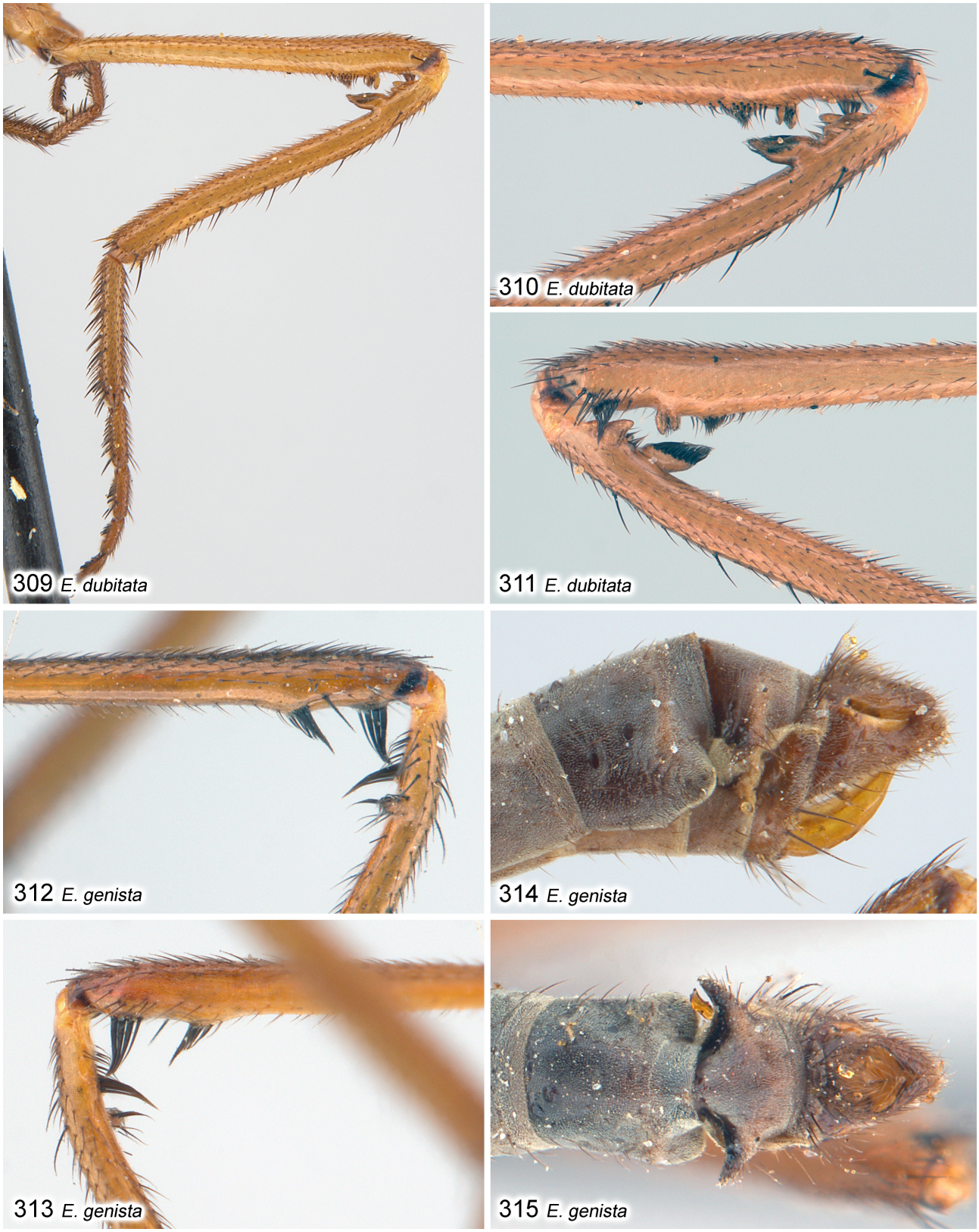
Abdomen concolourous with thorax, greyish pubescent, tergites brown, with pale posterior margins; posterior half of tergite 7 and sclerites of segment 8 shiny; sclerites of segment 8 narrowly fused anterolaterally. Terminalia (Fig. 324): brown, with posterior half of epandrium and phallus yellowish brown. Cercus long and linear, tapered to narrow, shallowly forked apex, shorter than epandrium; dorsal margin straight; dorsal setae longer than width of cercus. Subepandrial process with truncate apex, extending to either side of phallus. Epandrial lamella subtriangular, posterior margin rounded, with low expanded dorsoapical ridge; fused with cercus anteriorly; apical setae short, longer setae along ventral margin, shorter than width of epandrium. Hypandrium short, apical margin truncate, with numerous short setae. Phallus expanded on lower half; tapered and arched to narrow apex; apex emerging beyond cerci, with papilla-like projections on apical section; ejaculatory apodeme broad, half length of epandrium, Y-shaped, with lateral apodemes near lower margin.

Female. Unknown.

Geographical distribution and seasonal occurrence (Fig. 308). *Empis* (*En.*) *dubitata* **sp. nov.** is known from central California. Adults have been collected in April and May.

Etymology. Named from the Latin for uncertain, in reference to this being one of the species that is unplaced to species group.

Nuptial gift presentation. Form unknown.



FIGURES 309–315. Male postabdomen and hindleg of the *E*. (*Enoplempis*) unplaced species. **309,** *E*. (*En*.) *dubitata* **sp. nov.**, hindleg, anterior view; **310,** same, hind femur tibia joint, anterior view; **311,** same, hind femur tibia joint, posterior view; **312,** *E*. (*En*.) *genista* **sp. nov.**, hind femur tibia joint, anterior view; **313,** same, hind femur tibia joint, posterior view; **314,** same, postabdomen (holotype), lateral view; **315,** same, postabdomen (holotype), dorsal view.

***Empis* (*Enoplempis*) *genista* sp. nov.**
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(Figs 5, 312–318, 329)

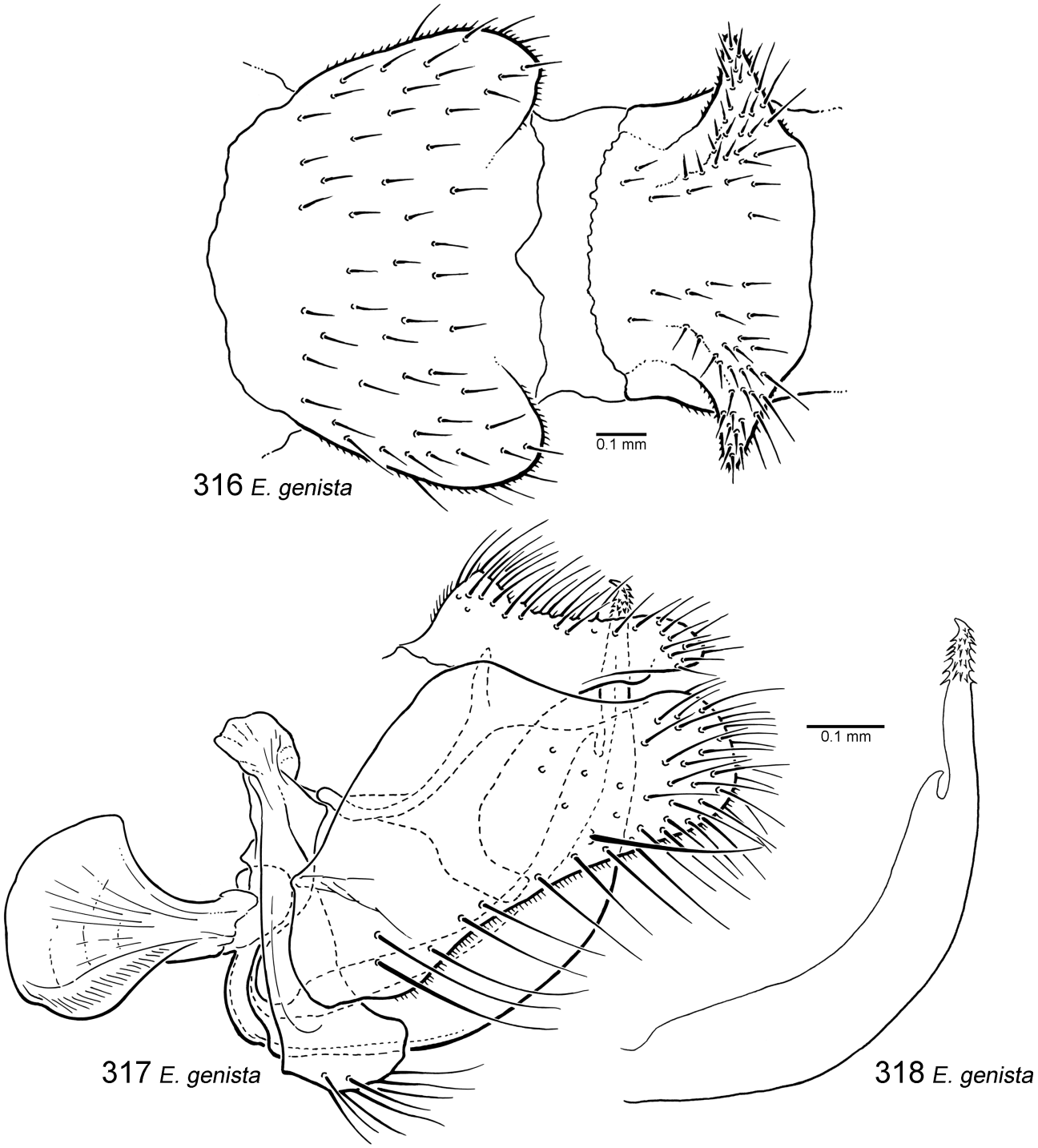
Type material. HOLOTYPE ♂, labelled: "[USA] San Diego [32°42′N 117°09′W]/ Cal."; "R. W. Doane/ Collector"; "near mixopolia"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *genista* Sinclair,/ Brooks & Cumming [red label]" (USNM). **PARATYPES: USA. California:** *Alameda County*: Patterson Reserve, Del Valle Lk. [37.5939°N 121.7094°W], 8.iii.1974, JAP (2♂, EMEC). *Los Angeles County*: Claremont [34°6′N 117°43′W], Baker, 6953 (1♂, 1♀, USNM). *Monterey County*: Arroyo Seco, The Lakes [36°14′N 121°28′W], 880 ft, 24.iv.1999, Arnaud Flight Trap, Collection No. 02194, PHA & M. Arnaud (1♂, USNM); Carmel Valley, Hastings Nat. History Pres. [36.3792°N 121.5629°W], 7–8.iii.1996, PHA (1♂, USNM). *Riverside County*: Santa Rosa Plateau, Mesa Redonda [33°29′28″N 117°20′44″W], 19.ii.1995, on flws *Baccharis salicifolius*, G.R. Ballmer (1♂, UCRC). *San Diego County*: Alpine [32°50′N 116°46′W], 10.iv.1915, M.C. Van Duzee (1♂, 1♀, USNM); same data except, 11.iv.1915 (1♂, 1♀, USNM); La Jolla [32°50′N 117°16′W], 1.ix.1914, E.P. Van Duzee (1♂, USNM). *Santa Barbara County*: Figueroa Mtn Rd above Birabent Cyn, 858 m, 34.741°N 120.009°W, 19.iii.2010, I.S. Winkler *et al.*, E10-24 (1♂, CNC); Santa Cruz Is. [34°00′N 119°43′W], U.C. Sta. HQ, 3.ii.1979, on *Ceanothus insularis*, JAP (1♂, EMEC); 25 mi. W New Cuyama, Sierra Madre PG [35°07′N 120°05′W], 21.iii.1969, L. Russell (1♂, OSAC). *Santa Clara County*: Harkins Collection (1♂, LACM). *Solano County*: L.G. Stebbins Cold Cyn Reserve [38.5101°N 122.0976°W], 24.iii.1979, S. Buchmann (2♂ with Tipulidae prey, UCDC).

Diagnosis. This species is distinguished from other species of the subgenus by the male with dichoptic eyes (Fig. 5), modified pregenital segments (Figs 314–316), hind femur with anteroventral and posteroventral tufts of black setae, longer than femur width (Fig. 312), absence of row of strong posterior setae on hind femur (Fig. 313), and phallus with single, subapical anterior appendage (Fig. 318).

Description. Wing length 5.4–6.0 mm. **Male.** Head dark in ground-colour, with greyish pruinescence (Fig. 5). Eyes dichoptic; frons broader than width of anterior ocellus; short setulae along inner margin of eye. Face without setae; short, slightly divergent towards mouthparts, with oral margin dark and shiny. Ocellar triangle elevated, with thin greyish pruinescence, with pair of parallel ocellar setae, shorter than occipital setae and several pairs of short setulae. Occiput bearing single row of setae, slightly stronger than postocular setae; postocular setae shorter than occipital row; postocellar region without setae. Antenna dark brown; scape 2× longer than pedicel, with short, black setae; pedicel with ring of apical setae; postpedicel long, slightly tapered, 5.5× longer than basal width; stylus length subequal to basal width of postpedicel. Palpus pale orange-yellow, with dark setulae. Proboscis yellowish brown, length less than 2× head height; labellum with short, dark setae.

Thorax dark brown in ground-colour, densely grey pruinescent, with 2 pairs of brown vittae (Fig. 5); median narrower pair between acr and dc rows, ending at prescutellar depression; faint broader outer vittae extending to postalar ridge; apex of postpronotal lobe shiny. Proepisternum with several pairs of short pale setae on lower section; upper proepisternum in front of spiracle without setae. Prosternum bare. Antepronotum with row of short setae. Postpronotum with 1 long seta and several short setae. Scutum with sparse uniserial row of acr; dc uniserial, longer and stronger than acr, increasing in size posteriorly; 2 posterior npl, with 1–2 slender anterior npl; 1 presut spal; 1 psut spal; 1 pal. Scutellum with pair of long apical sctl, with pair of outer, shorter marginal setae; disc bare. Laterotergite with 3–8 long setae. Anterior and posterior spiracles pale.

Legs slender, yellow, with tarsi darker; coxae with blue pruinescence (Fig. 5). Mid and hind coxae with single, strong lateral seta. Hind trochanter with numerous dark setulae. Femora without white ventral pile. Fore tibia with anterior face with short appressed setae; apex with circlet of preapical setae. Fore tarsomere 1 slender; tarsomeres 1–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid tibia with 2–3 pairs of erect anterodorsal and posterodorsal setae not longer than width of tibia; apex with circlet of preapical setae. Mid tarsus similar to fore tarsus. Hind femur with row of setae proximal to preapical posteroventral tuft of long, appressed setae, longer than width of femur and tips of setae strong bent; tuft of anteroventral setae proximal to posteroventral tuft on slight swelling, comprising longer outer setae and shorter inner setae; preapical anterodorsal seta distinct; without row of strong posterior preapical setae (Figs 312, 313). Hind tibia with base narrowed; 3–4 pairs of erect anterodorsal and posterodorsal setae, about as long as width of tibia; base with narrow anteroventral digitiform process, bearing several apical setae and tuft of long setae on inner face; row of longer anteroventral setae proximal to process; tuft of posteroventral setae proximal to anteroventral process and row of shorter proximal setae; posteroapical comb with seta (Figs 312, 313). Hind tarsus with tarsomere 1 slender; tarsomeres similar to mid tarsus.



FIGURES 316–318. Male postabdomen and terminalia of *E.* (*Enoplempis*) *genista* **sp. nov. 316,** postabdominal tergites 7–8, dorsal view; **317,** terminalia, lateral view; **318,** phallus, lateral view.

Wing lightly infuscate with dark veins; all veins well sclerotized; veins mostly complete (except Sc), with CuA+CuP reaching wing margin. Basal costal seta absent. R_5 and M_1 divergent near wing margin; R_5 ending slightly beyond wing tip; radial fork acute. Halter pale, yellowish to orange-yellow.

Abdomen darker than thorax, tergites brown, similar to scutal vittae. Pregenital segments modified (Figs 314–316): tergite 6 expanded posterolaterally into round lobes, with posterior margin of tergite with pair of sclerotized patches; tergite 7 expanded laterally into setose tapered lobes with narrow apex; sclerites of segment 8 narrowly fused anterolaterally. Terminalia (Figs 317, 318): reddish brown, subshiny; phallus yellowish. Cercus long and

linear, tapered to rounded apex, shorter than epandrium; inner margin with tooth-like subapical projection; setae shorter than width of cercus. Subepandrial process with truncate apex; extending to either side of phallus. Epandrial lamella linear, tapered to broadly rounded apex; not fused with cercus anteriorly; apical setae short, longer setae along ventral margin, shorter than width of epandrium. Hypandrium short, apical margin truncate; several short setae medially. Phallus (Fig. 318) very narrow at base, expanded on lower half; anterior margin expanded with single, subapical appendage; gradually tapered beyond mid-length; apex narrow with ring of spicules; apex emerging beyond cerci; ejaculatory apodeme half length of epandrium, T-shaped, with lateral apodemes near lower margin.

Female. Similar to male, except as follows: frons broader, as wide as ocellar triangle; hindleg without modified setae and processes; abdominal pleural membrane not visible; tergites 7 and 8 with pruinescence; sternite 8 narrowly prolonged posteriorly, one-third length of cercus.

Geographical distribution and seasonal occurrence (Fig. 329). *Empis* (*En.*) *genista* **sp. nov.** is known from central and southern California, including Santa Cruz Island in Santa Barbara County. Adults have been collected from February to April and also in September.

Etymology. From the Latin for broom or bush, in reference to the two tufts of setae on the male hind femur of this species.

Nuptial gift presentation. Two male paratypes were examined, each with an unwrapped crane fly (Tipulidae) prey item pinned below the specimen. This probably indicates that males of this species present unwrapped prey to females as nuptial gifts.

Remarks. This species is similar to the *E.* (*En.*) *delumbis* group on the basis of the spiculate apex of the phallus but differs in the modified setae and processes of the hindleg, single dorsal subapical phallic appendage and modified pregenital segments.

Empis (*Enoplempis*) *holoptica* sp. nov.

urn:lsid:zoobank.org:act:6A0608ED-9CCF-4F1E-8DC8-D7E1E4D58F9E
(Figs 319, 325, 330)

Type material. HOLOTYPE ♂, labelled: "CAL: No.Calif.Coast/ Range Pres. [39°42′N 123°39′W], 5 mi. N/ Branscomb, Mendo. Co/ v-26/27-[19]76/ R. Wharton coll."; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *holoptica* Sinclair,/ Brooks & Cumming [red label]" (EMEC). **PARATYPES: USA. California:** *El Dorado County*: Blodgett Forest, 13 mi. E Georgetown [38°54′N 120°39′W], 31.v.1974, black lite trap, 2200, 24454, JAP (1♂, EMEC). *Humboldt County*: 4 mi. E Shelter Cove [40.04°N 123.96°W], 21–22.v.1976, R. Wharton (1♂, EMEC). *Mendocino County*: Angelo Coast Range Reserve [39.7082°N 123.6515°W], 31.v.1980, E.I. Schlinger (1♂, EMEC); Empire Camp Rest Area S of Cummings on Hwy 101 [39.8267°N 123.5947°W], 18.v.1978, DDW (1♂, CAS); same data as holotype (3♂, 1♀, EMEC); same data except, 24–25.v.1976 (2♀, EMEC); same data except, 25.v.1976, E. Rogers (6♂, 4♀, EMEC); same data except, 25–27.v.1976 (1♂, EMEC); same data except, 25.v.1976, JAP (10♂, 1♀, EMEC); same data except, 24–25.v.1976, R. Coville (1♂, EMEC); same data except, Szerlip (1♂, EMEC); NCCRP, 3 mi. N Branscomb, 1400 ft, 17.v.1975, JAP (1♂, EMEC); same data except, E. White (2♂, EMEC); same data except, J. Benson (1♂, EMEC); same data except, 18–21.v.1984, E. Schlinger (1♂, EMEC); same data except, 5–6.v.1989, MT, S. O'Keefe (1♂, EMEC); 1 mi. N Piercy [39°58′N 123°47′W], 20–23.v.1976, R. Wharton (1♂, EMEC); same data except, J.A. Chemsak (1♀, EMEC); same data except, bl. light, Dietz, Chemsak & Powell (1♀, EMEC); 1 mi. SE Piercy, 20–21.v.1976, JAP (1♀, EMEC). *Tehama County*: 1 mi. SE Log Springs Sta. [39.817°N 122.773°W], 25.v.1981, L. Bezark (1♂, CNC).

Diagnosis. This species is distinguished from other species of the subgenus by the grey body (Fig. 319) and males are holoptic, with hindleg unmodified, hind tibia with long dorsal setae, and phallus gradually arched apically with roughened surface distant from narrow apex (Fig. 325).

Description. Wing length 4.8–5.6 mm. **Male.** Similar to *E.* (*En.*) *californica* **sp. nov.**, except as follows: head holoptic. Antenna dark.

Thorax with antepronotum with 4 or more pairs of dark setae. Scutum with 2 posterior npl, with several shorter anterior npl. Scutellum with pair of long apical sctl, with 1 pair of outer marginal setae.



FIGURES 319–323. Male habitus and hindleg of the *E*. (*Enoplempis*) unplaced species. **319,** *E*. (*En*.) *holoptica* **sp. nov.**, habitus, lateral view; **320,** *E*. (*En*.) *manning* **sp. nov.**, hindleg (holotype), lateral view; **321,** *E*. (*En*.) *missoula* **sp. nov.**, habitus, lateral view; **322,** same, hind femur tibia joint, anterior view; **323,** same, hind femur tibia joint, posterior view.

Legs long, slender, orange brown, apex of tibiae and tarsi darker brown; coxae without dense greyish pruinescence (Fig. 319). Fore tibia with 1–2 erect anterodorsal setae, length longer than width of tibia; anterior face with short appressed setae. Fore tarsomere 1 slender with short dorsal setae, with fine dense ventral setae; tarsomeres 2–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid tibia with 2 erect posterodorsal setae on basal half; biserial row of strong ventral setae, length slightly shorter than width of tibia. Mid tarsomere 1 without long dorsal setae; tarsomeres 1–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Hind femur

slender without modified setae and processes; fine ventral setae, nearly as long as width of femur (Fig. 319). Hind tibia without processes or modified setae; long dorsal setae along most of tibia, length mostly twice width of tibia; long, fine erect ventral and anterior setae about as long as width of tibia (Fig. 319). Hind tarsus swollen, with 1–3 long dorsal setae, similar to tibia, with strong ventral setae; tarsomeres 2–5 similar to fore tarsus.

Wing with veins mostly complete (except Sc), well sclerotized, except CuA+CuP weakened apically, reaching wing margin as fold.

Terminalia (Fig. 325): epandrium and cerci brown, phallus orange brown and shiny. Cercus subtriangular, with nearly straight dorsal margin, tapered posteriorly with rounded apex; setae shorter than width of cercus. Subepandrial process extending on either side of phallus. Epandrial lamella elongate, longer than height, nearly parallel-sided; posterior margin slightly expanded dorsally, rounded, bearing long setae ventrally, mostly shorter than width of epandrium. Hypandrium narrow, strap-like, expanded medially, with pointed posteriorly margin; without setae. Phallus with basal half not strongly expanded, tapered apically, gradually arched beyond cerci; apex slender, not expanded, with roughened surface distant from apex, opposite cerci; ejaculatory apodeme two-thirds length of epandrium, Y-shaped, with lateral apodemes positioned near ventral margin.

Female. Similar to male, except as follows: frons broader, wider than anterior ocellus; hind tibia with 4–6 strong anterodorsal and posterodorsal erect setae. Abdominal pleural membrane without darkened, expanded region; tergite 8 and syntergite 9+10 with pruinescence.

Geographical distribution and seasonal occurrence (Fig. 330). *Empis* (*En.*) *holoptica* **sp. nov.** is known from northern and central California. Adults have been collected in May.

Etymology. This species is named for the holoptic condition of the males, which is rare in the subgenus.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *manning* sp. nov.

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(Figs 320, 326, 327, 329)

Type material. HOLOTYPE ♂, labelled: "CAN: BC: Manning Prov.Pk/ Simikameen R - Canyon Tr./ 20.vii.2015, 1213 m/ N49°04.07′W120°48.19/ B.J. Sinclair"; "CNC/ 1078379"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *manning* Sinclair,/ Brooks & Cumming [red label]" [dissected] (CNC). **PARATYPES: CANADA. British Columbia:** Same data as holotype (1♀, CNC); Manning PP, Lightning Lake, for., 22.vii.2015, 1265 m, N49°03.52′ W120°50.48′, B.J. Sinclair (2♀, CNC).

Diagnosis. This species is distinguished from other species of the subgenus by the grey body and males are very narrowly dichoptic, with unmodified hindleg (Fig. 320), hind tarsomere 1 slightly swollen, hind tibia without long anterior setae, cercus with straight dorsal margin (Fig. 326) and phallus with narrow base and arched apical third (Fig. 327).

Description. Wing length 5–5.5 mm. **Male.** Similar to *E.* (*En.*) *susanae* **sp. nov.**, except as follows: terminalia (Figs 326, 327): cercus with straight dorsal margin; posterior half tapered, with pointed apex; setae shorter than width of cercus. Subepandrial process extending on either side of phallus. Epandrial lamella elongate, narrow, longer than height; posterior margin distinctly expanded dorsally, rounded, bearing long setae ventrally, length nearly subequal to width of epandrium. Hypandrium narrow, strap-like; without setae. Phallus (Fig. 327) with basal third slightly expanded, tapered apically, sinuous to strong bend at apical third; apical third arched; phallus opening appears restricted to tip [possibly damaged during preparation]; emerging beyond cerci; roughened subapical surface opposite apex of cercus; ejaculatory apodeme two-thirds length of epandrium, Y-shaped, with lateral apodemes positioned near ventral margin with short medial apodeme.

Female. Similar to male, except as follows: frons broader, slightly wider than anterior ocellus; legs stockier, without modified setae and processes; abdomen subshiny. Abdominal pleural membrane without darkened, expanded region; tergite 8 and syntergite 9+10 with pruinescence.

Geographical distribution and seasonal occurrence (Fig. 329). *Empis* (*En.*) *manning* **sp. nov.** is known only from the type locality in southern British Columbia. Adults were collected in July.

Etymology. The species name *manning* is a noun in apposition and is named after the provincial park where all the type specimens were collected.

Nuptial gift presentation. Form unknown.

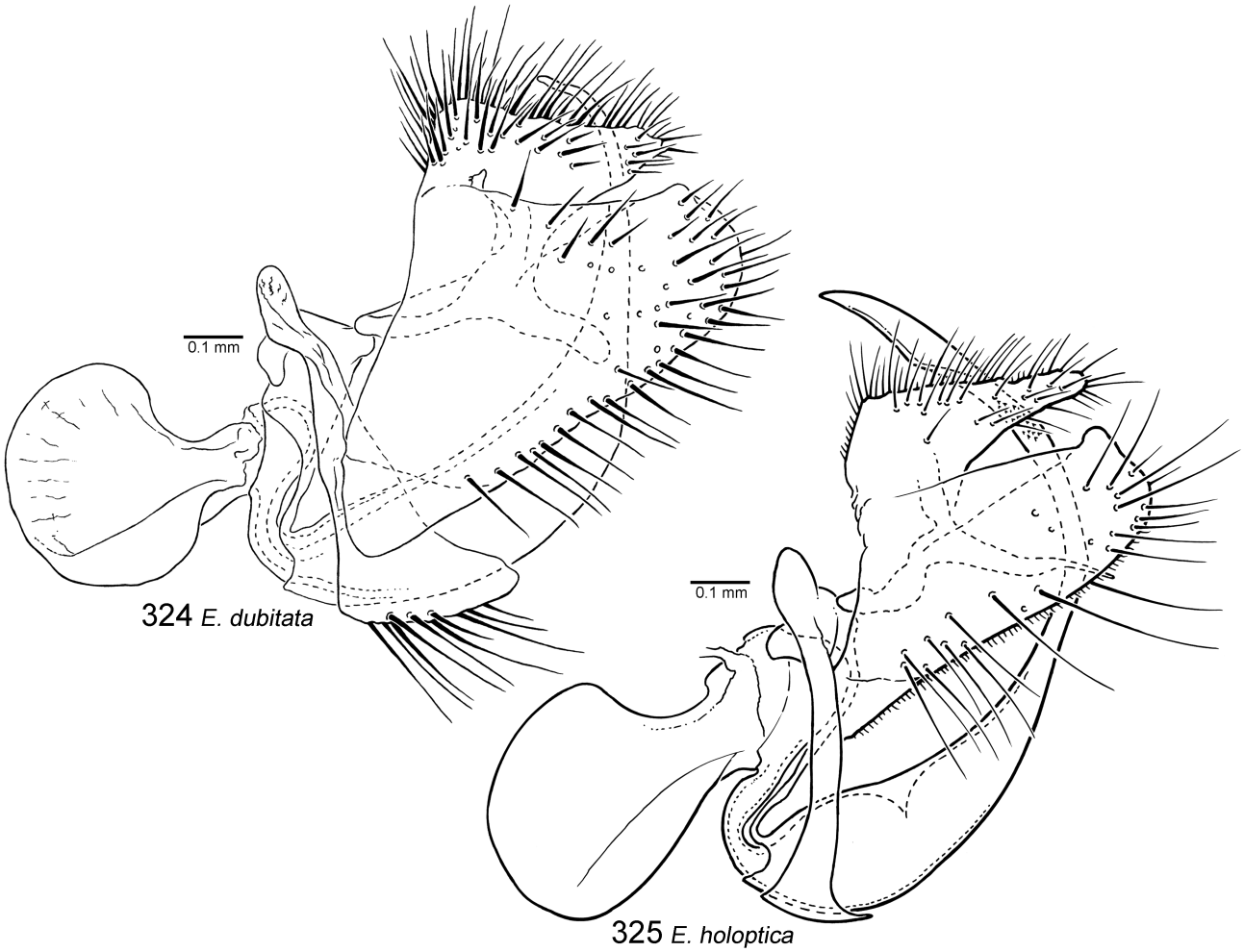
***Empis* (*Enoplempis*) *missoula* sp. nov.**
urn:lsid:zoobank.org:act:3F4926F0-AD4F-4F11-A245-356AE2B266CA
(Figs 321–323, 328, 330)

Type material. HOLOTYPE ♂, labelled: "USA: MT: Missoula Co./ Lolo NF; Gold Ck Rd; 1680m/ 47°03.338′N 113°44.776′W/ 27.vi.2017; B.J. Sinclair/ ex. roadside flowers"; "CNC/ 1078383"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *missoula* Sinclair,/ Brooks & Cumming [red label]" (CNC). **PARATYPES: CANADA. British Columbia:** Mt Thornhill nr Terrace [54°30′N 128°35′W], 29.vii.1960, 3000–4000 ft, W.R. Richards (1♂, CNC); same data except, 26.vii.1960, CHM (1♂, CNC); Vancouver Is., 2.3 km from Lk. Cowichan [48°49′N 124°03′W], 19–28.vii.1985, cold spring run beside S Shore Rd, MT, CH4575, I.M. Smith (1♂, CNC); Vancouver Is., Brooks Pen., The Throne, Mt. Doom, 50°10′N 127°46′W, 14.viii.1981, BCPM Brooks Pen. Project, R.A. Cannings, S.G. Cannings (1♂, UBCZ). **USA. Alaska:** *Juneau Borough*: Thane [58°15′N 134°19′W], 12.v.1952 (1♂, WSU). **Montana:** *Glacier County*: Glacier NP, Swiftcurrent Cpgd [48.7969°N 113.6721°W], J.G. Edwards (1♂, CAS). *Missoula County*: Same data as holotype (2♂, CNC). **Oregon:** *Benton County*: McDonald Forest nr Corvallis [44.6439°N 123.3384°W], 22.v.1969, E.M. Fisher (1♂, CSCA). **Washington:** *Chelan County*: Ida Creek Cpgd, 12 km W Leavenworth [47.6077°N 120.8476°W], 14.vi.2008, C. Borkent, CJB08-3 (1♂, LEM); Scotty Ck, 2520 ft, 47°24′5″N 120°39′20″W, 13.vi.2018, J.M. Cumming (1♂, CNC). *Clallam County*: Olympic NP, nr Hurricane Rdg. Ldg. [47.9735°N 123.4915°W], 4.viii.1972, Dry Ice MT, WJT, W.B. Garnett (1♂, WSU); Olympic NP, meadow below Sunrise Ridge, Mt Angeles [47°59′N 123°28′W], 1550 m, 24.vii.1978, DDW (3♂, 3♀, CAS). *Spokane County*: Bald Knob Cpgd, Mt Spokane SP [47.9144°N 117.1111°W], 1500 m, 25.vi.1978, DDW (13♂, 2♀, CAS); same data except, 4800–5200 ft, 9–10.vii.1975, WJT (6♂, 6♀, WSU); same data except, 21–22.vii.1975 (1♂, WSU); same data except, 9–10.vii.1975, MT with dry ice (43♂, 19♀, WSU); same data except, 21–22.vii.1975 (8♂, 9♀, WSU); same data except, 5200 ft, 6.vii.1976 (15♂, WSU); same data except, 28.vi.1977, MT (30♂, 20♀, WSU); same data except, 4800–5200 ft, 6.vii.1978 (22♂, 11♀, WFBM); same data except, sweeping (7♂, 3♂, WSU); same data except, 6.vii.1978 (1♂, WSU); same data except, 25.vi.1978 (19♂, 6♀, WSU); same data except, 5500 ft, 10.vii.1984, MT (12♂, 3♀, WSU); Mt Spokane, 5500 ft, 10.vii.1984, J. Jenkins (3♂, WSU); Mt Spokane SP, Burbling Ck on Day-Spokane Rd, 3750 ft, 26.vi.1978, sweeping, WJT (9♂, WSU).

Diagnosis. This species is distinguished from other species of the subgenus by the male with narrowly dichoptic eyes, pair of paint brush-like processes on hind femur and tibia (Figs 322, 323), absence of row of strong posterior setae on hind femur (Fig. 323), and short, simple phallus (Fig. 328).

Description. Wing length 5.8–6.0 mm. **Male.** Head dark in ground-colour, with greyish pruinescence (Fig. 321). Eyes narrowly dichoptic; frons slightly narrower than width of anterior ocellus; often with short setulae along inner margin of eye. Face without setae; short, slightly divergent towards mouthparts, with oral margin dark and shiny. Ocellar triangle elevated, with thin greyish pruinescence, with pair of parallel ocellar setae, shorter than occipital setae and several pairs of short setulae. Occiput bearing single row of setae, slightly stronger than postocular setae; postocular setae shorter than occipital row; postocellar region without setae. Antenna dark brown; scape 2× longer than pedicel, with short, black setae; pedicel with ring of apical setae; postpedicel long, tapered, 5× longer than basal width; stylus 1.5× longer than basal width of postpedicel. Palpus pale orange-yellow, with dark setulae. Proboscis yellowish brown, length less than 2× head height; labellum with short, dark setae.

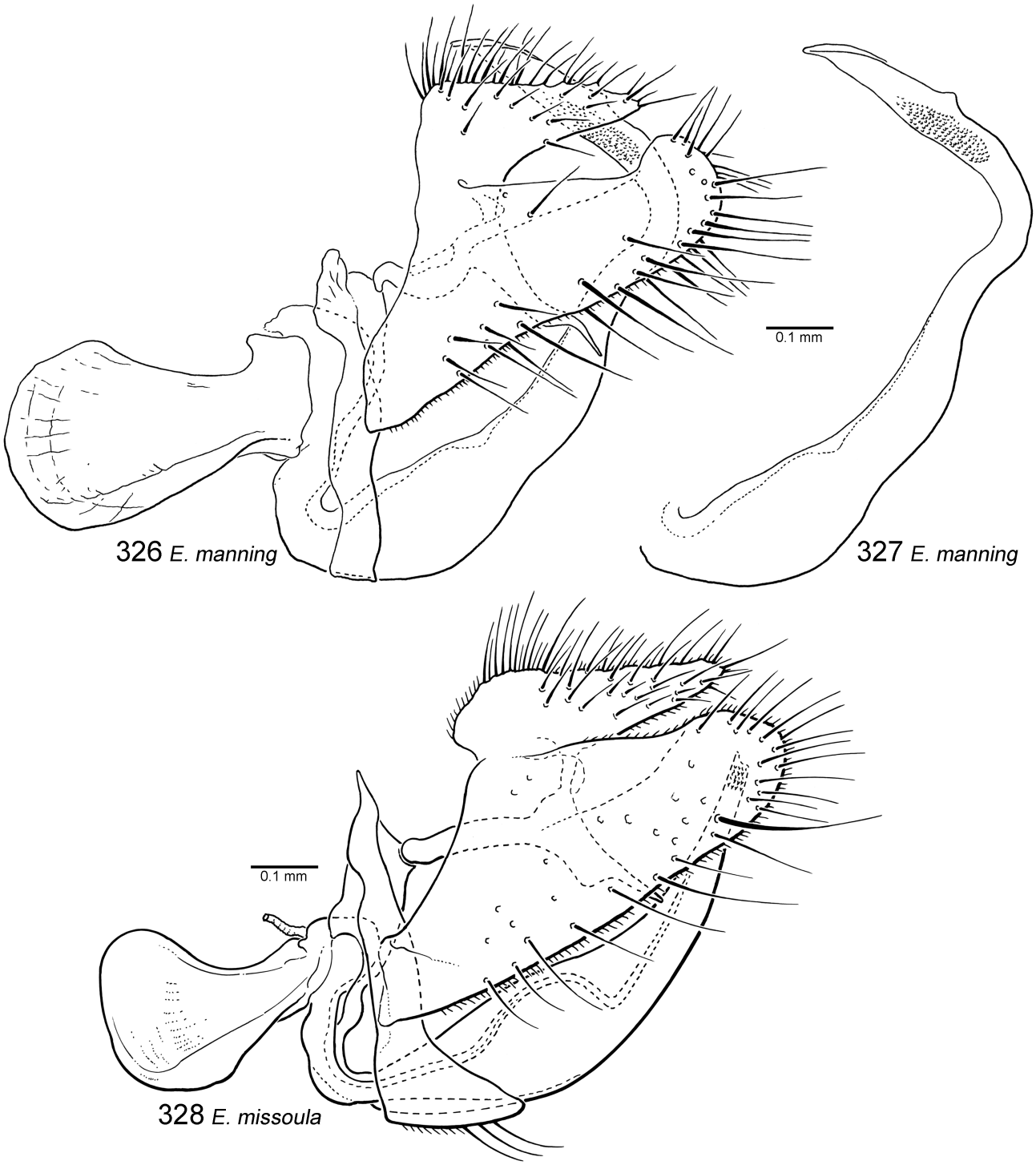
Thorax dark brown in ground-colour, densely grey pruinescent (Fig. 321), with 2 pairs of brown vittae; median narrower pair between acr and dc rows, ending at prescutellar depression; faint broader outer vittae extending to postalar ridge; apex of postpronotal lobe, postalar ridge and sometimes lower margin of notopleuron yellowish brown. Proepisternum with several pairs of short pale setae on lower section; upper proepisternum in front of spiracle without setae. Prosternum bare. Antepronotum with row of short setae. Postpronotum with 1 long seta and several short setae. Scutum with sparse uniserial row of acr; dc uniserial, longer and stronger than acr, increasing in size posteriorly; 2 posterior npl, with 1–2 slender anterior npl; 1 presut spal; 1 psut spal; 1 pal. Scutellum with pair of long apical sctl, with 1–2 pairs of outer, shorter marginal setae; disc bare. Laterotergite with linear patch of 5–10 long setae. Anterior and posterior spiracles pale.



FIGURES 324–325. Male terminalia of the *E*. (*Enoplempis*) unplaced species, lateral view. **324,** *E*. (*En*.) *dubitata* **sp. nov.**; **325,** *E*. (*En*.) *holoptica* **sp. nov.**

Legs slender, yellow, with apex of tibiae and tarsi brown (Fig. 321). Coxae with strong dark setae. Hind trochanter with numerous dark setulae. Femora with white ventral pile and anteroventral and posteroventral row of short setulae. Fore tibia with 2–3 outstanding anterodorsal and posterodorsal setae; anterior face with short appressed setae; apex with circlet of preapical setae. Fore tarsomere 1 narrow; tarsomeres 1–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid tibia with 2–3 pairs of erect anterodorsal and posterodorsal setae and several preapical setae; ventral face with dense setulae, with several strong posteroventral setae. Mid tarsus similar to fore tarsus. Hind femur with pair of paint brush-like preapical ventral processes, posteroventral process broader and flatter than anteroventral process; several erect anterodorsal setae on apical fourth; preapex with row of long anteroventral and posteroventral setae; apex with circlet of preapical setae; without row of strong posterior preapical setae (Figs 322, 323). Hind tibia with base narrowed and long dorsal setae, length less than twice width of tibia, with shorter erect ventral setae; pair of paint brush-like processes opposite processes of femur, anteroventral process broader than posteroventral process, with medial setae of brushes longer than outer setae; row of strong, dark setae proximal to ventral processes; with seta in posteroapical comb (Figs 321–323). Hind tarsus with tarsomere 1 somewhat thickened, with long dorsal setae, similar to tibia; remaining tarsomeres similar to mid tarsus.

Wing infuscate with dark veins; all veins well sclerotized, except CuA+CuP rather weak apically, reaching wing margin as fold; remaining veins complete (except Sc). Basal costal seta absent. R_5 and M_1 divergent near wing margin; R_5 ending at or slightly beyond wing tip; radial fork acute. Halter pale, white to yellowish (Fig. 321).



FIGURES 326–328. Male terminalia of the *E.* (*Enoplempis*) unplaced species, lateral view. **326,** *E.* (*En.*) *manning* **sp. nov.** (holotype); **327,** same, phallus (holotype); **328,** *E.* (*En.*) *missoula* **sp. nov.**

Abdomen paler than thorax, yellowish to nearly white with whitish pruinescence (Fig. 321); posterior marginal setae dark and long. Pregenital segments unmodified, except sclerites of segment 8 narrowly fused anterolaterally. Terminalia (Fig. 328): darker than abdomen; phallus shiny, orange brown. Cercus long and linear, tapered to narrow apex, shorter than epandrium; setae shorter than width of cercus. Subepandrial process broad basally, abruptly narrowed and straight; extending to either side of phallus. Epandrial lamella linear, tapered to broadly rounded apex; weakly fused with cercus anteriorly; setae mostly short, several longer than width of epandrium. Hypandrium short, apical margin arched; several short setae medially. Phallus very narrow at base, broadly expanded near mid-length;

gradually tapered beyond mid-length; apical section straight, shortened, with apex wide with ring of spicules; apex not emerging beyond epandrium; ejaculatory apodeme half length of epandrium, T-shaped, with lateral apodemes near lower margin.

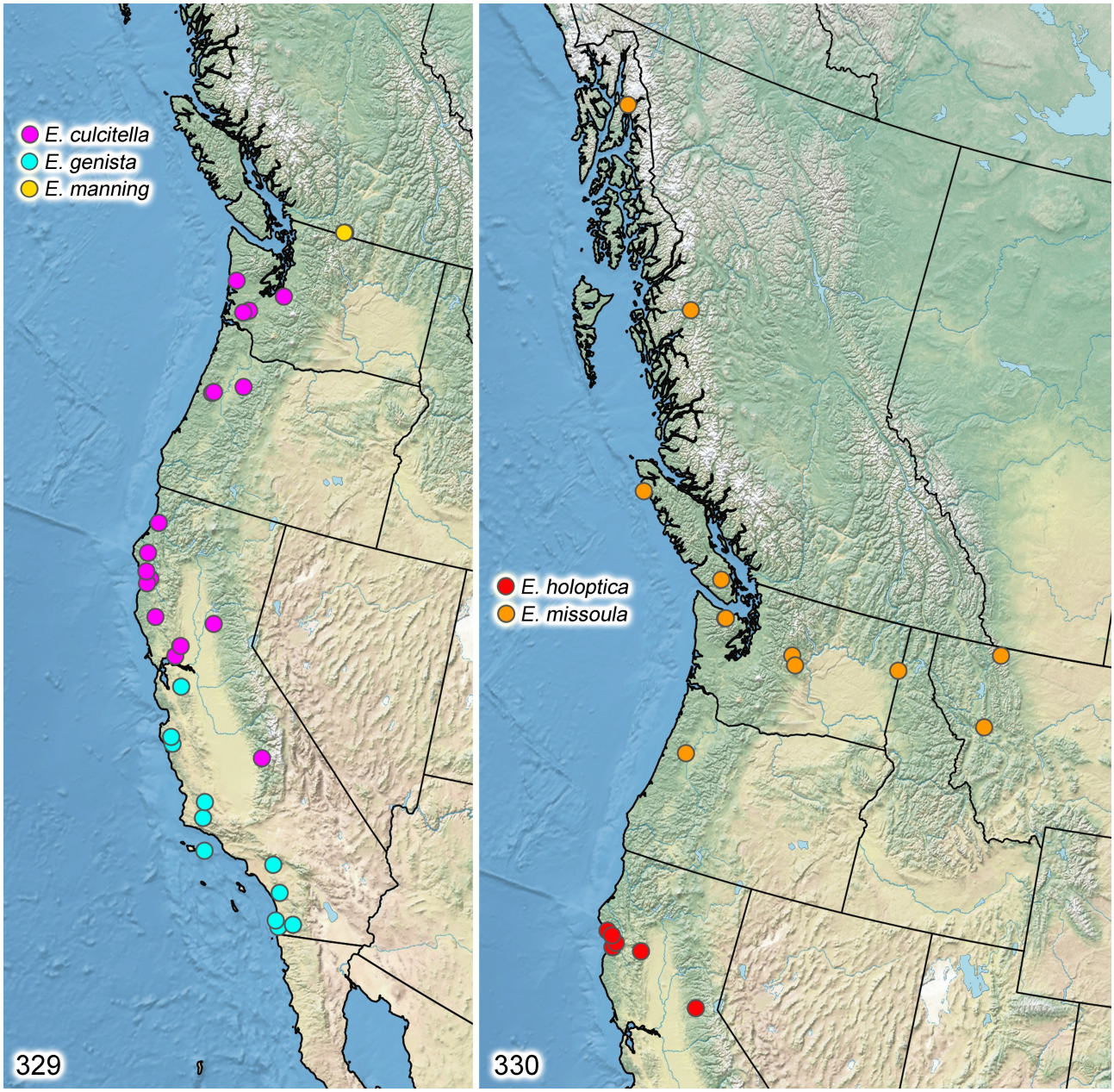
Female. Similar to male, except as follows: frons broader, wider than anterior ocellus; hindleg without modified setae and processes; abdomen brown; abdominal pleural membrane not visible; tergites 7 and 8 with pruinescence.

Geographical distribution and seasonal occurrence (Fig. 330). *Empis* (*En.*) *missoula* **sp. nov.** is known from southern Alaska, British Columbia, Montana, Washington and Oregon. Adults have been collected from May to August.

Etymology. The species name is in reference to the type locality, Missoula County, Montana and is a noun in apposition.

Nuptial gift presentation. Form unknown.

Remarks. This species is somewhat similar to species of the *E.* (*En.*) *delumbis* group on the basis of paint brush-like lobes on the hindleg but is excluded on the basis of the differences in the phallus.



FIGURES 329–330. Known geographical distribution of the *E.* (*Enoplempis*) unplaced species. **329,** *E.* (*En.*) *culcitella* **sp. nov.**, *E.* (*En.*) *genista* **sp. nov.** and *E.* (*En.*) *manning* **sp. nov.**; **330,** *E.* (*En.*) *holoptica* **sp. nov.** and *E.* (*En.*) *missoula* **sp. nov.**

***Empis* (*Enoplempis*) *oregonensis* sp. nov.**
urn:lsid:zoobank.org:act:A701E24D-5DDE-4F0D-8636-3F8F7E949351
(Figs 331, 338, 339, 353)

Type material. HOLOTYPE ♂ (Fig. 331), labelled: "USA: OR: Curry Co. Rouge R.,/ Siskiyou NF, Rd 1909 mi. 15.1@/ unmarked trailhead, 42.196197/ -123.992731, dry burned-over/ woods, 25.v.2014, S. Fitzgerald"; "CNC/ 1078377"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *oregonensis* Sinclair,/ Brooks & Cumming [red label]" (CNC). **PARATYPES: USA. Oregon:** *Benton County*: Rock Ck at end of Woods Ck Rd, 44°31′51.9″N 123°32′39.5″W, 546 m, 6.vii.2014, SJF (2♂, 1♀, CNC). *Curry County*: Same data as holotype (2♂, 1♀, CNC). *Tillamook County*: Boyer [45.0713°N 123.7277°W], 21.vi.1934 (2♀, AMNH); same data except, 21.vii.1935 (2♂, 1♀, AMNH); same data except, 28.vii.1935 (1♂, AMNH); same data except, 1.viii.1935 (1♂, AMNH); same data except, 2.vii.1937 (2♀, AMNH); same data except, 13.vii.1937 (1♀, AMNH); same data except, 24.vi.1938 (1♀, AMNH).

Diagnosis. This species is distinguished from other species of the subgenus by the grey body (Fig. 331) and males are holoptic, with unmodified hindleg, swollen hind tarsomere 1, hind tibia with long, dorsal setae, cercus with straight dorsal margin, tapered on posterior third and phallus with preapical dorsal expansion and roughened apex (Fig. 339).

Description. Wing length 5.1–6.0 mm. **Male.** Similar to *E.* (*En.*) *californica* **sp. nov.**, except as follows: head holoptic, eyes meeting on frons. Postpedicel long and tapered, 4× longer than basal width.

Thorax with antepronotum with 2–4 pairs of dark setae. Scutum with 2 posterior npl, with 1–2 short anterior npl setulae.

Legs short, slender, orange brown, apical half of tibiae and tarsi darker brown; coxae without dense greyish pruinescence (Fig. 331). Mid and hind femora with white ventral pile. Fore femur with anteroventral and posteroventral row of setae, shorter than half width of femur. Fore tibia with 2–4 erect anterodorsal and posterodorsal setae, longer than width of tibia; anterior face with short appressed setae. Fore tarsomere 1 swollen with several long dorsal setae, length longer than width of tarsomere, with fine dense ventral setae; tarsomeres 2–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur similar to fore femur. Mid tibia with 3–5 long posterodorsal setae; 3–4 long, strong anteroventral and posteroventral setae about as long as width of tibia. Mid tarsomeres 1–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Hind femur slender without modified setae and processes; rows of fine ventral setae, shorter than width of femur; strong anteroventral seta on apical fifth (Fig. 331). Hind tibia without processes or modified setae; long dorsal setae, length nearly twice width of tibia; without long anterior or ventral setae (Fig. 331). Hind tarsus swollen with several long dorsal setae, similar to tibia; otherwise tarsomeres 1–5 similar to mid tarsus.

Wing with CuA+CuP weakened and fading out before wing margin; remaining veins complete (except Sc). Halter pale, yellowish white to orange brown (Fig. 331).

Abdomen with dense whitish pruinescence when viewed from different angles; sclerites of segment 8 fused anterolaterally. Terminalia (Figs 338, 339): epandrium and cerci dark brown, with phallus orange brown and shiny. Cercus with straight dorsal margin, with tapered posterior third; setae nearly as long as width of cercus. Subepandrial process extending on either side of phallus. Epandrial lamella elongate and narrow, longer than height; posterior margin upcurved, rounded, bearing long setae ventrally, length nearly as long as width of epandrium. Hypandrium narrow, strap-like; without setae. Phallus (Fig. 339) with basal third expanded, tapered apically, gradually curved, apex emerging beyond cerci; apex with subapical dorsal expansion, with roughened apical surface; ejaculatory apodeme more than half-length of epandrium, Y-shaped, with lateral apodemes positioned near ventral margin with short medial apodeme.

Female. Similar to male, except as follows: frons broader, wider than anterior ocellus; legs stockier, without modified setae and processes; coxae often with bluish pruinescence. Abdominal pleural membrane without darkened, expanded region; tergite 8 and syntergite 9+10 with pruinescence.

Geographical distribution and seasonal occurrence (Fig. 353). *Empis* (*En.*) *oregonensis* **sp. nov.** is known from the Coast Range in Oregon. Adults have been collected from May to August.

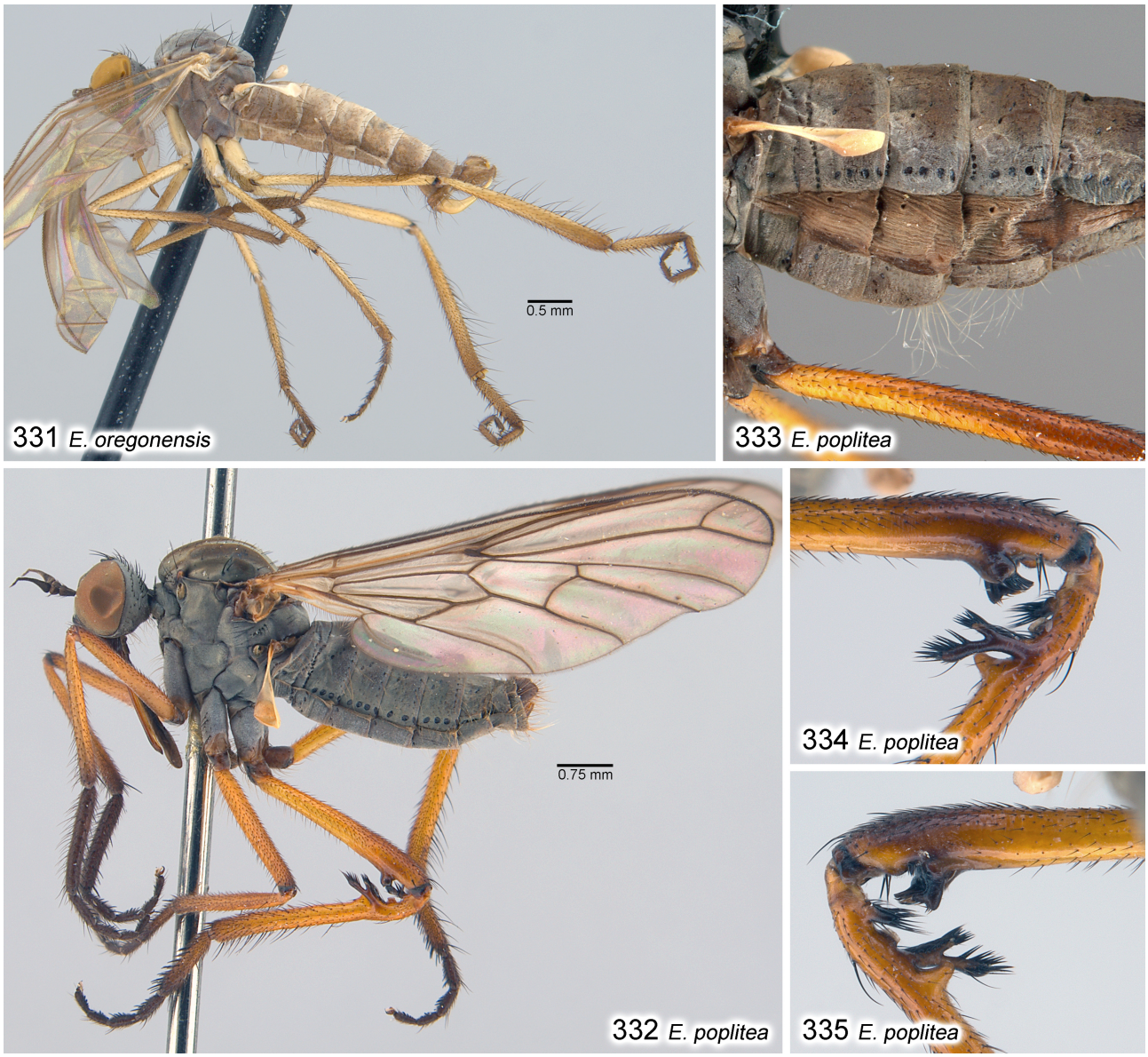
Etymology. This species is named after Oregon, the state in which all the type specimens were collected.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *poplitea* Loew
(Figs 332–337, 354)

Empis poplitea Loew, 1863: 16. Type-locality: Sitka, Alaska, USA.
Empis serperatrorum Melander, 1902: 324. Type-locality (by lectotype designation): Juliaetta, Idaho, USA.
Empis serperatrorum: Melander, 1902: 353 (synonym); Melander, 1928: 170 (synonym).
E. (*Enoplempis*) *poplitea*: Melander, 1928: 142 (assigned to subgenus *Enoplempis*).
Empis poplitea: Melander, 1965: 460 (catalogue); Yang *et al*., (2007): 139 (catalogue).

Type material examined. *Empis poplitea*: **LECTOTYPE** (here designated in order to fix identity of the species), ♂ labelled: "Type/ 1096 [red label with white top border]"; "Sitka [Alaska]"; "Loew"; "poplitea"; "LECTOTYPE/ *Empis poplitea* Loew/ des. Sinclair, Brooks &/ Cumming 2025 [red label]" (MCZ) [poor condition: wings broken off; one wing and legs glued to card below specimen]. **PARALECTOTYPE:** Same data as lectotype; "54." [dissected; legs, head, wings glued to card below specimen] (1♂, MCZ).



FIGURES 331–335. Male habitus, female abdomen and male hindleg of the *E*. (*Enoplempis*) unplaced species. **331,** *E*. (*En*.) *oregonensis* **sp. nov.**, habitus (holotype), lateral view; **332,** *E*. (*En*.) *poplitea* Loew, habitus, lateral view; **333,** same, female abdomen; **334,** same, hind femur tibia joint, anterior view; **335,** same, hind femur tibia joint, posterior view.

Empis serperatrorum: **LECTOTYPE** (here designated in order to fix identity of the species), ♂ labelled: "Juliaetta [46°34′N 116°42′W]/ Idaho"; "Empis/ serperatroruma/ Mel. [handwritten]/"; "JM Aldrich/ Coll"; "Cotype/ No. 41822/ U.S.N.M. [red label]"; "LECTOTYPE/ *Empis* (*Enoplempis*)/ *serperatrorum* Melander/ des. Sinclair, Brooks & Cumming 2025 [red label]" (USNM). **PARALECTOTYPES: USA. Colorado:** (5♂, 1♀, USNM). *Larimer County*: Fort Collins [40°33′N 105°4′W], 11.v.1900, Johnson (1♀, USNM); Longs Peak Inn [40.3397°N 105.5735°W], 25.vi., Cockerell (1♂, 1♀, USNM). **Idaho:** *Latah County*: Same data as lectotype (4♂, 6♀, USNM); same data except, (1♂, USNM = *E. podagra*); same data except, 12.v.1902 (1♀, USNM); same data except, C.W. Johnson (2♂, USNM); same data except, W.M. Wheeler (2♂, AMNH); Moscow [46°48′N 116°52′W], 1.vi.1900 (2♂, 2♀, USNM); Peck (1♂, 1♀, USNM); Troy [46°44′N 116°46′W], 4.v.1899 (1♂, USNM = *E. podagra*). *Nez Perce County*: Craig's Mt. [46°09′N 116°44′W] (1♀, USNM); same data except, W.M. Wheeler (1♀, AMNH).

Notes on type specimens. Melander (1902) based *E. serperatrorum* on 90 specimens of both sexes from Colorado and Idaho. Thirty-three probable syntypes were identified from USNM and AMNH, but only six bore red cotype labels. Three specimens from Colorado with cotype labels attached were collected in 1908, which is after the date of publication and consequently do not represent syntypes. In addition, two specimens with attached cotype labels from Juliaetta and Troy, Idaho, respectively, are *E. podagra*.

In a section following the descriptions ("Additional Notes and Descriptions"), Melander (1902, p. 338) stated that he was able to examine the types of specimens described by Loew during the proof stage of the publication, which resulted in a number of synonyms, including recognition that *E. serperatrorum* was conspecific with *E. poplitea* Loew (Melander 1902, p. 353). The catalogue (p. 355), figure caption (p. 362) and index (p. 364) all included this update.

Additional material examined. CANADA. British Columbia: Agassiz [49°14′N 121°46′W], 1.v.1920 (1♀, CNC); same data except, 5.v.1920 (1♀, CNC); same data except, 11.v.1922, R. Glendenning (1♂, CNC); same data except, 1.v.1924 (1♂, 2♀, USNM); same data except, 4.v.1925 (1♀, CNC); same data except, 2.v.1926 (1♀, CNC); same data except, 4.v.1927 (1♀, CNC); same data except, 28.iv.1927, H.H. Ross (2♀, CNC); same data except, 30.iv.1927 (1♀, CNC); same data except, 6.v.1927 (1♂, CNC); same data except, 7.v.1927 (1♂, CNC); Bowser [49°26′N 124°40′W], 31.v.1955, J.R. McGillis (1♂, CNC); same data except, 7.vi.1955 (1♂, CNC); Cultus Lk. [49.0583°N 121.9667°W], 24.v.1965, F. Schmid (1♂, CNC); Fraser Valley [49°06′N 122°17′W], 6.v.1921 (1♂, CNC); same data except, 10.viii.1921 (1♂, 1♀, CNC); Gordon Head [48°29′N 123°19′W], 30.iv.1918, W. Downs (2♀, RBCM); Graham Is., Slatechuck Mt [53.261°N 132.237°W], summit, 1975 m, 19.vii.1988, T.A. Wheeler (1♀, CNC); Haida Gwaii, Hot Spring Is. [52.5789°N 131.4388°W], 11.vi.1981, R.A. Cannings (1♀, RBCM); Haida Gwaii, Tlell [53.562°N 131.929°W], 25.v.1957, E.E. MacDougall (1♀, CNC); Haida Gwaii, Masset [54.0131°N 132.1492°W], 8.vi.1957, E.E. MacDougall (1♂, 1♀, CNC); Haida Gwaii, Sgaang Gwaii Is., 52°05′40″N 131°13′32″W, Allombert, Sylvain, #: ZG-01-001 (2♂, RBCM); Kaslo (49°54′N 116°54′W) (1♂, CNC); Metchosin, Matheson Lk. [48.3604°N 123.5951°W], 9.iv.1988, C.S. Guppy (1♀, RBCM); Miracle Beach [49.851°N 125.095°W], nr Oyster River, 11.v.1955, J.R. McGillis (1♀, CNC); Mt Douglas [48.4933°N 123.3453°W], 19.iv.1918, W. Downs (1♂, RBCM); Oliver [49°11′N 119°33′W], 7.v.1926, C.B. Garrett (1♀, CNC); same data except, 26.v.1923 (1♂, USNM); same data except, 2.vi.1923 (1♂, CNC); Remo, 7 mi. SW Terrace [54.4866°N 128.7143°W], 13.vi.1960, JGC (2♂, 1♀, CNC); Royal Oak [48.4901°N 123.3986°W], 26.iv.1917, R.C. Treherne (1♀, CNC); Savary Is. [49.9401°N 124.8108°W], 4.iv.1926 (1♂, UBCZ); same data except, 1.iv.1929 (1♂, UBCZ); same data except, "The Meadow" W of Beacon Pt, 11.iv.2000, SGC (1♂, RBCM); Shames, 18 mi. SW Terrace [54°29′N 128°57′W], 23.vi.1960, B. Heming, on flowers of *Heracleum lanatum* (1♂, CNC); Skidegate [53°16′N 131°59′W], 4.ix.1921, C.H. Crickmay (1♂, UBCZ); Smithers [54°46′N 127°10′W], 450–500 m, 22.vi.1978, N.L.H. Krauss (1♂, 1♀, AMNH); South Pender Is., Gowland Pt [48.737°N 123.184°S], 29.iv.1979, R.A. Cannings (1♀, UBCZ); Terrace [54°30′N 128°35′W], 31.v.1960, B. Heming (2♂, 3♀, CNC); same data except, R.J. Pilfrey (1♂, CNC); same data except, CHM (1♂, CNC); same data except, 8.vi.1960, JGC (1♂, CNC); same data except, 10.vi.1960, CHM (1♂, CNC); 32 mi. SW Terrace [54°20′N 129°17′W], 6.vi.1960, JGC, in cut over area (1♀, CNC); same data except, wet poplar cedar bush (river flats) (1♂, CNC); Gagnon Rd, 6 mi. W Terrace [54°29′N 128°44′W], 220 ft, 24.vi.1960, B. Heming, in clearing nr river (1♂, CNC); same data except, W.W. Moss, in dandelion meadow (1♂, 1♀, CNC); same data except, 20.vi.1960, JGC (1♂ with Bibionidae prey, 1♂, CNC); same data except, B. Heming (1♀, CNC); same data except, W.W. Moss, on buttercup (5♂, 2♀, CNC); same data except, 23.vi.1960, JGC (1♂ with Bibionidae prey, CNC); same data except, 24.vi.1960, CHM (1♂, CNC); Terrace, Spring Ck [54°30′N 128°35′W], 11.vi.1960, CHM (1♀, CNC); Vancouver [49°15′N 123°06′W] (1♂, RBCM); same data except, 4.v.1912 (1♂, 1♀, mounted as

pair, RBCM); same data except, 20.iv.1924, K.F. Auden (2♀, UBCZ); same data except, 13.v.1935 (1♂, RBCM); same data except, 203, Livingston, 20.iv.1896 (1♀, USNM); Vernon [50.267°N 119.272°W], 16.v.1960, H.R. Foxlee (1♂, UBCZ); Victoria [48°25′N 123°21′W] (1♀, RBCM); same data except, 20.iv.1916, R.C. Treherne (1♂, USNM; 1♂, 1♀, CNC); same data except, 30.iv.1916, A.E. Cameron (1♀, CNC); same data except, 1.v.1917 (1♂, 1♀, CNC; 1♀, DEBU); same data except, 14.iv.1919, W. Downes (1♀, DEBU); same data except, 3.v.1919, W.B. Anderson (1♂, CNC); same data except, Ten Mile Pt, 3.v.1987, R.A. Cannings (1♀, RBCM); Wellington [49°12′N 124°00′W], 4.v.1949, R. Guppy (1♂, 1♀, mounted as pair *in copula*, CAS; 1♂, CAS); Zymagotitz R, 6 mi. W Terrace [54°28′N 128°44′W], 190 ft, 20.vi.1960, R. Pilfrey (1♀, CNC). **USA. Alaska:** *Kodiak Island Borough*: Chowiet Island (Aleutian), 56°02.097′N 156°44.419′W, 10.vii.2009, prairie meadow, sweeping, Goulet & Boudreault (51♂, 39♀, CNC); Chowiet Island, 56.036800°N 156.736420°W, 10.vii.2009, swp, A. Renaud (1♀, CNC); Chowiet Island, 56.034530°N 156.733840°W, 71 m, 10.vii.2009, A. Renaud (1♀, CNC); Chowiet Island, 56.036500°N 156.736620°W, 16 m, 10.vii.2009, swp, A. Renaud (1♀, CNC); Chowiet Island, 56.035560°N 156.737660°W, 31 m, 10.vii.2009, swp, A. Renaud (1♀, CNC); Chowiet Island, 56.036670°N 156.736420°W, 16 m, 10.vii.2009, swp tall forb meadow, A. Renaud (1♂, 2♀, CNC); Kodiak [57°47′N 152°23′W], 20.vii.1899, Harriman Expedition ’99, T. Kincaid (1♂, USNM); Kukak Bay [58.3137°N 154.2848°W], 4.vii.1899, Harriman Expedition ’99, T. Kincaid (12♂, 2♀, USNM); *Sitka Borough*: Sitka [57°03′N 135°20′W], 16.vi.1899, Harriman Expedition ’99, T. Kincaid (1♂, 1♀, USNM); Sitka, 12.vii.1898, T. Kincaid (1♀, CNC). *Skagway Borough*: Skagway, Pullen Ck, 30 m, 59.45189°N 135.31778°W, grass, birch, willow, raspberry, alder, cottonwood, sweep, 13.v.2016, UAM100435226 (1♀, UAM). *Yakutat Borough*: Yakutat [59°32′N 139°43′W], 21.vi.1899, Harriman Expedition ’99, T. Kincaid (1♂, USNM). **Arizona:** White Mts, Greer [34.009°N 109.458°W], 9000 ft, 21.vi.1947, J.L. Sperry (1♀, USNM). **California:** *Modoc County*: Buck Ck Rgr Sta. [41.8723°N 120.2926°W], 5150 ft, 5–7.vi.1970, *Ranunculus*, J.A. Chemsak (1♂, EMEC); same data except, flight trap, P.A. Rude (1♀, EMEC); same data except, 8–10.vi.1970, J.A. Chemsak (1♀, EMEC); same data except, 11–13.vi.1970, JAP (1♂, 1♀, EMEC). *Santa Clara County*: **Colorado:** Colo, 2019, Baker (1♀, USNM). *Boulder County*: Boulder [40°00′N 105°16′W], 10.v.1926 (1♀, CAS); same data except, 4.5 mi. N, 10.vi.1961, J.R. Stainer (1♀, CNC); same data except, Flagstaff Cn., 5800 ft, CHM (1♀, CNC); Corona Pass [39°56′N 105°40′W], 10600 ft, 11.viii.1961, JGC (1♀, CNC); Ward, 810.viii.1919, F.4407B, about 40°4′N 105°33′W, 10500 ft (1♀, AMNH). *Clear Creek County*: Chicago Ck [39.6898°N 105.6457°W], 8800 ft, 5.viii.1961, BHP (1♂, CNC). *Clear Creek/ Summit County*: Loveland Pass [39.6638°N 105.8791°W], 12000 ft Summit, 7.viii.1961, JGC (2♂, CNC); same data except, 10.viii.1973, 11700–12000 ft, JAP (1♂, EMEC). *Custer County*: 12.viii.[no year], 10000 ft, R.H. Painter (1♂, USNM). *Grand County*: Agnes Lk. [40.3548°N 106.5926°W], 21.viii.1940, R.H. Painter (1♂, 3♀, USNM); Arapaho NF, Berthoud Pass, 39°48′47″N 105°46′11″W, 3644 m, 23.vii.2012, Li Shi (4♂, 3♀, CSCA); Rollins Pass Rd, 8 km ENE Winter Pk, 39°56′N 105°41′W, 3.viii.1999, 3620 m, S.L. & S.M.L. Heydon (3♂, 3♀, UCDC). *Gunnison County*: Cottonwood Pass [38.8285°N 106.4093°W], 12100 ft, 29.vii.1961, BHP (2♂, 4♀, CNC); same data except, JGC, in tundra (2♂, 3♀, CNC). *Jackson County*: Cameron Pass [40°31′N 105°53′W], 20.viii.1941, V.M. Tanner (2♂, 1♀, BYU); Cameron Pass, 11000 ft, 14.viii.1962, R.M. Bohart (1♂, UCDC); Cameron Pass, 19–22.viii.1940, Sabrosky (1♂, 2♀, USNM); Cameron Pass, 11800 ft, 31.vii., Col. (1♀, USNM); Old Teller City [40.4316°N 106.0059°W], 11.viii.1964, F.C. Harmston (1♂, USNM); Golden [39°44′N 105°12′W], 10.vi., E.J. Oslar (1♂ with *Rhamphomyia* prey, USNM); Golden, 30.iv.1988, R.S. Peigler (1♂, 1♀, LACM). *Lake County*: Independence Pass [39°06′N 106°33′W], 31.vii.1961, Tundra, JGC (5♂, 8♀, CNC); same data except, 7.viii.1961 (3♂, 2♀, CNC); same data except, CHM (6♂, 3♀, CNC); same data except, 31.vii.1961, BHP (1♂, 2♀, CNC); same data except, 8.viii.1961 (4♂, 5♀, CNC); Independence Pass, 21.vii.1962, F.C. Harmston (2♀, USNM); Kenosha Pass [39°24′N 105°45′W], 20.v.1964, F.C. Harmston (1♂, USNM). *Larimer County*: Rocky Mtn NP [40.3466°N 105.7364°W], 24.viii.1967, F.C. Harmston (11♂, USNM); Trail Ridge Rd, 11000ft, 25.viii.1933, Rocky Mountain NP, M. & H. James (1♂, USNM). *Mineral County*: Wolf Ck Pass [37°29′N 106°48′W], meadow, 10850 ft, 15.viii.1983, PHA (6♂, 3♀, CAS). *Ouray County*: Red Mt. [37°54′N 107°41′W], 11000 ft, 22.vii.1934, C.P. Alexander (1♀, AMNH). *Park/Summit County*: Hoosier Pass [39°21′N 106°03′W], 22.vii.1959, F.C. Harmston (1♂, USNM); same data except, 12000 ft, 8.viii.1961, BHP (1♀, CNC). *Park County*: Jefferson [39°22′N 105°48′W], 9400 ft, 14.vii.1961, W.R.M. Mason (1♂, CNC). *Saguache County*: Marshall Pass [38°23′N 106°14′W], 28.vii.1908, 10856 ft (2♂, 1?, USNM). *San Juan County*: S of Silverton [37°48′N 107°39′W], Molas-Elk Ck Trails, 26–29.vii.1985, J. Jenkins (1♀, WSU); Grenadier Range [37.7314°N 107.5820°W], Vestal Ck, 27.vii.1985, 10000–11000 ft, J. Jenkins (1♀, WSU). *San Miguel County*: Cornet Ck, Telluride, 37°55′N 107°45′W, 11000 ft, 9.vii.1919, F4375D (1♂, 1♀, AMNH). *Summit County*: Boston Mine area [39.4137°N 106.1395°W], headwaters of Mayflower

Ck, ~12000 ft, 22.vii, 2014, swp alpine meadows, SJF (6♂, 3♀, CNC). **Idaho:** *Bonner County*: Saddle Ck, 2 mi. N Priest Lk. [48.9726°N 116.7180°W], 5.v.1966, M.A. Brusven (1♂, 1♀, WFBM). *Bonneville County*: 12 mi. NE Swan Valley [43°27′N 111°21W], 23.vi.1964, WFB (2♂, 3♀, WFBM). *Caribou County*: 5 mi. E Wayan [42°58′N 111°22′W], 23.vi.1967, H.C. Manis (1♂, WFBM). *Elmore County*: Dixie [43°19′N 115°26′W], 21.iv.1980, D.E. Foster (1♂, 1♀, WFBM). *Franklin County*: Franklin [42°1′N 111°48′W], Cub Cyn, 1.vi.1948, G.E. Bohart (1♂, UCDC). *Idaho County*: Lawyer Ck [46.1667°N 116.2634°W], 24.v.1979, J.L. Littlefield (1♂, WFBM); Ferdinand [46°9′N 116°23′W], 8.vi.1958 (1♂, WFBM); 4 mi. S White Bird [45°45′N 116°18′W], 4.vi.1960, A.R. Gittins (1♀, WFBM). *Latah County*: 3 mi. S Deary [46°48′N 116°33′W], 14.v.1959, 2775 ft, B.A. Foote (1♂, WFBM); St. Joe NF, Emerald Ck Cpgd [47.0065°N 116.3273°W], along Emerald Ck, 24.vi.1978, DDW (1♂, 1♀, CAS); 4 mi. E Genesee [46°33′N 116°55′W], 13.v.1959, B.A. Foote (3♂, 1♀, WFBM); 3 mi. S Helmer [46°48′N 116°28′W], 22.v.1971, WJT (1♂, 2♀, WFBM); same data except, along Little Boulder Ck, 10.vi.1984, J. Jenkins (1♀, WSU); same data except, 5 mi. S Helmer, 2800 ft, 20.v.1975, N.E. Woodley (1♀, WSU); Harvard [46.917°N 116.73°W], 14.v.1962, *Salix*, WFB (1♂, 2♀, WSU); Juliaetta [46°34′N 116°42′W] (1♀, USNM); same data except, 8.v.1971, A.R. Gittins (1♂, WFBM); Kendrick [46°36′N 116°39′W], 7.vi.1917 (1♂, USNM); same data except, 13.iv.1951, 1219 ft, WFB (2♀, WFBM); Moscow [46°48′N 116°52′W], 30.v.1911 (1♂, USNM); same data except, 22.v.1913 (1♂, 1♀, USNM); same data except, 1.v.1937, C.C. Ball (1♀, WFBM); same data except, 25.v.1960, R.B. Hawkes (1♀, WFBM); 5 mi. S Moscow, 18.v.1961, WFB (1♀, LACM); Vassar Meadows [46.8471°N 116.5291°W], 27. v.1959, B.A. Foote (1♂, WFBM). *Nez Perce County*: Craig Mts [46°09′N 116°44′W] (1♂, AMNH); same data except, 8.vi.1918, ALM (1♂, 1♀, USNM); Eagle Ck [46.0217°N 116.7429°W], 21.iv.1979, D.J. Schotzko (2♂, 2♀, WFBM); 1 mi. NE Juliaetta Falls [46°34′N 116°42′W], 23.iv.1976, WFB (1♂, 1♀, WFBM); Lk. Waha [46°12′N 116°50′W], 9.vi.1918, ALM (2♂, 2♀, USNM); Lk. Waha, Flat Iron Rd, 15.vi.2014, 1040 m, 46°12.412′N 116°49.027′W, W Fk Sweetwater Ck, BJS (1♀, CNC); Lenore [46°30′N 116°33′W], 7.v.1938, C.C. Ball (2♀, WFBM); same data except, H.C. Elg (1♂, WFBM); same data except, E. Ritzheimer (1♂, WFBM); Lewiston [46.41°N 117.02°W], 23.iv.1939, H.C. Elg (1♂, WFBM); 8 mi. E Lewiston, 14.iv.1979, D.J. Schotzko (1♀, WFBM); Myrtle, Cottonwood Ck [46.4984°N 116.71096°W], 28.iv.1961, WFB (1♀, WFBM); Webb [46.3439°N 116.8331°W], 10.iv.1952, WFB (1♂, WFBM). *Shoshone County*: Merry Ck, 2 mi. E Clarkia [47°00′N 116°15′W], 26.vi.1966, M.A. Brusven (5♂, 3♀, WFBM). *Valley County*: 3.3 mi. NW Cascade [44°31′N 116°2′W], 10.vi.1967, L.S. Hawkins, Jr (1♂, 1♀, WFBM). **Montana:** *Carbon County*: Cave Ck, Pryor Mtns, 45°10.88′N 108°26.17′W, 22.vi.2003, 7120 ft, J.B. Runyon (1♀, MTEC). *Fergus County*: Judith Mtns [47°13′N 109°13′W], Big Grassy, 2.vii.1995, sweeping, C.E. Seibert (1♀, MTEC). *Glacier County*: Lk. St. Marys, Glacier NP [48.7413°N 113.4418°W], 1.vi.1938, E.C. Van Dyke (1♂, CAS). *Meagher County*: 20 mi. W Sulpher Spgs [46°32′N 110°54′W], Sum. Grass Mtn, 25.vi.1971, J.R. Powers (1♂, CAS). *Yellowstone County*: Laurel [45°40′N 108°46′W], 16.viii.1914 (1♂, AMNH). **Nebraska:** *Howard County*: St. Paul [41°12′N 98°27′W], 19.vii.1960, F.C. Harmston (1♂, USNM). *Sioux County*: Agate Fossil Beds Nat. Monument [42.421°N 103.753°W], 12.vi.1989 (1♀, CSUC). **New Mexico:** *Catron County*: Bursum Camp, 18 mi. E Alma [33.402°N 108.579°W], 9000 ft, 10.vii.1961, F., P. & J. Rindge (1♀, CNC). *Rio Arriba County*: Lower Canjilon Lakes [36.5495°N 106.3442°W], 16 km E Canjilon, 2987 m, 6.vii.1978, T.W. & W.T. Davies (4♂, 3♀, CAS). **Oregon:** *Benton County*: Corvallis [44°38′N 123°18′W], 8.iv.1932 (1♂, USNM); same data except, 6.iv.1907, J.C. Bridwell (1♂, OSAC); same data except, 15.iv.1930, L.G. Hudson (1♂, USNM); same data except, 4.iv.1935, G. Ferguson (1♂, CUIC); same data except, 13.iv.1945, G. Bennett (1♂, OSAC); same data except, 8.v.1912 (1♀, OSAC); Helmick Pk [44.7816°N 123.2368°W], 18.iv.1957, W.J. Hogg (1♂, RBCM); Kiger's Island [44°30′N 123°14′W], 19.iv.1930, R.E. Dimick (1♂, USNM); same data except, 8.iv.1930, J. Wilcox (1♂, 1♀, USNM); same data except, 12.iv.1930 (1♀, USNM); same data except, 19.iv.1930 (1♂, USNM); same data except, I. Wilcox (1♂, 1♂ with Bibionidae prey, USNM); Oregon Exper. Station [44°33′N 123°16′W], Acc. 1769, A.L. Lovett (1♀, OSAC); Philomath [44.5020°N 123.4426°W], 16.v.[no year], A.L. Lovett (1♀, USNM). *Clackamas County*: Sandy [45°23′N 122°15′W], 7.v.1969, E.M. Fisher (3♂, 1♀, CSCA; 1♂, 1♀, CAS). *Clatsop County*: S slope Saddle Mtn [45.9695°N 123.6853°W], 2500–328 ft, 14.vi.1969, E.M. Fisher (13♂, 1♀, 1♂ with Tipulidae prey, CSCA; 1♂, CAS); same data except, K. Goeden (3♂, 1♀, ODAC). *Deschutes County*: Indian Ford [44.3589°N 121.6103°W], Hwy 20, 20.vi.1964, K. Goeden, sweeping plants margin of creek (2♂, 2♀, ODAC). *Douglas County*: Dixonville [43.207°N 123.241°W], 9.v.1919, A.B. Black (1♀, OSAC); Glide [43°19′N 123°4′W], 28.iv.1964, K. Goeden (11♂, 1♀, ODAC). *Lane County*: Oakridge [43°44′N 122°27′W], 5 mi. E, 12.v.1969, E.M. & J.L. Fisher (1♂, CSCA). *Lincoln County*: Harlan [44.5398°N 123.6931°W], 7.iv.1960, G.P. Carpenter (1♂, 1♀, OSAC). *Marion County*: Idanha [44°42′N 122°05′W], 3 mi. E, 31.v.1969, E.M. Fisher (1♂, CSCA); Lk. Labish [45.0279°N

122.9432°W], 2.iv.1926, J. Wilcox (2♀, USNM); Mt Angel [45°04′N 122°47′W], Epper (2♂, 2♀, USNM). *Multnomah County*: Troutdale [45°31′N 122°22′W], 23.vi.1963, L.S. Miller, F.C. Harmston (1♂, 1♀, USNM); Columbia Gorge Rec. Area, Wahkeena Falls, trail to Multnomah Falls, 7.vi.2009, 45.576°N 122.128°W, I.S. Winkler, E09-54c (1♂, CNC). *Polk County*: Monmouth [44°51′N 123°13′W], sweeping grass and horsetails, 29.iv.1962, K. Goeden (1♀, ODAC). *Umatilla County*: Freewater [45°56′N 118°23′W], 4.v.1927, M.W. Stone (2♀, USNM); Meacham [45°31′N 118°26′W], 3680 ft, 8.v.1927, H.A. Scullen (1♂, USNM); 7 mi. E Mission [45°39′N 118°39′W], 20.v.1998, pan trap, F.D. Parker (1♀, LACM). *Washington County*: Forest Grove [45°31′N 123°06′W], 15.v.1922, S.E. Keen (1♂, 1♀, USNM); same data except, in house, 4.iv.1928 (1♀, OSAC); same data except, 8.iv.1941, L.P. Rockwood (1♀, USNM). **Utah:** *Box Elder County*: Mantua, Devil's Gate [41.4516°N 111.9199°W], 27.vi.1969, T.L. Whitworth (1♂, LACM). *Cache County*: Blacksmith Fork [41.6236°N 111.6633°W], 25.v.1969, D. Alm (1♂, LACM); Franklin Basin [42.1073°N 111.6283°W], 6.vii.1972, G.E. Bohart (1♂, LACM); W Hodges Cany. [41.9167°N 111.4013°W], 27–30.vi.1978, MT, WJH (1♂, LACM); Logan Cyn [41.8260°N 111.6113°W], 7500 ft, 4.vii.1947, G.E. Bohart (1♂, UCDC); same data except, Bunchgrass Ck, 13–19.vi.1986, Hanson, Knowlton (1♀, LACM); Tony Grove Cyn [41.8903°N 111.6299°W] 1–5.vii.1975, 7800 ft, Knowlton & Hanson (3♂, 2♀, LACM); same data except, 5–10.vii.1975 (2♂, 3♀, LACM); same data except, 10–16.vii.1975, MT (2♂, 3♀, LACM); Tony Grove Jct. [41.8866°N 111.5639°W], 22.vi–3.vii.1984, MT (1♂, LACM); same data except, 6–12.vii.1984 (7♂, 1♀, LACM); same data except, 12–19.vii.1983, MT, WJH (1♀, LACM). *Duchesne County*: Strawberry [40°09′N 110°34′W], 15.vii.1938, G.F. Knowlton, F.C. Harmston (1♂, LACM). *Iron County*: Cedar Breaks [37.6364°N 112.8453°W], 26.vii.1968, 10000 ft, G.F. Knowlton (2♂, LACM); same data except, 16.vii.1962 (1♀, UCDC). *Kane County*: Duck Creek [37.5242°N 112.6631°W], 26.vii.1968, 9000 ft, G.F. Knowlton (1♂, 1♀, LACM). *Rich County*: Allen [Walton] Cyn [41.483°N 111.346°W], 24.vi.1967, G.F. Knowlton, P.W. Bergman (1♂, LACM); *Utah County*: Payson Cyn [40.023°N, 111.717°W], V.W. Tanner (1♀, BYU). **Washington:** *Asotin County*: Fields Spring SP [46°4′N 117°10′W], 31.vii.1971, MT dry ice, WJT, W.B. Garnett (1♂, WSU); same data except, 14.vi.1972, WJT (4♂, WSU); same data except, 15.vi.1972 (4♂, 1♂ with Rhagionidae prey, WSU); same data except, 4 mi. S Anatone, 3500–4000 ft, 19.v.1973, WJT (1♂, WSU); same data except, 7.vi.1973 (1♂, WSU); same data except, 12–13.vi.1974 (1♀, WSU); 10 mi. S Fields Spring SP, 22.vi.1972, WJT (1♂, 2♂ with Bibionidae prey, 2♀, WSU). *Columbia County*: Tucannon Fish Hatch., 20 mi. E Dayton [46°19′N 117°39′W], 2650 ft, 15.v.1979, MT, WJT (9♂, WFBM; 1♂, 1♀, mounted as pair *in copula*, WFBM). *Island County*: Whidbey [48.1713°N 122.6092°W], 15.iv.1898 (1♂, USNM). *King County*: Seattle [47°36′N 122°19′W], 11.iv.1898 (1♀, USNM). *Kitsap County*: Manchester [47°33′N 122°33′W], 15.iv.1951, V. Tartar (1♂, OSAC). *Pierce County*: Clover Ck [47.126°N 122.398°W], 14.v.1979, T.L. Whitworth (1♀, LACM); Tacoma [47°14′N 122°27′W], 3.v.1977, MT, T.L. Whitworth (1♂, 1♀, LACM). *Thurston County*: Olympia [47°2′N 122°54′W], 20.iv.1894 (1♂, USNM); same data except, 22.iv.1894 (1♀, USNM); same data except, 1.v.1894 (1♀, USNM). *Whatcom County*: Point Roberts [48°59′N 123°04′W], 1.v.1955, G.J. Spencer (1♂, 1♀, UBCZ); Deming [48°49′N 122°13′W], 25.v.1908 (1♀, USNM). *Whitman County*: Almota [46°42′N 117°28′W] (1♂, 2♀, USNM); same data except, 25.v.1913 (2♂, USNM); same data except, 4.17 (1♂, USNM); same data except, 20.iv.1895, C.V. Piper (1♂, CUIC); same data except, 6.v.1972, dry ice MT, WJT (1♂, WSU); same data except, 27.iv.1972 (2♀, WSU); Almota, 900 ft, 17–18.iv.1981, WJT, sweeping *Salix* fls (1♂, 1♀, USNM); Almota nr Snake River, 650–900 ft, 17.iv.1981, R.H. Miller (1♂, MTEC); Kamiac Butte [46.8704°N 117.1528°W], 1.vi.1912 (1♂, USNM); 8 mi. W Pullman, Lyle Grove [46°43′N 117°11′W], 21.v.1977, S. Woods (1♂, WSU); Pullman [46°43′N 117°11′W] (1♂, 2♀, USNM); same data except, June (1♂, USNM); same data except, May 30 (1♂, USNM); same data except, 14.v.1901 (1♂, USNM); same data except, 4.vi.1904 (1♂, USNM); same data except, 3.v.1907 (1♀, USNM); same data except, 24.v.1907 (1♂, USNM); same data except, 4.v.1910 (1♀, USNM); same data except, 7.v.1914 (1♀, CUIC); same data except, 5.v.1915 (1♂, USNM); same data except, 20.v.1917, ALM (1♀, USNM); same data except, 23.v.1918 (4♂, 5♀, USNM); same data except, 6.vi.1918 (5♂, 6♀, USNM); same data except, 22.v.1923 (1♂, USNM); 8 mi. SW Colton, Steptoe Cyn [46.4520°N 117.2054°W], 1100 ft, 4.iv.1987, swarm WJT (2♂ with Ephemeroptera and *Rhamphomyia* prey, 2♂, 6♀, WFBM); 10 mi. SW Colton, Steptoe Cyn, 26.iv.1975, WJT (1♀, WSU); Wawawai [46°38′N 117°22′W], R.W. Doane (3♂, USNM); same data except, 1.v.1909, W.M. Mann (1♂, USNM); same data except, 14.v.1909 (2♂, USNM); same data except, 2400 ft, 28.v.1922, ALM (2♂, 2♀, USNM); same data except, 10.iv.1966, in flowers of *Lomatium* Cous, D.S. Horning (1♂, WFBM); Yakawawa Cyn, 7 mi. NW Colton [46.5761°N 117.2884°W], 2500 ft, 21.v.1977, conspecific swarms, WJT (3♂, 3♀ mounted as pairs, WSU; 4♂, 30♀, WSU). *Yakima County*: 10 mi. E Chinook Pass [46°56′N 121°20′W], 3400 ft, on American R, 24.vii.1976, sweeping, WJT (1♂, WSU); No. Yakima [46°36′N 120°30′W],

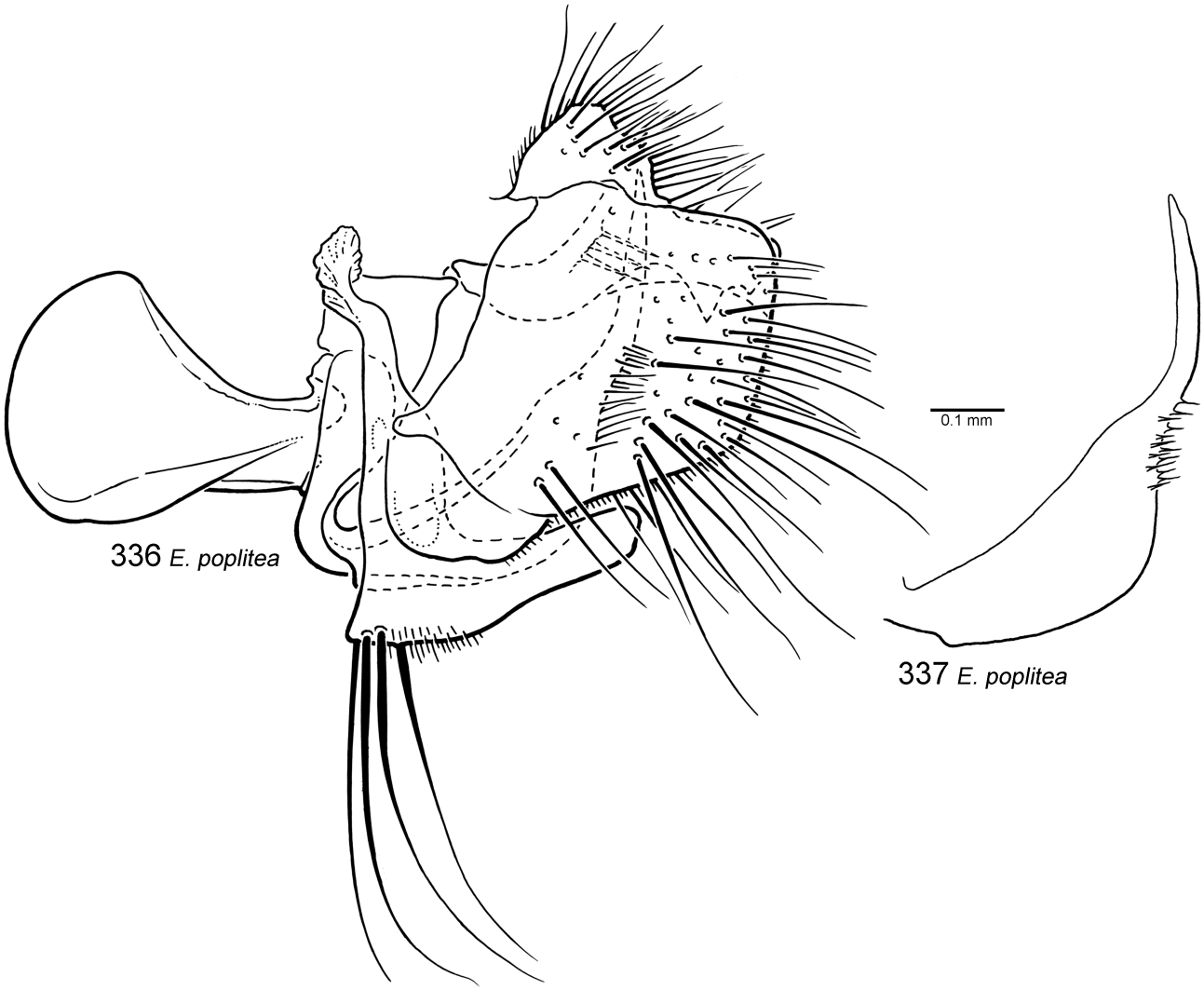
22.v.1917, ALM (1♀, USNM). **Wyoming:** *Albany County*: Upper Nash Fork Cpgd [41.3595°N 106.2357°W], 15.viii.1957, 10500 ft, E.M. & R.H. Painter (1♀, USNM). *Carbon County*: meadow south side Hwy 130, east of Ryan Pk [41°19′N 106°30′W], 2990 m, 1.viii.1973, PHA (3♂, CAS); E of Saratoga [41°27′N 106°48′W], 13.viii.1957, 6000 ft, E.M. & R.H. Painter (1♂, USNM). *Park County*: Yellowstone NP, 21–22.vii.1920, F.475 2, 44°43′N 110°30′W, 7500 ft (1♂, AMNH).

Diagnosis. This species is distinguished from other species of the subgenus by four broad, brown scutal vittae, long forked subapical process on the male hind tibia (Fig. 334), strong posteroapical setae on mid tibia and absence of row of posterior preapical setae on the male hind femur (Fig. 335). Females can be recognized by the long pale setae on sternites 3 and 4 (Fig. 333).

Redescription. Wing length 6.6–8.0 mm. **Male.** Head dark in ground-colour, with greyish pruinescence (Fig. 332). Dichoptic, upper ommatidia not enlarged. Frons divergent towards antennae; narrowest section of frons wider than width of anterior ocellus; with short setulae along inner margin of eye. Face without setae; slightly divergent towards mouthparts, with oral margin dark and shiny. Ocellar triangle elevated, with thin greyish pruinescence, with pair of parallel ocellar setae and several shorter posterior setulae. Occiput with single median row of strong, stiff setae, shorter than ocellar setae, longer and finer ventrally; postocular setae with upper 2–3 setae strongly curved, shorter than ocellar setae, with lower postocular setae straight, half length of upper setae; postocellar region without setae. Antenna dark; scape more than 2× longer than pedicel, with short, black setae; pedicel with ring of apical setae; postpedicel long and tapered, 4× longer than basal width; stylus slightly more than 1.5× longer than basal width of postpedicel. Palpus pale, yellowish brown, with dark setulae. Proboscis reddish brown, length less than 2× head height; labellum with short, dark setae.

Thorax dark brown in ground-colour, densely grey pruinescent (Fig. 332). Scutum with 2 pairs of broad brownish vittae running between setal rows; lateral pair extending beyond prescutellar depression; apex of postpronotal lobe shiny yellowish brown. Proepisternum with slender brownish setae on lower section; upper proepisternum in front of spiracle without setae. Prosternum bare. Antepronotum with row of 4–5 pairs of dark, stiff setae, longer laterally. Postpronotum with 1 long seta and several short, dark stiff setae. Scutum with short, fine uniserial acr; dc uniserial to biserial, slightly longer, stronger than acr, increasing in length posteriorly; 1–2 posterior npl, with several short anterior npl; 1 short, slender presut spal; 1 short, slender psut spal; 1 pal. Scutellum with 1 widely separated pair of short sctl, aligned with dc row, with 0–1 outer, short pair of marginal setulae; disc bare. Laterotergite with narrow patch of 4–8 strong, dark setae. Anterior and posterior spiracles pale.

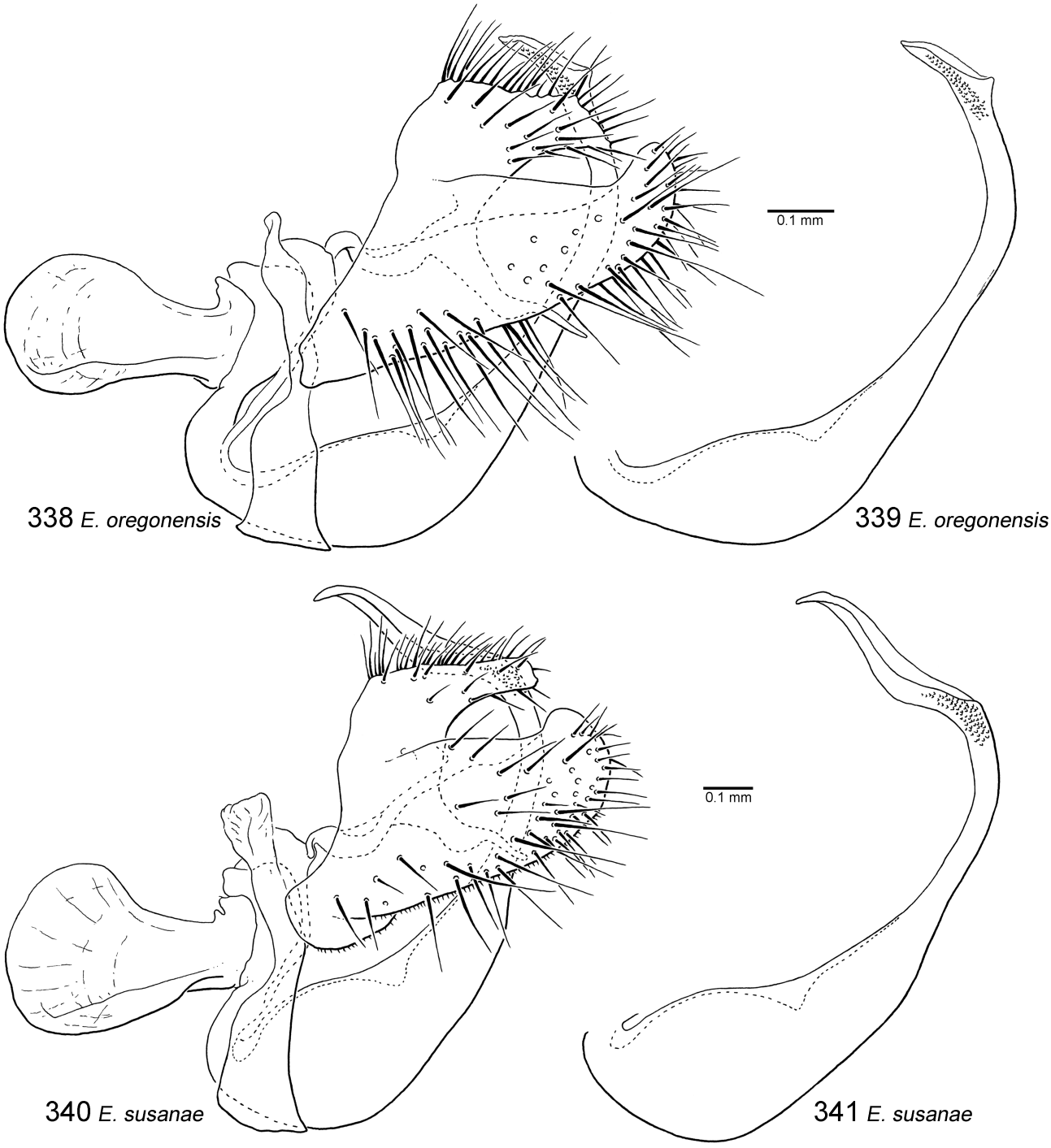
Legs strong, orange brown to reddish brown, tarsi usually darker; coxae and trochanters dark, with dense greyish pruinescence, concolourous with pleura (Fig. 332). Coxae with slender, black setae. Hind trochanter with dark setae. Fore femur clothed in short, black setae. Fore tibia with 3–4 long anterodorsal and posterodorsal setae on apical half to third, longer than width of tibia; apical half with long posterior setae; ring of outstanding preapical setae; anterior face clothed in dense short setulae. Fore tarsomere 1 swollen, as broad as basal width of tibia, with dense setulae and long setae on all faces, longer than width of tarsomere; tarsomeres 1–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur clothed in short, black setae; base with long, slender ventral setae, longer than width of femur; apex often with strong anterior preapical seta. Mid tibia with apical comb of 5–6 spine-like posterior setae, length one-third length of tarsomere 1; 1–2 anterodorsal and posterodorsal setae, subequal to width of femur. Mid tarsus similar to fore tarsus, except tarsomere 1 without long, dense setae. Hind femur with knob-like preapical anteroventral process with broad base, inner posterior margin with comb of short, black appressed setae, length as long as height of process; row of 4–5 posteroventral setae, distal to knob-like process, length shorter than width of femur; posteroventral digitiform process with base fused to anteroventral process, with subapical branch projecting distally with short setae; cluster of 2–3 short spine-like black setae distal to process, with low posteroventral ridge extending to apex; apex of femur without preapical row of posterior setae; preapical anterior seta strong, shorter than width of femur (Figs 334, 335). Hind tibia with long, forked posteroventral digitiform process on basal quarter, with strong black setae along inner base of process and branches of fork; with crown of strong black setae, length as long as fork, usually darkly pigmented in contrast to paler tibia and femur; bare, digitiform posteroventral process slightly distal to forked process, variable in length; short, setose posteroventral process (similar to forked process) distal to bare process; sharp inner ridge proximal to setose process; with seta in posteroapical comb; apical third with long dorsal setae, length slightly longer than width of tibia (Figs 334, 335). Hind tarsomere 1 somewhat inflated, with long dorsal setae, similar to tibia; tarsomeres 2–5 similar to mid tarsus.



FIGURES 336–337. Male terminalia of *E*. (*Enoplempis*) *poplitea* Loew, lateral view. **336,** terminalia; **337,** phallus.

Wing slightly infuscate with dark veins (Fig. 332), darker about Rs node, apex of cell dm and base of radial fork; all veins complete (except Sc), well sclerotized; CuA+CuP distinctly reaching wing margin. Basal costal seta absent. R_5 and M_1 slightly divergent at wing margin; R_5 ending at or near wing tip; radial fork acute. Halter pale, yellowish brown (Fig. 332).

Abdomen dark, with dense greyish pruinescence, concolourous with scutum (Fig. 332); long, brownish lateral setae on pregenital segments, paler and finer on ventrum. Pregenital segments unmodified, except sclerites of segment 8 narrowly separated, weakly narrowly fused anteriorly. Terminalia (Figs 336, 337): brown, subshiny with phallus and hypandrium orange brown. Cercus with short, subtriangular basal section, projecting above epandrium, setae longer than width of cercus; distal section more thickly sclerotized than basal section, subrectangular, hidden along dorsal margin of epandrium, apex rounded, projecting slightly beyond epandrium; ventral margin of distal cercus with tooth-like apicoventral project and subapical tooth-like apicoventral projection; distal section with several long setae; fused anteriorly to epandrium. Hypoproct with row of 4–5 obliquely projecting setae. Subepandrium without process; without row of medium-length setae. Epandrial lamella truncate apically, length subequal to height; posterior margin without projection, bearing longest setae along posterior margin; some setae as long as epandrial width. Hypandrium long, with V-shaped notch on apical margin; several pairs of long setae at base, longer than length of hypandrium. Phallus (Fig. 337) with broad basal half, tapered, mostly straight apically; apex not emerging beyond cercus; apex tapered, not expanded; dense, short setae on tapered section; ejaculatory apodeme as long as length of epandrium, T-shaped, with ventrally positioned lateral apodemes.



FIGURES 338–341. Male terminalia of the *E*. (*Enoplempis*) unplaced species, lateral view. **338,** *E*. (*En*.) *oregonensis* **sp. nov.**; **339,** same, phallus; **340,** *E*. (*En*.) *susanae* **sp. nov.**; **341,** same, phallus.

Female. Similar to male, except as follows: frons broader, nearly as wide as ocellar triangle; hindleg without modified setae and processes; mid tibia with strong ventroapical setae; abdominal pleural membrane appears darker and broader on segment 5; sternites 3 and 4 with long pale setae, as long as length of sclerite (Fig. 333); base and medial sections on tergites 7 and 8 shiny.

Geographical distribution and seasonal occurrence (Fig. 354). *Empis* (*En.*) *poplitea* is known from southern Alaska, British Columbia, Washington, Oregon, northern California, Idaho, Montana, Wyoming, Nebraska, Colorado, Utah, Arizona and New Mexico. Adults have been collected from April to September.

Nuptial gift presentation. Alcock (1973) indicated that the male nuptial gift of this species is unwrapped prey

and included a photo of a mating pair with a tipulid nuptial gift. Among the material examined are male specimens with either Bibionidae, Rhagionidae, *Rhamphomyia* (Empididae), or Ephemeroptera prey items pinned beneath each specimen.

Remarks. The male terminalia lacks the subepandrial processes and the hypoproct is setose, as is found in the *E*. (*En*.) *canaster*, *E*. (*En*.) *nodipoplitea* and *E*. (*En*.) *amytis* groups.

Alcock (1973) described the mating behaviour of *E*. (*En*.) *poplitea*. During copulation the male hindlegs were observed on either side of the female abdomen rhythmically moving up and down, possibly providing tactile stimuli during mating.

Empis (*Enoplempis*) *richardvockerothi* sp. nov.

urn:lsid:zoobank.org:act:42CF9230-DE6E-4954-BB9F-523B54A9391B
(Figs 342–345, 350, 354)

Type material. HOLOTYPE ♂ (Fig. 342), labelled: "[USA] CALIF./ Sta. Barbara [34°25′N 119°42′W]/ 11.II.1993/ J.R. Vockeroth"; "Tunnel Road/ Trail 130m"; "CNC/ 1078382"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *richardvockerothi* Sinclair,/ Brooks & Cumming [red label]" (CNC). **PARATYPES: USA. California:** *Los Angeles County*: Angeles Crest Hwy, San Gabriel Mts. [34.3589°N 117.9129°W], 15.iii.1957, C.L. Hogue (2♂, LACM); Claremont [34°6′N 117°43′W], Baker, (9♂, 5♀, USNM); same data except, Mts nr Claremont (1♂, 2♀, USNM); San Gabriel Cyn, Hwy 39, F.R. 2N24 at OVH Area, 34.238°N 117.864°W, 7.iv.2009, E09-16, I.S. Winkler & K.C. Collins (1♂, CNC); Sepulveda Cyn [34°07′N 118°28′W], 9.ii.1958, R.S. Erdmann (3♂, LACM); Topanga Cyn, 34.08°N 118.59°W, 8.iii.1995, B. Brown, G. Hendler, MT (1♂, LACM). *Orange County*: Santa Ana Mts, Hwy 74, 33°36′6.2″N 117°30′38.0″W, 515 m, 15.iii.2010, K. Collins, male swarm, unwrapped prey (3♂, CNC). *Santa Barbara County*: Same data as holotype (17♂, 2♀, CNC). *Tulare County*: 0.5 mi. SE Ash Mtn Seq. NP HQ [36°29′N 118°49′W], 4.ii.1984, flume debris trap, R.D. Haines (4♂, CSCA).

Diagnosis. This species is distinguished from other species of the subgenus by the absence of distinct lobes on the male hindleg (Figs 343–345), modified setae confined to short, divergent rows on femur and tibia, male cercus narrow with truncate apex, subepandrial process present, and phallus distinctly attenuated near mid-length (Fig. 350).

Description. Wing length 5.0–5.3 mm. **Male.** Head dark in ground-colour, with greyish pruinescence (Fig. 342). Eyes holoptic. Frons forming small triangular plate above antennae; without short setulae along inner margin of eye. Face without setae; short, parallel-sided towards mouthparts, with oral margin dark and shiny. Ocellar triangle elevated, with thin greyish pruinescence, with pair of parallel ocellar setae and several pairs of short setulae. Occiput bearing single row of setae, slightly stronger than postocular setae; postocular setae shorter than occipital row; postocellar region without setae. Antenna dark brown; scape 2× longer than pedicel, with short, black setae; pedicel with ring of apical setae; postpedicel long, tapered, 5× longer than basal width; stylus 1.5× longer than basal width of postpedicel. Palpus pale orange-yellow, with dark setulae. Proboscis yellowish brown, length less than 2× head height; labellum with short, dark setae.

Thorax dark brown in ground-colour, densely grey pruinescent (Fig. 342), with 2 pairs of brown vittae: median narrower pair between acr and dc rows, ending at prescutellar depression; broader outer vittae extending to postalar ridge; apex of postpronotal lobe and postalar ridge yellowish brown. Proepisternum with several pairs of short setae on lower section; upper proepisternum in front of spiracle without setae. Prosternum bare. Antepronotum with row of short setae. Postpronotum with 1 long seta and several short setae. Scutum with short uniserial acr anteriorly, biserial posteriorly; dc uniserial, longer and stronger than acr posteriorly; 2–3 posterior npl, with 1–2 slender anterior npl; 1 presut spal, with several setulae; 1 psut spal; 1 pal. Scutellum with pair of long apical sctl, with 1–2 pairs of outer, shorter marginal setae; disc bare. Laterotergite with linear patch of 5–8 long setae. Anterior and posterior spiracles pale.



FIGURES 342–349. Male habitus and hindleg of the *E.* (*Enoplempis*) unplaced species. **342,** *E.* (*En.*) *richardvockerothi* **sp. nov.**, habitus (holotype), lateral view; **343,** same, hind tibia, lateral view; **344,** same, hind femur tibia joint, anterior view; **345,** same, hind femur tibia joint, posterior view; **346,** *E.* (*En.*) *sierraensis* **sp. nov.**, hind tibia (holotype), lateral view; **347,** same, hind femur tibia joint (holotype), anterior view; **348,** *E.* (*En.*) *susanae* **sp. nov.**, hind tibia (holotype), lateral view; **349,** *E.* (*En.*) *yakimensis* **sp. nov.**, hind tibia (holotype), lateral view.

Legs slender, pale brown, increasingly darker apically (Fig. 342). Coxae with thin dark setae. Hind trochanter with numerous dark setulae. Fore femur sparely clothed in short setae. Fore tibia with 3–4 outstanding anterodorsal setae on proximal two-thirds, with 2 posterodorsal setae on apical third; anterior face with short appressed setae; apex with circlet of preapical setae. Fore tarsomere 1 somewhat swollen, slightly narrower than apex of tibia, with single row of strong ventral setae; tarsomeres 2–4 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur with anteroventral and posteroventral

row of pale setulae, longer at base. Mid tibia with 2–3 pairs of erect anterodorsal and posterodorsal setae and several preapical setae; ventral face with dense setulae, with several strong posteroventral setae. Mid tarsus slender; tarsomeres 1–4 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Hind femur with erect pale setulae; preapical region with V-shaped row of strong, black setae: setae of posterior row shorter with blunt tips; setae of anterior row longer, tapered; without distinct processes; without row of strong posterior preapical setae (Figs 344, 345). Hind tibia with long dorsal setae, length twice width of tibia, with shorter erect anteroventral setae; sub-basal region, opposite modified setae of femur, with pair of oblique comb rows of tightly appressed, shiny black anteroventral and posteroventral wavy setae, slightly longer than width of tibia; proximally; with seta in posteroapical comb (Figs 343–345). Hind tarsus with tarsomere 1 slightly inflated, with long dorsal setae, similar to tibia; remaining tarsomeres similar to mid tarsus.

Wing infuscate with dark veins; all veins well sclerotized, except CuA+CuP rather weak, reaching wing margin as fold; veins complete (except Sc). Basal costal seta present, similar length to outer sctl. R_5 and M_1 divergent near wing margin; R_5 ending at or slightly beyond wing tip; radial fork acute. Halter pale, yellowish brown.

Abdomen paler than thorax, with whitish pruinescence; posterior marginal setae brown, anterior setae thinner, pale, shorter. Pregenital segments unmodified, except sclerites of segment 8 narrowly fused anterolaterally. Terminalia (Fig. 350): similar to abdomen, brown, pruinescent; phallus paler and shiny. Cercus linear, truncate apically, shorter than epandrium; setae shorter than width of cercus. Subepandrial process broad basally, tapered to narrow, downcurved apex; extending to either side of phallus. Epandrial lamella subtriangular, tapered to broadly rounded apex, slightly upcurved dorsoapically; weakly fused with cercus anteriorly; setae longer than cercal setae, mostly concentrated along posterior margin. Hypandrium very short, apical margin shallowly concave; several short setae medially. Phallus broadly expanded near mid-length; abruptly narrowed beyond mid-length, tapered apically to narrow pointed tip, with distinct subapical bend; apex emerging slightly beyond cercus; ejaculatory apodeme two-thirds length of epandrium, T-shaped, with lateral apodemes near lower margin.

Female. Similar to male, except as follows: frons broader, as wide as anterior ocellus; hindleg without modified setae and processes. Abdominal pleural membrane pale, not expanded; tergites 7 and 8 with pruinescence.

Geographical distribution and seasonal occurrence (Fig. 354). *Empis* (*En.*) *richardvockerothi* **sp. nov.** is known from central and southern California. Adults have been collected from February to April.

Etymology. This species is named after our colleague, the late J. Richard Vockeroth (CNC), who collected the holotype.

Nuptial gift presentation. Male swarms have been observed for this species (K. Collins pers. comm.), with male specimens collected with unwrapped prey [see video: https://www.youtube.com/watch?v=wVmJngFAsBc].

Remarks. This species is closely related to *E.* (*En.*) *sierraensis* **sp. nov.** The modifications of the male hindleg in both species are similar to *E.* (*En.*) *nodipoplitea* and related species, but the subepandrial process is present in *E.* (*En.*) *richardvockerothi* **sp. nov.** and *E.* (*En.*) *sierraensis* **sp. nov.** and absent in *E.* (*En.*) *nodipoplitea*.

Empis (*Enoplempis*) *sierraensis* sp. nov.

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(Figs 346, 347, 351, 353)

Type material. HOLOTYPE ♂, labelled: "[USA] CALIF./ Sierra Co./ 1 mi. E Sierra/ City [39°34′N 120°38′W] 8-VII-1967/ P. Opler, Coll."; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *sierraensis* Sinclair,/ Brooks & Cumming [red label]" [dissected] (EMEC).

Diagnosis. This species is distinguished from *E.* (*En.*) *richardvockerothi* **sp. nov.** by the males with sparse dorsal setae of the hind tibia, length less than twice width of tibia, sub-basal setal in tuft shorter than width of hind tibia (Figs 346, 347), and phallus gradually tapered beyond mid-length (Fig. 351).

Description. Wing length 5.4 mm. **Male.** Similar to *E.* (*En.*) *richardvockerothi* **sp. nov.**, except as follows: head with palpus dark brown.

Thorax with dorsal chaetotaxy of scutum obscured by pin; 3–4 posterior npl, with 1–2 slender anterior npl; 1 presut spal, with several setulae; 1–2 psut spal; 1 pal. Scutellum with pair of long apical sctl, with 2 pairs of outer, shorter marginal setae. Laterotergite with linear patch of more than 8 long setae.

Fore coxa with bluish pruinescence near base. Fore tibia with 1–2 outstanding anterodorsal and posterodorsal

setae; anterior face with short appressed setae; apex with circlet of preapical setae. Fore tarsomere 1 slender, without strong ventral setae; tarsomeres 1–3 with dense, pale ventral pruinescence; tarsomeres 2–4 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur with long, erect ventral setulae, length longer than width of femur, longer at base. Mid tibia with 2–3 erect posterodorsal setae and several preapical setae; ventral face with dense setulae, with several strong posteroventral setae. Hind femur with erect pale setulae; preapical region with slight posteroventral swelling with anteroventral and posteroventral tuft of short, black setae, shorter than width of femur; without distinct processes (Figs 346, 347); without row of strong posterior preapical setae. Hind tibia with sparse, erect dorsal setae, length less than twice width of tibia, without shorter erect anteroventral setae; sub-basal region, opposite modified setae of femur, with pair of setal tufts on small ridges (Figs 346, 347). Hind tarsus with tarsomere 1 slightly inflated, with 2 long dorsal setae; remaining tarsomeres similar to mid tarsus.

Wing without basal costal seta.

Terminalia (Fig. 351): cercus linear, projecting obliquely, with distinct notch on apex; shorter than epandrium; base rather broad, with short, dense setulae; setae shorter than width of cercus. Subepandrial process narrow, tapered to narrow, downcurved apex; extending to either side of phallus. Epandrial lamella linear, slightly tapered to broadly rounded apex; weakly fused with cercus anteriorly; apical setae nearly as long as length of cercus. Hypandrium short, apical margin gently arches; numerous long setae medially. Phallus broadly expanded on lower two-thirds; apical third strongly tapered to narrow opening; apex emerging slightly beyond epandrium; ejaculatory apodeme slightly more than half length of epandrium, T-shaped, with lateral apodemes near lower margin.

Female. Unknown.

Geographical distribution and seasonal occurrence (Fig. 353). *Empis* (*En.*) *sierraensis* **sp. nov.** is known only from the holotype collected in Sierra County, California in July.

Etymology. The species name is in reference to the type locality, Sierra County, California.

Nuptial gift presentation. Form unknown.

Remarks. This species is closely related to *E.* (*En.*) *richardvockerothi* **sp. nov.**

Empis (*Enoplempis*) *susanae* sp. nov.

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(Figs 308, 340, 341, 348)

Type material. HOLOTYPE ♂, labelled: "USA: CA: Nevada Co./ Big Culvert along Sagehen Crk/ N39°26′04.4″ W120°16′52.2″/ Malaise, 11-17.vii.2012/ J.M. Cumming, S.E. Brooks/ C. Borkent"; "CNC/ 1078378"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *susanae* Sinclair,/ Brooks & Cumming [red label]" (CNC). **PARATYPES: USA. California:** *Nevada County*: Same data as holotype (3♂, 1♀, CNC; 2♂, 1♀, CSCA); same data as holotype except, 17.vii–10.viii.2012 (2♂, CNC); Sagehen Creek Field Station, 13.vii.2012, N39°25′54.6″ W120°14′26.0″, swept creek, S.H. Cumming (1♂, CNC).

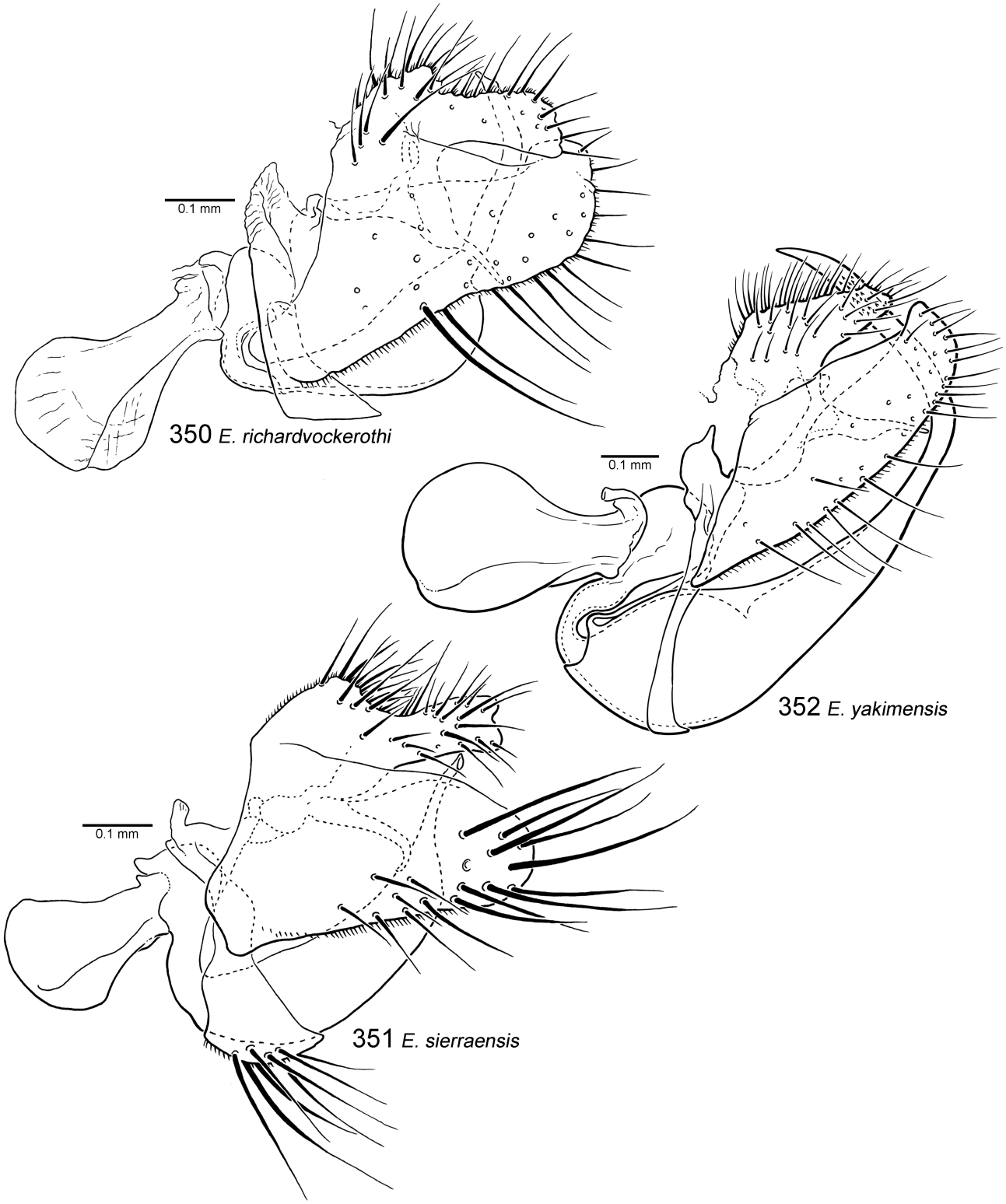
Diagnosis. This species is distinguished from other species of the subgenus by the grey body and males very narrowly dichoptic with unmodified hindleg, hind tarsomere 1 slightly swollen, hind tibia without long anterior setae (Fig. 348), cercus with straight dorsal margin, and phallus with broad base and sinuous apical third, with long slit-like opening (Figs 340, 341).

Description. Wing length 5.5–6.1 mm. **Male.** Similar to *E.* (*En.*) *californica* **sp. nov.**, except as follows: head narrowly dichoptic. Frons very narrow, width less than width of anterior ocellus. Antenna with postpedicel long and tapered, 4–5× longer than basal width.

Thorax with scutum with narrow median pair of greyish vittae; broader outer pair of greyish vittae very faint or absent. Antepronotum with 4 pairs of dark setae. Scutum with short, fine uniserial or biserial acr; dc longer than acr, increasing in length and stronger posteriorly; 1–2 posterior npl, with 1–2 shorter anterior npl. Scutellum with pair of long apical sctl, with 1 pair of marginal setae, length half or apical sctl.

Legs short, slender, yellow to orange brown, apical half of tibiae and tarsi darker brown, basal half of tarsomere 1 often paler than apical half; coxae without dense greyish pruinescence. Femora with white ventral pile. Fore femur with anteroventral and posteroventral row of setae, shorter than half width of femur. Fore tibia with 1–2 erect anterodorsal setae; anterior face with short appressed setae. Fore tarsomere 1 not swollen, without long dorsal setae, with fine dense ventral setae; tarsomeres 1–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with

apicolateral pair of spine-like setae, longer than width of segment. Mid femur similar to fore femur. Mid tibia with 1–3 erect posterodorsal setae; several erect ventral setae, similar to posterodorsal setae. Mid tarsomeres 1–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Hind femur slender without modified setae and processes (Fig. 348); rows of fine ventral setae, nearly as long as width of femur; strong anteroventral seta usually present on apical fourth. Hind tibia without processes or modified setae; 4–5 anterodorsal and posterodorsal erect setae, longer than width of tibia (Fig. 348). Hind tarsomere 1 broader than fore tarsomere 1, without dorsal setae; otherwise tarsus similar to mid tarsus.



FIGURES 350–352. Male terminalia of the *E.* (*Enoplempis*) unplaced species, lateral view. **350,** *E.* (*En.*) *richardvockerothi* **sp. nov.**; **351,** *E.* (*En.*) *sierraensis* **sp. nov.** (holotype); **352,** *E.* (*En.*) *yakimensis* **sp. nov.** (holotype).

Wing with CuA+CuP weak apically, reaching wing margin.

Abdomen paler than thorax, with dense whitish pruinescence. Terminalia (Figs 340, 341): ventral margin of epandrium and dorsal margin of cercus dark brown, with phallus orange brown and shiny. Cercus with straight dorsal margin; posterior half rectangular, with truncate apex; setae shorter than width of cercus. Subepandrial process extending on either side of phallus. Epandrial lamella elongate, longer than height; posterior margin with somewhat expanded dorsally, rounded, bearing setae ventrally, shorter than width of epandrium. Hypandrium narrow, strap-like; without setae. Phallus (Fig. 341) with basal third strongly expanded, tapered apically, with strong bend at apical third; apical third sinuous, arched, apex with long, narrow slit-like opening; emerging beyond cerci; apex tapered to narrow tip, with roughened subapical surface at base of long narrow opening; ejaculatory apodeme two-thirds length of epandrium, Y-shaped, with lateral apodemes positioned near ventral margin with short medial apodeme.

Female. Similar to male, except as follows: frons broader, slightly wider than anterior ocellus; legs stockier, without modified setae and processes. Abdominal pleural membrane without darkened, expanded region; tergite 8 and syntergite 9+10 with pruinescence.

Geographical distribution and seasonal occurrence (Fig. 308). *Empis* (*En.*) *susanae* **sp. nov.** is known only from Sagehen Creek in Nevada County, California. Adults have been collected in July and August.

Etymology. This species is named in recognition of the third author's wife, Susan Cumming, who has collected many specimens of *Empis* (*Enoplempis*), including a paratype of this species.

Nuptial gift presentation. Form unknown.

Empis (*Enoplempis*) *yakimensis* sp. nov.

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(Figs 308, 349, 352)

Type material. HOLOTYPE ♂, labelled: "[USA] WASHINGTON: Yakima/ Co., 8 mi SW Tieton/ RS, Snoqualmie NP/ Bear Crk [46°42′N 120°45′W], VI-(11-12)-73"; "D. Corredor/ Collector"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *yakimensis* Sinclair,/ Brooks & Cumming [red label]" [dissected] (WSU).

Diagnosis. This species is distinguished from other species of the subgenus by the grey body and males are dichoptic with hindleg unmodified, slender hind tarsomere 1, hind tibia without long anterior setae (Fig. 349), cercus with straight dorsal margin, and phallus with swollen basal third, strongly bent at apical third, apex not expanded with subapical roughened surface (Fig. 352).

Description. Wing length 4.7 mm. **Male.** Similar to *E.* (*En.*) *californica* **sp. nov.**, except as follows: head dichoptic. Frons slightly narrower than width of anterior ocellus. Antenna with postpedicel long and tapered, 5× longer than basal width.

Thorax with scutum with fine biserial acr; dc slightly longer, stronger than acr anteriorly, increasing in length and stronger posteriorly; 2 posterior npl, with 1–2 shorter anterior npl.

Legs long, slender, yellow, apical tarsi darker; coxae without dense greyish pruinescence. Femora without white ventral pile. Fore femur with anteroventral and posteroventral row of setae, shorter than half width of femur. Fore tibia with 1–2 erect anterodorsal setae; anterior face with short appressed setae. Fore tarsomere 1 slender [? flattened, difficult to determine]; without long dorsal setae; tarsomeres 1–5 with biserial row of spine-like ventral setae; tarsomeres 1–4 with apicolateral pair of spine-like setae, longer than width of segment. Mid femur similar to fore femur. Mid tibia without erect setae. Mid tarsomere 1 with stronger ventral spine-like setae, otherwise similar to fore tarsus. Hind femur slender, without modified setae and processes (Fig. 349); row of fine anteroventral and posteroventral setae, length shorter than width of femur. Hind tibia without processes or modified setae; 2–4 anterodorsal and posterodorsal setae (Fig. 348). Hind tarsus slender with several long preapical dorsal setae, otherwise similar to mid tarsus.

Wing with R_{4+5} unbranched on left wing, R_4 short stub on right wing.

Terminalia (Fig. 352): cercus straight along dorsal margin, tapered on apical half; setae shorter than width of cercus. Subepandrial process extending on either side of phallus. Epandrial lamella elongate, longer than height; linear with posterior margin slightly upcurved, rounded, bearing long setae ventrally, shorter than width of epandrium. Hypandrium narrow, strap-like; without setae. Phallus with basal third strongly expanded, tapered apically, with strong bend near apical third; apical third straight, apex emerging beyond cerci; apex narrow with elongate opening;

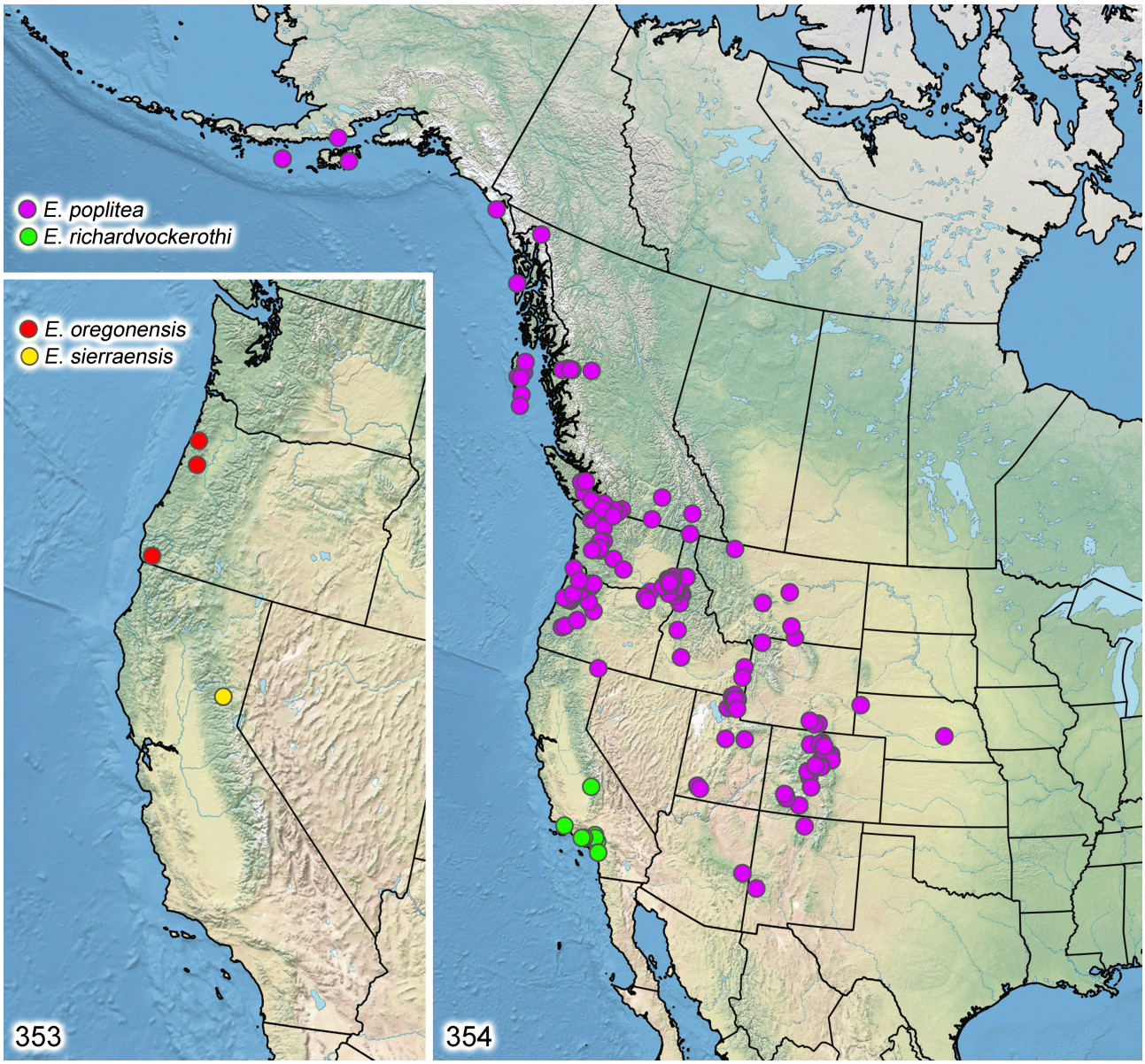
roughened surface subapically; ejaculatory apodeme more than half-length of epandrium, Y-shaped, with lateral apodemes positioned near ventral margin with short medial apodeme.

Female. Unknown.

Geographical distribution and seasonal occurrence (Fig. 308). *Empis* (*En.*) *yakimensis* **sp. nov.** is known only from the holotype collected in Yakima County, Washington in June.

Etymology. The species name is in reference to the type locality, Yakima County, Washington.

Nuptial gift presentation. Form unknown.



FIGURES 353–354. Known geographical distribution of the *E.* (*Enoplempis*) unplaced species. **353,** *E.* (*En.*) *oregonensis* **sp. nov.** and *E.* (*En.*) *sierraensis* **sp. nov.**; **354,** *E.* (*En.*) *poplitea* Loew and *E.* (*En.*) *richardvockerothi* **sp. nov.**

Key to males of *Empis* (*Enoplempis*) from the Rocky Mountains westward

1 Entirely yellow, including thorax (Figs 107, 144, 291) 2
- At least thorax dark, usually with grey pruinescence (*e.g.*, Figs 41, 62, 143, 164, 179, 299, 332) 9
2 Hind tibia geniculate at base; male hindlegs asymmetrical (Figs 210–214, 216, 217) [*mira* group] 3
- Hind tibia not geniculate at base; male hindlegs symmetrical (Figs 108, 109, 145–147, 291) 7
3 Scutum usually with single median brown vitta (sometimes not clearly visible due to preservation); right hind femur with two elongate posteroventral tufts, as long as width of femur (Fig. 213). . . . . ***E.* (*En.*) *williamturneri*** Sinclair, Brooks & Cumming

- Scutum usually with or without several vittae; right hind femur with one elongate posteroventral tuft as long as width of femur (Fig. 212) 4
4 Scutum with row of dark spots at base of the dorsocentral setae 5
- Scutum with dark or pale vitta at base of the dorsocentral setae 6
5 Right hind femur with anteroventral digitiform lobe on apical third, clothed in short setae (Fig. 211); right hind tibia with subapical swelling directed vertically, with black thorn-like setae (Figs 211, 212) . . . . . ***E.* (*En.*) *mira*** (Bigot)
- Right hind femur without anteroventral digitiform lobe (Fig. 214); right hind tibia with subapical swelling directed horizontally, without black thorn-like setae (Fig. 214) . . . . . ***E.* (*En.*) *submira*** Sinclair, Brooks & Cumming
6 Right hind femur without anteroventral setae opposite subapical swelling on tibia (Fig. 217); mid femur with long posteroventral setae at most slightly longer than width of femur . . . . . ***E.* (*En.*) *winkleri*** Sinclair, Brooks & Cumming
- Right hind femur with long anteroventral setae opposite subapical swelling on tibia (Fig. 216); mid femur with long posteroventral setae more than twice width of femur (Fig. 215) . . . . . ***E.* (*En.*) *macdonaldi*** Sinclair, Brooks & Cumming
7 Hind femur and tibia without processes, setal combs or rows of modified setae (Fig. 291) . . . . . ***E.* (*En.*) *cerina* sp. nov.**
- Hind femur and tibia with processes, setal combs and/or rows of modified setae (Figs 108, 109, 145–147) 8
8 Hind femur without anteroventral paint brush-like process; hind tibia with subbasal swelling and bend, bearing anteroventral lobe without setae, slightly arched with flattened anterior face; long dorsal setae evenly distributed along entire hind tibia (Figs 145–147) [*delumbis* group, in part] . . . . . ***E.* (*En.*) *delumbis*** Melander [in part]
- Hind femur with anteroventral paint brush-like process; hind tibia without subbasal swelling, straight, bearing anteroventral lobe with setae; long dorsal setae confined mostly to apical half (Figs 107–109) [*canaster* group, in part] . . . . . ***E.* (*En.*) *safra* sp. nov.**
9 Hind femur and tibia without processes, setal combs or rows of modified setae; hind femur at most with slender setulae beneath (Figs 179–182, 286, 288) 10
- Hind femur and tibia with processes, setal combs and/or rows of modified setae (*e.g.*, Figs 16, 72, 134, 156, 178, 189, 205, 219, 231, 258, 334) 21
10 Face and scape with numerous setae, longer than scape; palpus with ventral setae longer than palpus (Figs 179, 181) [*geneatis* group, in part] 11
- Face bare; scape and palpus without elongate setae 13
11 Very large species, wing length more than 6 mm; cercus broadly rounded dorsally (Fig. 187) . . . . . ***E.* (*En.*) *subgeneatis* sp. nov.**
- Smaller species, wing length 5 mm or less; cercus prolonged dorsally or projecting horizontally (Figs 185, 186) 12
12 Hairy species (Fig. 181); cercus broader than epandrium, prolonged dorsally (Fig. 185) . . . . . ***E.* (*En.*) *geneatis*** (Melander)
- Shorter haired species (Fig. 179); cercus narrower than epandrium, projecting horizontally (Fig. 186) . . . . . ***E.* (*En.*) *oharai* sp. nov.**
13 Hind tibia with more than 6 pairs of dorsal setae (Figs 286, 288, 290, 319, 331) 14
- Hind tibia with 4–6 pairs of dorsal setae (Figs 304, 320, 348, 349) 18
14 Eyes holoptic, frons narrower than width of anterior ocellus (Fig. 319) 15
- Eyes dichoptic, frons as wide or wider than width of anterior ocellus 17
15 Cercus with deep cleft near mid-length; phallus sinuous on apical half (Figs 294, 295) . . . . . ***E.* (*En.*) *blodgettensis* sp. nov.**
- Cercus with dorsal margin straight; phallus gradually arched on apical half (Figs 325, 338, 339) 16
16 Apex of phallus expanded, with roughened surface (Fig. 339) . . . . . ***E.* (*En.*) *oregonensis* sp. nov.**
- Apex of phallus slender, with subapical roughened surface, opposite cerci (Fig. 325) . . . . . ***E.* (*En.*) *holoptica* sp. nov.**
17 Hind tibia with long, slender anterior setae (Fig. 290); cercus expanded dorsally, with sloping posterior face and posteroventral elongation (Fig. 296) . . . . . ***E.* (*En.*) *californica* sp. nov.**
- Hind tibia without long, slender anterior setae (Fig. 286); cercus not greatly expanded dorsally, posterior face projecting and tapered (Fig. 292) . . . . . ***E.* (*En.*) *aphela* sp. nov.**
18 Eyes dichoptic, narrowly separated by less than width of anterior ocellus . . . . . ***E.* (*En.*) *yakimensis* sp. nov.**
- Eyes holoptic, closely approximated 19
19 Epandrium strongly, narrowly upturned apically; phallus with broad apex, with roughened surface encircling tip (Fig. 306) . . . . . ***E.* (*En.*) *delnortensis* sp. nov.**
- Epandrium broadly upturned apically; phallus with narrow apex, with subapical roughened surface (Figs 326, 327, 340, 341) 20
20 Cercus with truncate apex; phallus without distinct upcurved lip at edge of opening (Figs 340, 341) . . . . . ***E.* (*En.*) *susanae* sp. nov.**
- Cercus with tapered apex; phallus with distinct upcurved lip at edge of opening (Figs 326, 327) . . . ***E.* (*En.*) *manning* sp. nov.**
21 Hind femur and tibia with dense rows of preapical setae, lacking processes and lobes (Figs 219, 220, 343–347) 22
- Hind femur and tibia with setose processes and lobes (*e.g.*, Figs 17, 46, 69, 74, 106, 137, 146, 168, 178, 189, 205, 228, 258, 334) 24
22 Hind femur with preapical ventral subtriangular swelling (Fig. 220); subepandrium without ventral process (Sinclair *et al.* 2013, fig. 13B) [*nodipoplitea* group] . . . . . ***E.* (*En.*) *nodipoplitea*** Steyskal
- Hind femur without preapical swelling (Figs 344–347); subepandrium with ventral process (Figs 350, 351) 23
23 Hind tibia with numerous long dorsal setae, length nearly twice width of tibia; hind tibia with sub-basal setal rows tightly appressed, longer than width of tibia (Figs 343, 344); phallus strongly attenuated near mid-length (Fig. 350) . . . . . ***E.* (*En.*) *richardvockerothi* sp. nov.**

- Hind tibia with sparse dorsal setae, length less than twice width of tibia; hind tibia with sub-basal setae in tuft, shorter than width of tibia (Fig. 346); phallus gradually tapered beyond mid-length (Fig. 351). . . . . ***E.* (*En.*) *sierraensis* sp. nov.**

24 Hind femur with elongate, bare sickle-shaped anteroventral process (Figs 189–191, 195, 196, 202–205) [*manca* group] . . . 25

- Hind femur without elongate sickle-shaped anteroventral process (*e.g.*, Figs 30, 43, 58, 95, 117, 146, 155, 165, 222, 225, 258, 300). 28

25 Sickle-shaped process straight, base arising obliquely from hind femur (Figs 190, 191); hind tibia usually with small curvature and anteroventral swelling opposite sickle-shaped process (Figs 189–191); apex of phallus slender, without sculpturing (Fig. 197). . . . . ***E.* (*En.*) *bova* sp. nov.**

- Sickle-shaped process strongly curved, base arising perpendicular to hind femur; hind tibia usually without small curvature and anteroventral swelling opposite sickle-shaped process (Figs 195, 196, 202–205); apex of phallus usually expanded, with sculpturing (Figs 198–200, 206). 26

26 Hind femur with anteroventral and posteroventral rows of short, thickened black setae proximal to sickle-shaped process (Figs 195, 196). . . . . ***E.* (*En.*) *manca*** Coquillett

- Hind femur without anteroventral and posteroventral rows of short, thickened black setae proximal to sickle-shaped process (Figs 202–205) 27

27 Hind femur with short row of posteroventral setae, opposite sickle-shaped process (Fig. 204); sickle-shaped process greatly prolonged and slender apically (Figs 202–204) . . . . . ***E.* (*En.*) *submanca* sp. nov.**

- Hind femur without short row of posteroventral setae, opposite sickle-shaped process (Fig. 205, upper leg); sickle-shaped process not greatly prolonged and slender apically (Fig. 205). . . . . ***E.* (*En.*) *wilderae* sp. nov.**

28 Abdomen mostly shiny, especially on apical segments (Figs 15, 22, 29, 62, 63, 73, 131, 176, 240) 29

- Abdomen pruinescent; at most only shiny bands on anterior or posterior margin of tergites (doubtful cases, where abdomen appears partially shiny, will key both ways) (*e.g.*, Figs 41, 55, 71, 104, 154, 227, 299, 321, 332) 41

29 Scutum with 4 shiny vittae (Fig. 239); male terminalia narrow and standing erect (Fig. 240) [*turgida* group] 30

- Scutum without shiny vittae (Figs 21, 28, 32, 66, 137, 176); male terminalia directed horizontally (Figs 15, 22, 29, 63, 73, 164) 31

30 Tergite 7 with pair of rounded, membranous lateral lobes (Fig. 243); subepandrial process long, extending beyond posterior margin of epandrium (Fig. 244); phallus with 4–5 lateral teeth-like marginal projections in posterior view (Fig. 245). . . . . ***E.* (*En.*) *turgida* sp. nov.**

- Tergite 7 without pair of rounded, membranous lateral lobes; subepandrial process very short, not extending beyond posterior margin of epandrium (Fig. 247); phallus with more than 10 lateral teeth-like marginal projections in posterior view (Fig. 248) . . . . . ***E.* (*En.*) *woodleyi* sp. nov.**

31 Cercus held upright, perpendicular to epandrium (Figs 15, 22, 29) [*arrecta* group] 32

- Cercus not held upright, parallel to epandrium (Figs 63, *cf.* 71, 73, 164) 35

32 Scutum with three brownish vittae (Fig. 28); hind tibia with single narrow process (Figs 15, 16, 29–31); hind tibia distinctly broadened apically (Figs 16, 29–31) 33

- Scutum without three brownish vittae (Figs 21, 32); hind tibia with pair of narrow processes (Figs 17–19, 34); hind tibia not distinctly broadened apically (Figs 17, 33) 34

33 Distal dorsal setae of hind tibia subequal in length to distal width of tibia (Fig. 16); posteroventral preapical row of thickened setae on hind femur with proximal setae evenly spaced and distal setae slightly shorter than proximal setae (Fig. 16) . . . . . ***E.* (*En.*) *arrecta* sp. nov.**

- Distal dorsal setae of hind tibia twice width of distal half of tibia (Figs 30, 31); posteroventral preapical row of thickened setae on hind femur with proximal setae closely approximated and distal setae *ca* half length of proximal setae (Fig. 31) . . . . . ***E.* (*En.*) *occidentalis* sp. nov.**

34 Hind femur with posterior row of 5–6 short, thickened preapical setae (Figs 17, 19, 20); preapical posteroventral lobe of hind femur without narrow lateral prolongation (Figs 18, 19); male cercus with elongate ventrally projecting posterior lobe, hypandrium with long setae (Fig. 26). . . . . ***E.* (*En.*) *diokra* sp. nov.**

- Hind femur with posterior row of 3–4 short, thickened preapical setae (Figs 33, 34); preapical posteroventral lobe of hind femur with narrow lateral prolongation (Fig. 34); male cercus with short ventrally projecting posterior lobe, hypandrium without long setae (Fig. 38). . . . . ***E.* (*En.*) *shoshona* sp. nov.**

35 Frons very narrow, eyes closely approximated (narrower than anterior ocellus) or holoptic (Figs 139, 176). 36

- Frons at least as wide as anterior ocellus (Fig. 66). 39

36 Eyes with upper facets enlarged (Fig. 177); hind tibia somewhat clavate (Fig. 176); hind tarsomere 1 expanded, nearly as wide as apex of hind tibia [*geneatis* group] . . . . . ***E.* (*En.*) *fisheri* sp. nov.** [in part]

- Eyes without upper facets enlarged; hind tibia not clavate (Figs 137, 164); hind tarsomere 1 not as wide as apex of hind tibia. 37

37 Hind femur without row of black anteroventral setae proximal to preapical region (Fig. 135) [*clava* group, in part] . . . . . ***E.* (*En.*) *mariposa* sp. nov.** [in part]

- Hind femur with row of black anteroventral setae proximal to preapical region (Figs 138, 165). 38

38 Hind femur with tight row of short, black anteroventral setae proximal to preapical region (Fig. 165); hind tibia with long dorsal setae, length more than twice width of tibia [*delumbis* group, in part] . . . . . ***E.* (*En.*) *spiculata* sp. nov.** [in part]

- Hind femur with row of stout, long anteroventral setae on apical third, length longer than width of femur (Fig. 138, lower leg); hind tibia with short dorsal setae, less than twice width of tibia [*clava* group, in part]. . . . ***E.* (*En.*) *tularensis* sp. nov.** [in part]

39 Hind femur with posterior preapical setae greatly thickened and lengthened, longer than apical width of femur (Figs 133, 134) [*clava* group, in part] . . . . . ***E.* (*En.*) *clava* sp. nov.** [in part]

- Hind femur with posterior preapical setae not greatly thickened and lengthened, not longer than apical width of femur (Figs 70, 75) [*bigoti* group, in part] 40
40 Hind tibia with long, narrow, bare anteroventral pointed lobe (Figs 67–70) . . . . . ***E.* (*En.*) *multifaria* sp. nov.** [in part]
- Hind tibia with broad, anteroventral anvil-shaped setose lobe (Figs 74, 75) . . . . . ***E.* (*En.*) *podagra*** Melander
41 Abdomen grey pruinescent with narrow shiny bands on tergites (sometimes bands partially hidden beneath folds (Figs 41, 55, 71, 251) 42
- Abdomen grey to yellowish, without shiny bands margins on tergites, although some species with pale, dull tergal margins (*e.g.*, Figs 94, 97, 104, 154, 157, 164, 167, 227, 277, 299) 49
42 Hind femur with preapical row of black posterior setae, often short and thickened and arranged horizontally (Figs 44, 47, 70, 72, 254, 270) 43
- Hind femur without preapical row of black posterior setae (Fig. 58) [*bigoti* group, in part] . . . . ***E.* (*En.*) *montgomeryi* sp. nov.**
43 Frons narrowed below ocellar triangle, narrower than width of anterior ocellus (Fig. 66) [*bigoti* group, in part] . . . . . ***E.* (*En.*) *multifaria* sp. nov.** [in part]
- Frons parallel-sided, wider than anterior ocellus (Fig. 42) 44
44 Wing length 6 mm or longer [*valentis* group, in part] 45
- Wing length less than 6 mm 46
45 Scutellum usually with 6 or more setae of various sizes; wing without tuft of basal costal setae distinct from distal row of costal setae; occiput with multiple rows of setae, rather dense, especially ventrally (Fig. 252); large species, wing length generally greater than 7 mm . . . . . ***E.* (*En.*) *aeripes*** Melander
- Scutellum with 4 strong setae; wing with tuft of black basal costal setae distinct from distal row of costal setae; occiput with setae confined to two rows, very sparse ventrally (Fig. 268); smaller species, wing length generally less than 7 mm . . . . . ***E.* (*En.*) *mixopolia*** Melander [in part]
46 Wing with tuft of black basal costal setae distinct from distal row of costal setae [*valentis* group, in part] . . . . . ***E.* (*En.*) *mixopolia*** Melander [in part]
- Wing with basal costal setae not forming tuft distinct from distal row of costal setae [*bigoti* group, in part] 47
47 Median ventral lobe of hind femur low, divided apically into pair of lobes (Figs 46, 47); cercus tapered posteriorly (Fig. 53) . . . . . ***E.* (*En.*) *bigoti*** Melander
- Median ventral lobe of hind femur oval, inflated, rarely shallowly divided apically into pair of low lobes (Figs 43, 44, 72); cercus rounded posteriorly (Figs 52, 78) 48
48 Lower lobe on hind tibia with setae along posterior margin shorter than length of lobe (Figs 43, 44); phallus with apical section abruptly bent, without rounded lobe at apex of basal section of phallus (Fig. 52) . . . . . ***E.* (*En.*) *aerobatica*** Melander
- Lower lobe on hind tibia with setae along posterior margin, longer than length of lobe (Fig. 72); phallus with apical section gently arched, with rounded lobe at apex of basal section of phallus (Figs 78, 79) . . . . . ***E.* (*En.*) *paraerobatica* sp. nov.**
49 Hind femur with preapical row of black (rarely pale) posterior or posteroventral setae, often short and thickened and arranged horizontally (*e.g.*, Figs 133, 134, 138, 147, 156, 166, 272, 311), occasionally seta(e) with expanded tip (Fig. 301) 50
- Hind femur without preapical row of posterior or posteroventral setae (*e.g.*, Figs 87, 106, 114, 159, 223, 226, 232), occasionally with cluster of posteroventral setae distal to preapical swelling (Figs 232, 313) 68
50 Hind femur with long, obliquely directed, digitiform anteroventral process (Figs 255, 258, 260, 271, 273, 278) [*valentis* group, in part] 51
- Hind femur without long, obliquely directed, digitiform anteroventral process (Figs 50, 122, 132, 135, 138, 146, 155, 165, 168, 178, 300, 310) 57
51 Halter with pale, yellowish knob (Fig. 259) 52
- Halter with dark knob (Fig. 277) 56
52 Anteroventral digitiform process of hind femur with short lobe attached at base (viewed ventrally) (Figs 260, 273, 274) . . . 53
- Anteroventral digitiform process of hind femur without short lobe attached at base (Figs 255, 256, 267, 272) 54
53 Basal lobe of anteroventral digitiform process of hind femur with several thin apical setae (Fig. 260) . . . . . ***E.* (*En.*) *flavobulla* sp. nov.**
- Basal lobe of anteroventral digitiform process of hind femur with apical brush of black, thick setae (Figs 273) . . . . . ***E.* (*En.*) *subaeripes* sp. nov.**
54 Hind femur with pair of short lobes medial to digitiform anteroventral process (Fig. 256) . . . . . ***E.* (*En.*) *disconvenita*** Melander **stat. rev.**
- Hind femur with one lobe medial to digitiform anteroventral process (Figs 267, 272) 55
55 Lobe medial to digitiform anteroventral process slightly arched apically (Fig. 272) . . . . . ***E.* (*En.*) *paraeripes* sp. nov.**
- Lobe medial to digitiform anteroventral process strongly arched, sickle-shaped (Fig. 267) . . . . . ***E.* (*En.*) *fresno* sp. nov.**
56 Acrostichals usually uniserial; scutellum with 4 primary setae; wing length shorter than 7 mm; anteroventral process on hind femur with separate inner medial knob (Fig. 258) . . . . . ***E.* (*En.*) *dolabraria*** Melander
- Acrostichals biserial; scutellum with 6 or more setae; wing length greater than 7 mm; anteroventral process on hind femur with inner knob at base, not separated (Figs 278, 279) . . . . . ***E.* (*En.*) *valentis*** Coquillett
57 Eyes with upper facets enlarged (Fig. 177); hind tibia somewhat clavate; hind tarsomere 1 expanded, nearly as wide as apex of hind tibia (Fig. 176) [*geneatis* group, in part] . . . . . ***E.* (*En.*) *fisheri* sp. nov.** [in part]
- Eyes with upper facets not enlarged; hind tibia not clavate; hind tarsomere 1 not expanded as wide as apex of hind tibia (Figs 48, 121, 131, 137, 145, 154, 167, 299, 309) 58
58 Hind femur with row of pale or black anteroventral setae proximal to preapical region (Figs 132, 133, 138, 165, 300, 310) 59

- Hind femur without row of pale or black anteroventral setae proximal to preapical region (Figs 50, 122, 135, 146, 155, 168) 63
59 Hind femur with pair of nipple-like posteroventral lobes, proximal to row of preapical posteroventral setae (Fig. 311). . . . . ***E.* (*En.*) *dubitata* sp. nov.**
- Hind femur without pair of nipple-like posteroventral lobes, proximal to row of preapical posteroventral setae (Figs 133, 166, 301). 60
60 Hind femur with row of stout, long anteroventral setae on apical third, length longer than width of femur (Fig. 138) . . . . . ***E.* (*En.*) *tularensis* sp. nov.** [in part]
- Hind femur with row of anteroventral setae shorter than width of femur (Figs 132, 165, 300) 61
61 Hind femur with row of 5–6 thickened posterior setae, shorter than width of femur [*delumbis* group, in part] (Fig. 166) . . . . . ***E.* (*En.*) *spiculata* sp. nov.** [in part]
- Hind femur with 1–2 very elongate thickened posterior setae, longer than width of femur (Figs 133, 134, 301) 62
62 Abdomen with modified tergites 6 and 7 (Figs 302, 303); outstanding posterior seta on hind femur with expanded tip (Fig. 301); hind femur with anteroventral row of dark, thickened setae and sparse dark ventral setae, shorter than width of femur (Fig. 300). . . . . ***E.* (*En.*) *culcitella* sp. nov.**
- Abdomen without modified tergites; outstanding posterior setae on hind femur tapered apically (Figs 133, 134); hind femur with anteroventral row of fine, pale setae and dense pale ventral setae, nearly as long as width of femur (Figs 133, 134) [*clava* group, in part]. . . . . ***E.* (*En.*) *clava* sp. nov.** [in part]
63 Hind tibia with dorsal setae shorter than width of tibia (Fig. 137) [*clava* group, in part] . . . . . ***E.* (*En.*) *mariposa* sp. nov.** [in part]
- Hind tibia with long, sometimes dense dorsal setae, longer than width of tibia (Figs 48, 121, 145, 154, 167). 64
64 Hind tibia with dorsal setae three times or more width of tibia (Figs 154, 167) [*delumbis* group, in part]. 65
- Hind tibia with dorsal setae less than three times width of tibia (Figs 48, 121, 145) 66
65 Hind femur with 3 closely approximated preapical ventral protuberances (Figs 155, 156); hypandrial setae slender, not longer than length of hypandrium (Fig. 160); abdominal marginal setae dark . . . . . ***E.* (*En.*) *floricola* sp. nov.**
- Hind femur with 2 closely approximated preapical ventral protuberances and third offset protuberance (Figs 168, 169); hypandrial setae thickened, longer than length of hypandrium (Fig. 172); abdominal marginal setae pale . . . . . ***E.* (*En.*) *tripenicillata* sp. nov.**
66 Scutum with 3 brown vittae (viewed anteriorly), contrasting with grey pruinescence, with rows of setae running within vittae (Fig. 49); apical third of hind femur with setose knob-like anteroventral lobe (Fig. 50) [*bigoti* group, in part]. . . . . ***E.* (*En.*) *collinsi* sp. nov.**
- Scutum with 2 or 4 dark vittae, with rows of setae running between vittae; apical third of hind femur without anteroventral lobe (Figs 122, 146) 67
67 Hind tibia with basal anteroventral lobe without setae, slightly arched with flattened anterior face (Fig. 146) [*delumbis* group, in part] . . . . . ***E.* (*En.*) *delumbis*** Melander [in part]
- Hind tibia with basal anteroventral lobe with apical setae, knob-like and rounded (Fig. 122) [*canaster* group, in part] . . . . . ***E.* (*En.*) *subcanaster* sp. nov.**
68 Hind tibia with elongate, forked anteroventral process, fringed with dark setae (Fig. 334) . . . . . ***E.* (*En.*) *poplitea*** Loew
- Hind tibia without elongate, forked anteroventral process (*e.g.*, Figs 86, 99, 105, 158, 177, 231, 322) 69
69 Hind femur with 1–2 paint brush-like preapical ventral lobes (Figs 83, 86, 89, 95, 98, 113, 117, 322) 70
- Hind femur without paint brush-like preapical ventral lobes (Figs 105, 125, 126, 158, 222, 225, 228, 231, 312) 77
70 Hind tibia with single basal process (Figs 86, 89) [*canaster* group, in part] 71
- Hind tibia with 2 or more basal processes (Figs 83, 95, 98, 113, 117, 322). 72
71 Hind tibia with long, narrow posteroventral process (Fig. 86); hind tibia with long dorsal setae, twice width of tibia (Fig. 85). . . . . ***E.* (*En.*) *canaster*** Melander
- Hind tibia with short, broad, triad posteroventral process (Fig. 89); hind tibia with shorter dorsal setae, only slightly longer than width of tibia (Fig. 88) . . . . . ***E.* (*En.*) *falcata*** Melander
72 Hind femur with preapical, knob-like posterior lobe (Fig. 99); hypandrium with pair of very long, strong, closely approximated setae (Fig. 102) [*canaster* group, in part]. . . . . ***E.* (*En.*) *contrasta* sp. nov.**
- Hind femur without preapical knob-like posterior lobe (Figs 96, 84, 114, 118, 323); hypandrium with numerous slender setae or without setae (Figs 93, 101, 119, 120, 328). 73
73 Hind femur without curved, bare posteroventral process (Fig. 323); epandrium narrow and prolonged posteriorly (Fig. 328). . . . . ***E.* (*En.*) *missoula* sp. nov.**
- Hind femur with curved, bare posteroventral process(es) (Figs 84, 96, 114, 118); epandrium round and truncate posteriorly (Figs 93, 101, 119, 120) [*canaster* group, in part] 74
74 Hypandrium without setae (Fig. 119). . . . . ***E.* (*En.*) *sagehenensis* sp. nov.**
- Hypandrium with setae (Figs 93, 101, 120). 75
75 Hind femur with single curved, bare posteroventral process (Figs 84, 96) 76
- Hind femur with 3 variously shaped, bare posteroventral processes (Fig. 118). . . . . ***E.* (*En.*) *spokanensis* sp. nov.**
76 Hind femur with inner ventral paint brush-like process (Figs 95, 96) . . . . . ***E.* (*En.*) *chillcotti* sp. nov.**
- Hind femur with inner ventral process reduced to unmounted appressed narrow cluster of setae (Figs 83, 84). . . . . ***E.* (*En.*) *arizonensis* sp. nov.**
77 Holoptic (Fig. 157) [*delumbis* group, in part] . . . . . ***E.* (*En.*) *sphaera* sp. nov.**

- Dichoptic to closely approximated. 78
78 Hind femur with cluster of slender, black posteroventral setae distal to preapical swelling (Figs 223, 226, 229, 232) [*teres* group] 79
- Hind femur without cluster of slender, black posteroventral setae distal to preapical swelling (Figs 106, 126, 313). 82
79 Fore tarsomere 1 with long dorsal setae, more than twice width of tarsus (Figs 227, 230). 80
- Fore tarsomere 1 with dorsal setae, less than twice width of tarsus (Fig. 221) 81
80 Hind femur with preapical ventral whip-like tuft of setae arising from short knob-like lobe (Figs 228, 229); dorsal margin of cercus with angled projection (Fig. 235) . . . . . ***E. teres*** Melander
- Hind femur with preapical ventral whip-like tuft of setae arising from round, inflated lobe (Figs 231, 232); dorsal margin of cercus with straight dorsal margin (Fig. 236). . . . . ***E.* (*En.*) *undulasetosa* sp. nov.**
81 Hind tibia with single basal lobe (Fig. 222) . . . . . ***E.* (*En.*) *scotti* sp. nov.**
- Hind tibia with two basal lobes (Fig. 225) . . . . . ***E.* (*En.*) *scutica* sp. nov.**
82 Anterobasal process of hind tibia broad with setal fringe on anterior and posterior sides (Figs 105, 106) [*canaster* group, in part]. . . . . ***E.* (*En.*) *fitzgeraldi* sp. nov.**
- Anterobasal process of hind tibia narrow, with setae confined mostly to apex (Figs 125, 126, 312, 313) 83
83 Hind femur with pair of elongate tufts of appressed preapical setae (anteroventral and posteroventral), longer than apical width of femur (Figs 312, 313); pregenital segments modified (Figs 314, 315); subepandrial process present (Fig. 317). . . . . .

Evolution of nuptial gifts in *Empis* (*Enoplempis*)

The evolution of nuptial gifts and courtship behaviour in Empidinae and in *Empis* (*Enoplempis*) specifically, is a complex topic warranting discussion. As outlined by Downes (1970), Chvála (1976) and Cumming (1994), most empidine species (generally classified into two large tribes, Hilarini and Empidini) usually form aerial mating swarms over a landmark. Typically these swarms are composed of males that each carry a nuptial gift, usually of prey, that are presented to and consumed by females, which have entered the swarm to mate and obtain a meal. However, numerous species of Empidinae have females that are ornamented with either (or a combination of) pennate scales, enlarged and coloured wings, or eversible abdominal pleural sacs. In these species, females swarm and males carrying nuptial gifts enter these swarms to choose a mate, which is a form of sex-role reversal (Cumming 1994; Murray *et al*. 2022). Female swarms have not been observed in *Empis* (*Enoplempis*), but in several species females have extensive darkened abdominal pleural membranes that are probably eversible as suggested by Sinclair *et al*. (2013) for the eastern species *E*. (*Enoplempis*) *tridentata*. It is likely in some of these abdominally modified species, that females swarm (Table 1) and males are involved in sex-role reversed mate selection.

Within the Empidoidea, nuptial gifting occurs only in the Empidinae (Cumming 1994) and also in a fossil species of a non-related genus, *Alavesia* Waters & Arillo, belonging to the basal empidoid family, Atelestidae (Tang *et al*. 2022). Nuptial gifts, which are always presented by males to females, are usually prey items that are consumed by females, or sometimes they are inedible plant objects such as silken wind-blown seeds or flower petals, or occasionally they are secreted structures generally referred to as balloons (Cumming 1994). Within the Empidini, the only group, which has males that produce secreted balloons, are some species of *Empis* (*Enoplempis*). The nuptial gifts used by species in this subgenus show an incredible range of diverse forms, from unwrapped prey to wrapped prey in secreted froth, to hollow empty secreted balloons without prey (Turner 2012; Sinclair *et al.* 2013). A compilation of the courtship behaviours in those species of *Empis* (*Enoplempis*) for which we have direct or inferred observations on nuptial gift type (only 24 of 95 species, or 25%) (see also Sinclair *et al*. 2013, 2021; Alcock 2015), most commonly use unwrapped prey as nuptial gifts (16 of 24 species, or 67%), followed by either frothy balloons with edible prey (3 of 24 species, or 13%), balloons with inedible prey fragments (1 of 24 species, or 4%), or completely empty prey-less balloons (4 of 24 species, or 17%) (Table 1).

The common use of unwrapped edible prey items, which are consumed by females during mating, is very probably the groundplan nuptial gift condition in *Empis* (*Enoplempis*) as discussed by Cumming (1994) for Empidinae. The various types of balloons (Figs 3, 6–14) are probably derived numerous times from this groundplan condition, given their distribution across several of the *Empis* (*Enoplempis*) species groups proposed in this revision. Reduction in the edible quality of nuptial gifts in conjunction with balloon type, is also unlikely to be the straight-line transformation series of steps proposed by Kessel (1955), given the scattered distribution of nuptial gift types within *Empis* (*Enoplempis*). This is completely contrary to the hypothesis of Tang *et al*. (2022) who proposed that the discovery of an empty prey-less balloon in Burmese amber being held onto by a male of the atelestid genus *Alavesia*, is proof that empty prey-less balloons are the groundplan condition for the entire Empidoidea. They then suggested that the addition of edible prey onto balloons and then prey items not associated with any secretions, must have been the direction of nuptial gift evolution within Empidoidea, with feeding on prey being the most derived condition. This evolutionary scenario is highly unlikely given our current knowledge of phylogenetic relationships within the Empidoidea (see Sinclair & Cumming 2006; Wahlberg & Johanson 2018). Even though the Atelestidae are the probable sister-group to the remainder of the Empidoidea, the discovery of nuptial balloon use in a single member of this family, although interesting, must be due to convergence with balloon use within the Empidinae. The Atelestidae are a relatively small group of flower-feeding flies that probably feed on pollen and nectar (Sinclair *et al*. 2024) and whose mating habits, except for the presumed behaviour of a single Burmese amber specimen of *Alavesia*, are completely unknown. The vast majority of Empidoidea are predators and all except the Empidinae, do not present nuptial gifts, either prey or balloons (Cumming 1994; Sinclair & Cumming 2006). To suggest that the empty inedible prey-less balloon is the groundplan condition for the entire Empidoidea, a condition that then must have been lost as a courtship behaviour numerous times in almost all of the superfamily's constituent lineages, is counter-intuitive and in no way parsimonious.

Acknowledgements

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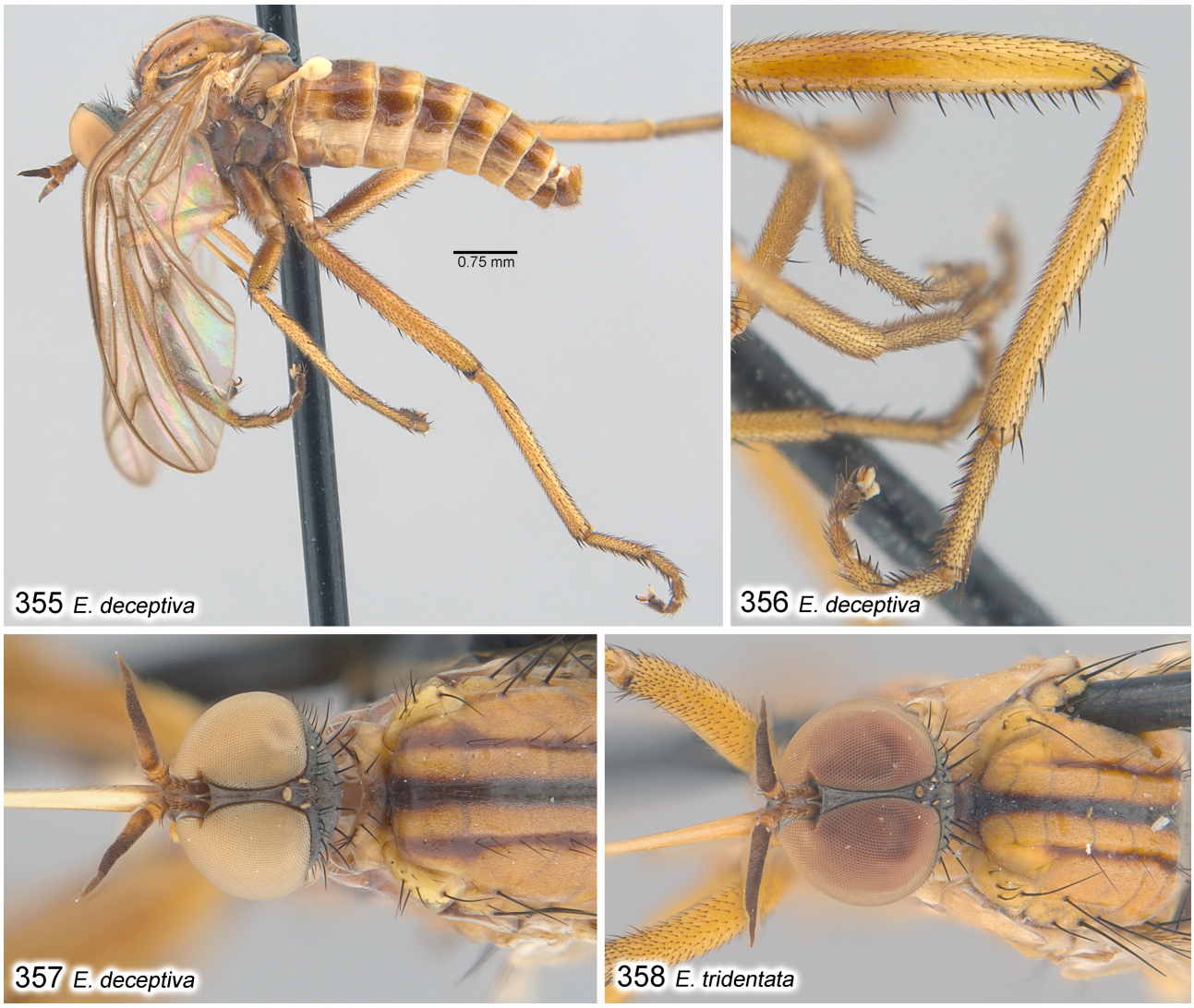
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Appendix 1: Updates on eastern North American *Empis* (*Enoplempis*)

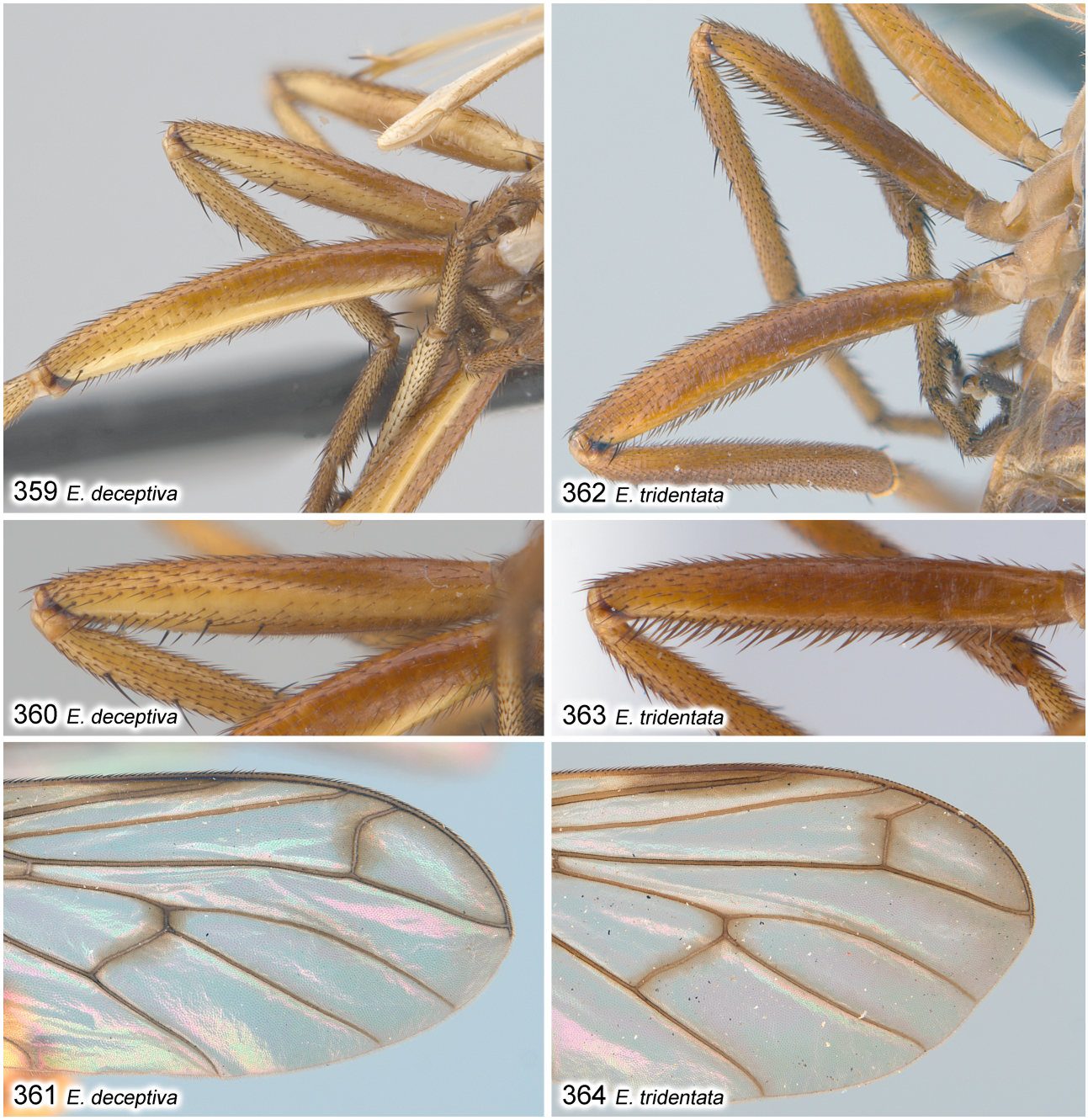
New significant records for eastern North American species

The following specimens became available for study following the publication of Sinclair *et al*. (2013). They are listed here because they represent new state records for these species.

Empis* (*En.*) *gulosa Coquillett: USA. Virginia: Great Falls [38°59′53″N 77°17′18″W], 2.v.1916, W.L. McAtee (1♂, USNM); same data except, iv.1924, R.C. Shannon (1♂, USNM).
Empis* (*En.*) *prodigiosa Cumming: USA. Massachusetts: Bash Bish Falls [42.115°N 73.491°W], 27.vi.1912 (1♂, USNM).
Empis* (*En.*) *stenoptera Loew: USA. Massachusetts: Mt. Greylock [42.637°N 73.165°W], 14.vi.1902? (1♂, USNM).
Empis* (*En.*) *tridentata Coquillett: USA: Florida: Walton Co., DeFuniak Springs [30.720°N 86.120°W], 28.iv–6.v.1981, Winegarner & Deyrup (2♀, CNC). North Carolina: Jones Co., Island Creek [35.025°N 77.135°W], 1.v.2002, G. & M. Wood (1♀, CNC).
Empis* (*En.*) *volsella Sinclair: USA. Virginia: Woodstock [38°52′37″N 78°30′41″W], 29.v., F.C. Pratt (1♂, USNM).



FIGURES 355–358. Male habitus, head and hindleg of the *E*. (*Enoplempis*) *tridentata* species group. **355,** *E*. (*En*.) *deceptiva* **sp. nov.**, habitus (holotype), lateral view; **356,** same, hindleg, lateral view; **357,** same, head, dorsal view; **358,** *E*. (*En*.) *tridentata* Coquillett, head, dorsal view.



FIGURES 359–364. Female legs and wing of the *E*. (*Enoplempis*) *tridentata* species group. **359,** *E*. (*En*.) *deceptiva* **sp. nov.**, legs, posterior view; **360,** same, mid femur, posterior view; **361,** same, apex of wing; **362,** *E*. (*En*.) *tridentata* Coquillett, legs, posterior view; **363,** same, mid femur, posterior view; **364,** same, apex of wing.

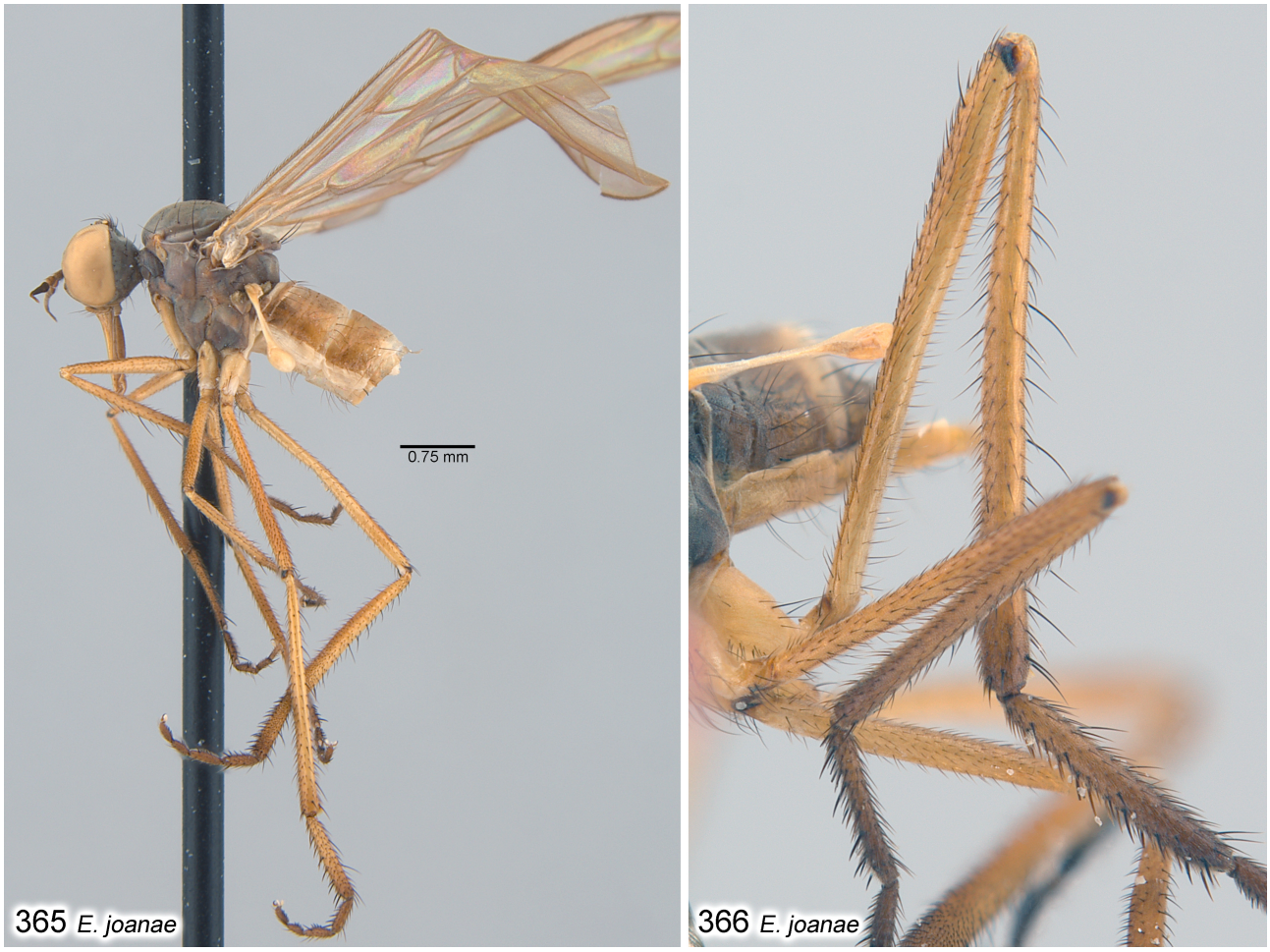
New species of eastern North American *Empis* (*Enoplempis*)

Empis (*Enoplempis*) *deceptiva* sp. nov.

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(Figs 355–357, 359–361, 367, 368, 370)

Type material. HOLOTYPE ♂ (Fig. 355), labelled: "CAN:QC:Terrasse Vaudreuil/ Molson Nature Reserve [45°23′41″N 73°58′32″W]/ Malaise, 16–25.vi.1999, S.E. Brooks"; "CNC1078534"; "E. (Enoplempis)/ tridentata Coquillett/ det. Sinclair *et al.* 2013"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *deceptiva* Sinclair,/ Brooks & Cumming

[red label]" (CNC). **PARATYPES: CANADA. Ontario:** Nepean, 24 Gervin St, 45.317°N 75.720°W, 2.vii.2020, 90 m, MT, J.E. O'Hara (1♂, CNC). **Quebec:** Cté Vaudreuil, summit Mt. Rigaud [45.466°N 74.326°W], 16.vii.1993, D.M. Wood (1♀, CNC). **USA. Massachusetts:** *Middlesex County*: Melrose Highlands [42°28′07″N 71°04′11″W], 1.vii.1911, J.D. Tothill (1♂, CNC). **New Hampshire:** *Strafford County*: Durham [43°08′N 70°55′W], 1.vii.1981, K. Tacewski (1♀, CNC). *Hillsborough County*: Nashua, Long Hill, 20 m, N42°42′59″ W71°27′04″, 27.vi–5.vii.2004, MT, S.D. & A.V. Gaimari (7♂, 6♀, CNC).



FIGURES 365–366. Habitus and hindleg of *E.* (*Enoplempis*) *joanae* **sp. nov. 365,** holotype habitus (dissected), lateral view; **366,** paratype, hindleg, lateral view

Diagnosis. This species is included in the *E.* (*En.*) *tridentata* species group on the basis of three distinct scutal vittae, wings with clouding at base of R_4 and apex of the discal cell and robust ventral setae on the hind femur. Males of this new species are distinguished from *E.* (*En.*) *tridentata* by the more widely separated eyes (Fig. 357 vs Fig. 358), less tapered cercus and evenly arched phallus. Females are distinguished by the absence of short pennate scales on the mid and hind femora (Figs 359, 360 vs Figs 362, 363) and absence of a stub vein near the base of R_4 (Fig. 361 vs Fig. 364).

Description. Wing length 5.1–6.0 mm. **Male.** Similar to *E.* (*En.*) *tridentata* except as follows: head with eyes separated on frons by width of anterior ocellus (Fig. 357).

Terminalia (Figs 367, 368): cercus yellow, epandrium darker. Cercus short, broad, separate from anterior margin of epandrium, broader at anterior end; posterior end slightly narrower than anterior end, apex tapered; clothed in setae, longer apically. Subepandrial process slender, straight, extending to either side of phallus. Epandrial lamella subquadrate, posterior margin somewhat truncate, bearing short apical setae. Hypandrium very reduced, with truncate apical margin, about 0.5× as long as epandrium; lacking setae. Phallus with broad base, tapered, apically smoothly curved, not sinuous; apex emerging beyond cercus; ejaculatory apodeme shorter than epandrium; inverted Y-shaped, with short median keel.

Female. Similar to male, except as follows: frons broader, about twice width of anterior ocellus; spine-like setae of mid femur less numerous and slightly less stout; pennate scales on mid and hind femora absent (Figs 359, 360); base of R_4 without short stub vein (Fig. 361); cercus long and slender, slightly shorter than tergite 8.

Geographical distribution and seasonal occurrence (Fig. 370). *Empis* (*En.*) *deceptiva* **sp. nov.** is known from Ontario and Quebec and the New England states of New Hampshire and Massachusetts. Adults have been collected in June and July.

Etymology. The species name is from the Latin *decipio*, in reference to this species being overlooked among the specimens of *E*. (*En*.) *tridentata*.

Nuptial gift presentation. Form unknown.

Remarks. This species was found hidden among identified specimens of *E*. (*En*.) *tridentata*. While re-examining the legs of *E*. (*En*.) *tridentata*, it was discovered that northern specimens lacked rows of small pennate scales on the female mid and hind femora (Figs 359, 360), base of R_4 without short stub vein (Fig. 361) and the male eyes were significantly more widely separated (Fig. 357) compared to the lectotype of *E*. (*En*.) *tridentata* (Pennsylvania) and more southern specimens (Fig. 358). In addition, small differences in the male terminalia were discovered which supported the recognition of a new species despite the shared distinctive body colour pattern and wing clouding. These two species are assigned to the newly recognized *E*. (*En.*) *tridentata* species group based on the characters listed in the above diagnosis.

Empis (*Enoplempis*) *joanae* sp. nov.

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(Figs 365, 366, 369, 370)

Type material. HOLOTYPE ♂ (Fig. 365), labelled: "U.S.A.: WV: Monongahela,/ Pocahontas County;/ 38.371650°N 79.761117°W;/ 20.V.2000; MT; L. Butler,/ J. Strazanac; CNC513376"; "HOLOTYPE/ *Empis* (*Enoplempis*)/ *joanae* Sinclair,/ Brooks & Cumming [red label]" [dissected] (CNC). **PARATYPES: USA. Virginia:** *Amherst County*: summit, Cold Mtn, nr Hog Camp Gap, Appalachian Tr., 1256 m, N37°45′8″ W79°12′12″, 7.vi.2001, J. Skevington (2♂, CNC).

Diagnosis. This species is assigned to the *E.* (*En.*) *snoddyi* group on the basis of the narrow epandrium, form of the apex of the phallus and long, narrow hind femur with slender, erect ventral setae (Fig. 366). The new species is distinguished by the broad, untapered male cercus, with the medial face with short, dense setae.

Description. Wing length 5.2–5.7 mm. **Male.** Similar to *E.* (*En.*) *snoddyi* Steyskal except as follows: thorax with pleura dark grey, concolourous with scutum, without pale highlights along sutures (Fig. 365).

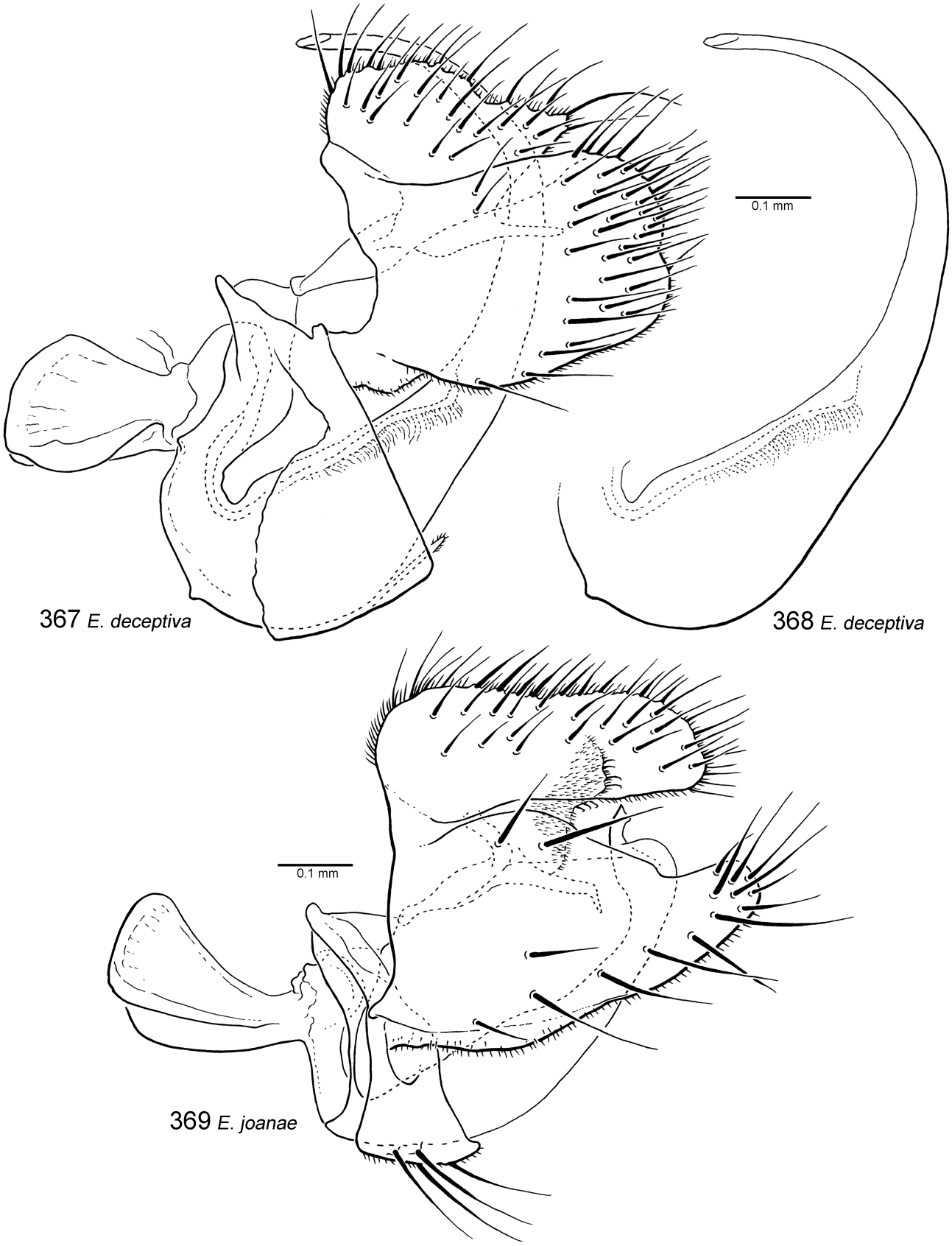
Terminalia (Fig. 369): yellowish brown, except dorsal and apical margins of cerci dark. Cercus separated from dorsal margin of epandrium, untapered, with rounded apical margin; medial face with short, dense setae; dorsal margin of cercus with short, strong setae. Hypoproct lacking setae; subepandrial process slender, with hooked tip, not extending to phallus. Epandrial lamella slender, slightly longer than cercus; subapical portion narrowed, apex rounded; strong setae along ventral margin and apex. Hypandrium short, truncate posteriorly, slightly projected medially, about 0.25× as long as epandrium; clothed with several dark setae, longer than hypandrium. Phallus broadly tubular, narrowed subapically with broadly rounded apex and slender, anterior apical filament; ejaculatory apodeme 0.5× length of epandrium; T-shaped, with median keel.

Female. Unknown.

Geographical distribution and seasonal occurrence (Fig. 370). *Empis* (*En.*) *joanae* **sp. nov.** is currently known only from the "Delmarva" [see Remarks] states and specifically in the Appalachian Mountains of Virginia and West Virginia. Adults have been collected in May and June.

Etymology. This species is dedicated to the first author's mother, Joan Sinclair, who always supported his unlikely adventures in entomology and closely followed the lives and careers of her four children.

Nuptial gift presentation. Form unknown, but presumably involves balloons similar to those of *E.* (*En.*) *snoddyi* and *E*. (*En*.) *vockerothi* Cumming (Fig. 14) (Sinclair *et al*. 2013).



FIGURES 367–369. Male terminalia of the *E*. (*Enoplempis*) *tridentata* and *snoddyi* species groups, lateral view. **367,** *E*. (*En*.) *deceptiva* **sp. nov.**; **368,** same, phallus; **369,** *E*. (*En*.) *joanae* **sp. nov.** (holotype).

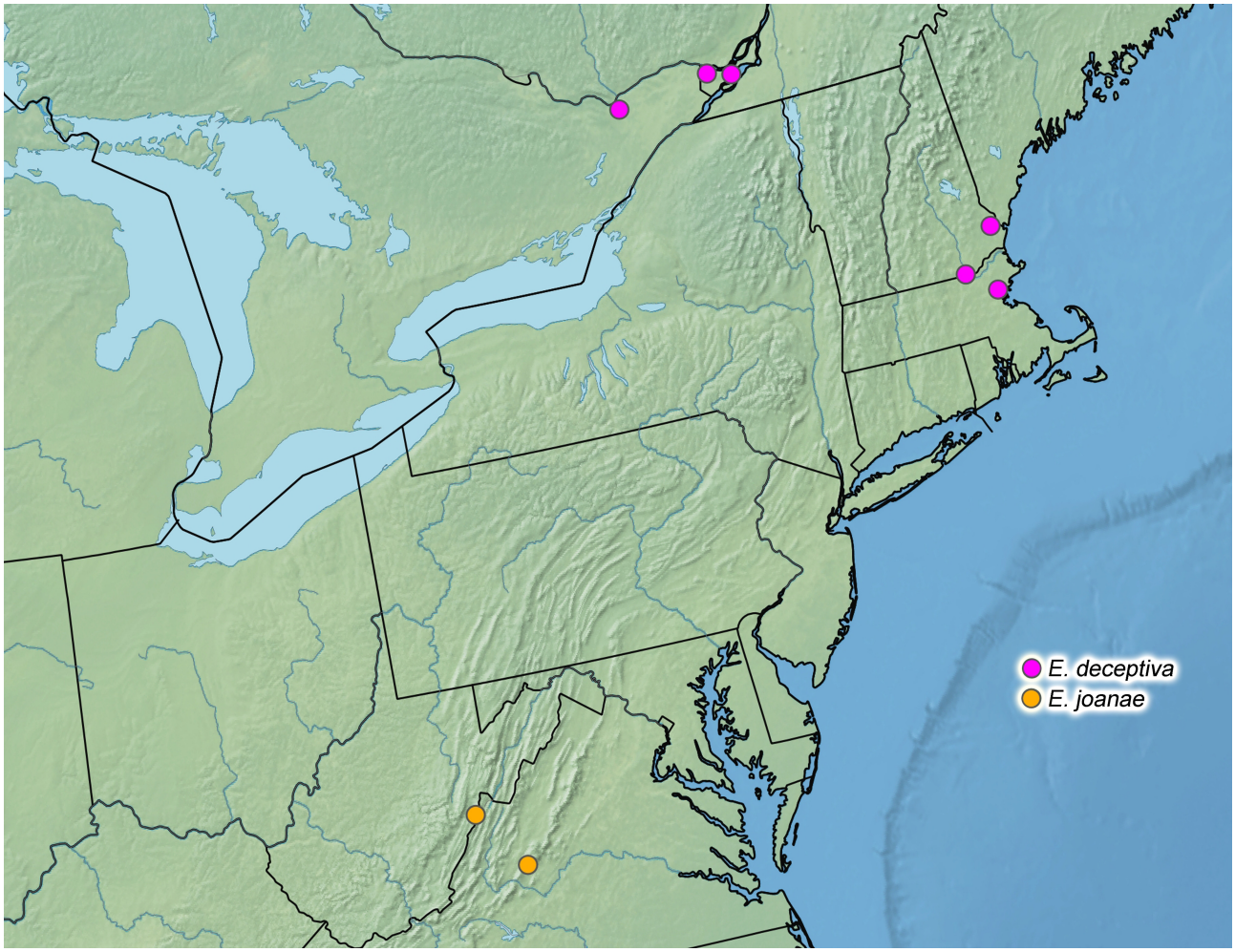


FIGURE 370. Known geographical distribution of *E.* (*Enoplempis*) *deceptiva* **sp. nov.** and *E.* (*En.*) *joanae* **sp. nov.**

Remarks. Following the publication of the revision of eastern North American *E.* (*Enoplempis*) by Sinclair *et al*. (2013), a male specimen, collected in the "Delmarva" states (see Murphy *et al*. 2018) Malaise trap survey, was identified as a new species on the basis of the male terminalia. This led to the re-examination of specimens of *E.* (*En.*) *snoddyi* from this area. As a result, the two male specimens from Virginia listed above, were mistakenly listed under *E.* (*En.*) *snoddyi* in Sinclair *et al*. (2013).

Appendix 2: List of *Empis* (*Enoplempis* Bigot) species and species groups

The following is a list of the 96 known species (95 described, one unnamed) of *Empis* (*Enoplempis* Bigot) arranged by species group, and their distribution (eastern, western, transcontinental) in North America. Eastern species (including the transcontinental *E.* (*Enoplempis*) *nodipoplitea* Steyskal) and members of the *Empis* (*Enoplempis*) *mira* species group are fully treated in Sinclair *et al*. (2013) and Sinclair *et al*. (2021), respectively.

***Empis* (*Enoplempis*) *arrecta* species group**

Empis (*Enoplempis*) *arrecta* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *diokra* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *occidentalis* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *shoshona* Sinclair, Brooks & Cumming **sp. nov.** (western)

***Empis* (*Enoplempis*) *amytis* species group**

Empis (*Enoplempis*) *amytis* Walker (eastern)
Empis (*Enoplempis*) *appalachicola* Sinclair (eastern)
Empis (*Enoplempis*) *gulosa* Coquillett (eastern)
Empis (*Enoplempis*) *nuda* Loew (eastern)
Empis (*Enoplempis*) *penicillata* Brooks (eastern)
Empis (*Enoplempis*) *stenoptera* Loew (eastern)

***Empis* (*Enoplempis*) *bigoti* species group**

Empis (*Enoplempis*) *aerobatica* Melander (western)
Empis (*Enoplempis*) *bigoti* Melander (western)
Empis (*Enoplempis*) *collinsi* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *montgomeryi* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *multifaria* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *paraerobatica* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *podagra* Melander (western)

***Empis* (*Enoplempis*) *canaster* species group**

Empis (*Enoplempis*) *arizonensis* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *canaster* Melander (western)
Empis (*Enoplempis*) *chillcotti* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *contrasta* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *falcata* Melander (western)
Empis (*Enoplempis*) *fitzgeraldi* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *montywoodi* Brooks (eastern)
Empis (*Enoplempis*) *safra* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *sagehenensis* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *spokanensis* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *subcanaster* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) sp. A (western)

***Empis* (*Enoplempis*) *clava* species group**

Empis (*Enoplempis*) *clava* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *mariposa* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *tularensis* Sinclair, Brooks & Cumming **sp. nov.** (western)

***Empis* (*Enoplempis*) *delumbis* species group**

Empis (*Enoplempis*) *delumbis* Melander (western)
Empis (*Enoplempis*) *floricola* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *sphaera* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *spiculata* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *tripenicillata* Sinclair, Brooks & Cumming **sp. nov.** (western)

***Empis* (*Enoplempis*) *geneatis* species group**

Empis (*Enoplempis*) *fisheri* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *geneatis* (Melander) (western)
Empis (*Enoplempis*) *oharai* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *subgeneatis* Sinclair, Brooks & Cumming **sp. nov.** (western)

***Empis* (*Enoplempis*) *loripedis* species group**

Empis (*Enoplempis*) *arthritica* Melander (eastern)
Empis (*Enoplempis*) *gladiator* Melander (eastern)
Empis (*Enoplempis*) *loripedis* Coquillett (eastern)
Empis (*Enoplempis*) *volsella* Sinclair (eastern)

***Empis* (*Enoplempis*) *manca* species group**

Empis (*Enoplempis*) *bova* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *manca* Coquillett (western)
Empis (*Enoplempis*) *submanca* Sinclair, Brooks & Cumming **sp. nov.** (western)

Empis (*Enoplempis*) *wilderae* Sinclair, Brooks & Cumming **sp. nov.** (western)

***Empis* (*Enoplempis*) *mira* species group**

Empis (*Enoplempis*) *macdonaldi* Sinclair, Brooks & Cumming (western)
Empis (*Enoplempis*) *mira* (Bigot) (western)
Empis (*Enoplempis*) *submira* Sinclair, Brooks & Cumming (western)
Empis (*Enoplempis*) *williamturneri* Sinclair, Brooks & Cumming (western)
Empis (*Enoplempis*) *winkleri* Sinclair, Brooks & Cumming (western)

***Empis* (*Enoplempis*) *nodipoplitea* species group**

Empis (*Enoplempis*) *ctenocnema* Melander (eastern)
Empis (*Enoplempis*) *nodipoplitea* Steyskal (transcontinental)
Empis (*Enoplempis*) *pectinata* Sinclair (eastern)

***Empis* (*Enoplempis*) *snoddyi* group**

Empis (*Enoplempis*) *joanae* Sinclair, Brooks & Cumming **sp. nov.** (eastern)
Empis (*Enoplempis*) *snoddyi* Steyskal (eastern)
Empis (*Enoplempis*) *vockerothi* Cumming (eastern)

***Empis* (*Enoplempis*) *teres* species group**

Empis (*Enoplempis*) *scotti* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *scutica* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *teres* Melander (western)
Empis (*Enoplempis*) *undulasetosa* Sinclair, Brooks & Cumming **sp. nov.** (western)

***Empis* (*Enoplempis*) *tridentata* species group**

Empis (*Enoplempis*) *deceptiva* Sinclair, Brooks & Cumming **sp. nov.** (eastern)
Empis (*Enoplempis*) *tridentata* Coquillett (eastern)

***Empis* (*Enoplempis*) *turgida* species group**

Empis (*Enoplempis*) *turgida* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *woodleyi* Sinclair, Brooks & Cumming **sp. nov.** (western)

***Empis* (*Enoplempis*) *valentis* species group**

Empis (*Enoplempis*) *aeripes* Melander (western)
Empis (*Enoplempis*) *disconvenita* Melander **stat. rev.** (western)
Empis (*Enoplempis*) *dolabraria* Melander (western)
Empis (*Enoplempis*) *flavobulla* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *fresno* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *mixopolia* Melander (western)
Empis (*Enoplempis*) *paraeripes* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *subaeripes* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *valentis* Coquillett (western)

Unplaced species

Empis (*Enoplempis*) *aphela* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *blodgettensis* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *californica* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *cerina* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *culcitella* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *delnortensis* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *dubitata* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *enodis* Melander (eastern)
Empis (*Enoplempis*) *genista* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *holoptica* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *manning* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *missoula* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *oregonensis* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *poplitea* Loew (western)
Empis (*Enoplempis*) *prodigiosa* Cumming (eastern)

Empis (*Enoplempis*) *richardvockerothi* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *sierraensis* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *susanae* Sinclair, Brooks & Cumming **sp. nov.** (western)
Empis (*Enoplempis*) *yakimensis* Sinclair, Brooks & Cumming **sp. nov.** (western)

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