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Annotated Checklist of the Diplura (Hexapoda: Entognatha) of California

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Abstract

The first checklist of California dipluran taxa is presented with annotations. New state and county records are reported, as well as new taxa in the process of being described. California has a remarkable dipluran fauna with about 8% of global richness. California hosts 63 species in 5 families, with 51 of those species endemic to the State, and half of these endemics limited to single locales. The genera *Nanojapyx*, *Hecajapyx*, and *Holjapyx* are all primarily restricted to California. Two species are understood to be exotic, and six dubious taxa are removed from the State checklist. Counties in the central Coastal Ranges have the highest diversity of diplurans; this may indicate sampling bias. Caves and mines harbor unique and endemic dipluran species, and subterranean habitats should be better inventoried. Only four California taxa exhibit obvious troglomorphy and may be true cave obligates. In general, the North American dipluran fauna is still under-inventoried. Since many taxa are morphologically uniform but genetically diverse, genetic analyses should be incorporated into future taxonomic descriptions. Natural Heritage Program conservation status ranks were recommended.

Key words: biodiversity, endogean, subterranean, troglobiont, troglomorphy, two-pronged bristletail

Introduction

We present here the first comprehensive checklist of the California dipluran fauna, building upon previous regional checklists by Hilton (1932), Condé & Thomas (1957), Bareth & Condé (1958), and Allen (1994, 2002). Diplurans, commonly known as two-pronged bristletails, are one of the most ancient groups of hexapods but their diversity is poorly documented. Globally, at least 800 species in 8 families are recognized, with many more taxa remaining to be described (Allen 2002). Diplurans have small segmented, pale bodies (most being a few millimeters in length), lack eyes and wings, and have two beaded antennae and two sensory tails (cerci). Due to their small size, cryptic habits, the loss of these appendages during collection, and the difficulty in identification (due to morphological homogeneity), diplurans are not well studied (Lock *et al.* 2010).

Methods

To build the checklist, we attempted an exhaustive literature review, examined museum collections, and queried various databases. The following data sources were particularly useful: California Academy of Sciences (CAS) Department of Entomology Collection Catalog Database; National Museum of Natural History (NMNH or USNM) Department of Entomology collections database; University of California at Berkeley Essig Museum of Entomology (EMEC); University of California at Davis Bohart Museum of Entomology (BME); and Natural History Museum of Los Angeles County (LACM). Of considerable importance were the unpublished determinations by L. Smith of slide mounted material that was curated by his associate, R. Schuster, former collections manager at BME. All records not directly attributed to others are new records of the authors. We did not refine taxonomic determinations of the material we summarize here, but taxonomic keys of families and subfamilies can be found in: Condé & Thomas (1957); Paclt (1957); Ferguson (1981a, 1990); and Allen (2002). The three superfamilies of diplura can easily be distinguished by the type of caudal cerci: Campodeoidea possess

elongate, segmented, and filiform cerci; Projapygoidea possess shorter segmented cerci with glandular canals; and Japygoidea possess unsegmented, robust, and usually heavily sclerotized forceps (Allen 2002; Dallai *et al.* 2011).

Results

Suborder Rhabdura Cook, 1896

Superfamily Projapygoidea Pagés, 1959

Family Anajapygidae (Paclt, 1957)

Anajapyx hermosus Smith, 1960

Placer County: 4 miles west of Newcastle, 5 Apr. 1958, paratype female (BME), L. Smith and R. Schuster (Smith 1960c).

Superfamily Campodeoidea Handlirsch, 1903

Family Campodeidae Lubbock, 1873

Subfamily Campodeinae Condé, 1956

The genus *Campodea* Westwood, 1842 has a “worldwide distribution and comprises about 150 soil-dwelling, omnivorous species, sized up to 5 mm and highly uniform in appearance” (Podsiadlowski *et al.* 2006, p. 50).

Campodea californiensis Hilton, 1932

Alameda County: Berkeley, Charles Lee Tilden Regional Park, 50–100 meters east of intersection of Shasta Road (Rd.) and Hill Rd., 1 male, 28 Feb. 1955, P. Remy; Berkeley, canyon near Memorial Stadium, 1 female, 20 Feb. 1955, P. Remy; Oakland, middle and upper region of Strawberry Creek, 1 female, 18 Feb. 1955, P. Remy; Oakland, Strawberry Canyon, between the stream and the road, to the level of Jardin Botanique, 1 female, 19 Feb. 1955, P. Remy; Oakland, under wood, 350 meters downstream of Saint Theresa Catholic Church, left shore of the stream, 18 Mar. 1955, 1 female, P. Remy; Oakland, 130 meters south of Saint Theresa Catholic Church, 2 males, 1 female, 6 Mar. 1955, P. Remy; Oakland, 4400 Gilbert Street (St.), garden in fallow land, 1 male, 6 Mar. 1955, P. Remy; Redwood Park, 28 May 1954, 1 male, 1 female, E. Gilbert (Condé & Thomas 1957). **Contra Costa County:** Acalanes Valley, fallow land garden 30 meters uphill of 847 Acalanes Rd., 16 Mar. 1955, 1 male, P. Remy (Condé & Thomas 1957). **Fresno County:** Non-specific records reported by Allen (2002). **Humboldt County:** Redwood, south of Eureka (Allen 1994). **Inyo County:** Non-specific records reported by Allen (2002). **Los Angeles County:** Los Angeles, hill to the right of the entrance to the tunnel on the road to Pasadena, near Yale St., 15 Feb. 1955, 2 larvae, P. Remy; Elysean Park, 1 female, 15 Feb. 1955, P. Remy (Condé & Thomas 1957). **Marin County:** Muir Woods (Silvestri 1933; Allen 1994); “Region d’Inverness, forest near the coast of Tomales Bay, 2 males, 1 female, 8 Mar. 1955, A. Hill, J. MacSwain, P. Remy, P. Wygodzinsky; Tocaloma, forest near the bridge, 2 males, 1 female, 8 Mar. 1955, J. MacSwain and P. Remy; S. P. Taylor State Park, north entrance of the park, 1 female, 24 Oct. 1953, V. Roth; 4 miles south of Woodacre, 6 females, 1 Nov. 1953, E. Gilbert, V. Roth, and R. Schuster (Condé & Thomas 1957). **Mendocino County:** Caspar, 1 male, 4 females, 1 larva, 3 Mar. 1954, J. Helfer; Hartsook Grove, 1 male, 3 females, 19 Apr. 1953, E. Gilbert and R. Schuster; Franklin Lane Park, 1 larva, 10 Oct. 1953, J. MacSwain (Condé & Thomas 1957). **Monterey County:** Monterey, forest on the right of the road to Salinas, 200 meters of intersection of Fremont St., 1 larva, 25 Mar. 1955, P. Remy; Carmel, 1 male, 21 Dec. 1953, V. Roth (Condé & Thomas 1957). **Riverside County:** “Idyllwild, under needles,” 1 female, 1 Aug. 1947, R. Elliott (Bareth & Condé 1958). **San Benito County:** Pinnacles National Monument, near Headquarters and cabins, 1 male and 2 larvae, 24

Mar. 1955, P. Remy (Condé & Thomas 1957). **San Francisco County:** San Francisco (Allen 1994). **San Mateo County:** Palo Alto and Saratoga (Silvestri 1933); near Moss Beach, small garden, 2 males, 2 females, 2 larvae, 5 Mar. 1955, E. Gilbert and P. Remy; 4 miles west of San Mateo, on the side of Highway 5, 1 male, 1 female, 2 larvae, 18 Apr. 1954, E. Gilbert and R. Schuster; between Crystal Springs Reservoirs and La Honda, 1 male, 2 larvae, 4 Mar. 1955, E. Gilbert and P. Remy; Pescadero, Memorial State Park, 7 males, 5 females, 8 larvae, 18 Apr. 1954, E. Gilbert and R. Schuster (Condé & Thomas 1957). **Santa Cruz County:** Boulder Creek, female, 1 larva, 23 Dec. 1953, V. Roth. **Sonoma County:** Armstrong Peak, 3 females, 14 November 1954, J. Helfer (Condé & Thomas 1957). **Tulare County:** “Soda Creek, near Camp Nelson, 3500 ft approx., under limestone rocks beside creek”, 3 males, 3 females, 1 larvae, 9 Aug. 1947, C. Remington (Bareth & Condé 1958). **Tuolumne County:** Strawberry, 1 female, 23 June 1953, J. Rozen (Condé & Thomas 1957).

The subspecies *C. c. nordica* Silvestri, 1933 is known only from Corvallis, Oregon (Silvestri 1933; Allen 2002).

***Campodea (Hypercampa) essigi* Silvestri, 1933**

Marin County: Muir Woods, in humus, and Saratoga, Mill Valley (Silvestri 1933). **San Mateo County:** San Mateo (Allen 1994).

***Campodea insidiator* Bareth & Condé, 1958**

Humboldt County: “1/2 mile S of Founder’s Tree, near Dyerville, in soil, under logs, and around Sequoia tree bases”, 4 males, 9 females, 1 undeterm., 18 Aug. 1947, C. and J. Remington (Bareth & Condé 1958); “in redwoods south of Eureka” (type in the Pomona College Collection) (Hilton 1932).

Bareth & Condé (1958) also reassigned these Humboldt County specimens formerly identified as *C. californiensis*: Freshwater, 1 male, 10 Oct. 1953, G. Marsh and R. Schuster; 1 mile south of Dyerville, 2 larvae, 19 Oct. 1953, E. Gilbert and R. Schuster; 19.3 miles east of Green Point Ranch, 1 female, 11 Aug. 1954, E. Gilbert and R. Schuster. Records that Silvestri assigned to *C. californiensis* from the San Francisco region are probably this taxon (Bareth & Condé 1958).

***Campodea kelloggi* Silvestri, 1912 (endogean)**

Alameda County: Oakland, 4400 Gilbert St., residential garden, 1 male, 1 female, 6 Mar. 1955, P. Remy (Condé & Thomas 1957). **Los Angeles County:** Mount Lowe (Silvestri 1912a); Santa Catalina Island (Hilton 1932); “in and near Claremont”; “from the South Hills” (Hilton 1932); “from nearly every canyon north of Claremont, including....San Antonio, Palmer’s, Live Oak and San Dimas, as well as in the South Hills” (Gardner 1914); San Dimas Canyon and a residential garden in San Dimas on Saint George Dr.; Claremont (Condé & Thomas 1957); Pomona, just west of San Jose Hills (Condé & Thomas 1957). **Monterey County:** Pacific Grove (Silvestri 1912a; Bareth & Condé 1958); Crest Drive, Pebble Beach, in pine duff, 20 Sep. 1959, 2 specimens, L. Smith (BME). **Riverside County:** near Lake Elsinore and near Corona (Hilton 1932; Allen 1994). **San Bernardino County:** Camp Baldy, at edge of Cucamonga Wilderness under large stone in creek bed in campground, 1 female, 3 larvae, 2 Aug. 1947, C. Remington (Bareth & Condé 1958); Cucamonga Canyon (Gardner 1914). **San Diego County:** “...Temecula grade, in San Diego County” (Hilton 1932); Borrego Springs, Hellhole Canyon, 25 Mar. 1959, L. Smith (BME). **San Francisco County:** San Francisco (Silvestri 1912a). **San Mateo County:** Farm near Moss Beach (Condé & Thomas 1957). **Santa Barbara County:** Santa Cruz Island (Hilton 1932).

Common in southern California (Gardner 1914; Bareth & Condé 1958); Hilton (1937) reports it to be common in Baja California; also Arizona (Condé & Thomas 1957).

Campodea lamimani Silvestri, 1933

Alameda County: Berkeley: on top of hill near addresses 35 and 55 Tamalpais Rd., 1 male, 1 female, 3 Mar. 1955, P. Remy; lower region of Woolsey Canyon, 2 males, 1 female, 17 and 18 Feb. 1955, P. Remy (Condé & Thomas 1957). Collections in Oakland by P. Remy in 1955 (Condé & Thomas 1957): middle and upper region of Strawberry Canyon, 1 female, 1 larva; Lake Temescal, 6 males, 5 females, 1 larva; under wood, downhill 350 meters of Saint Theresa Catholic Church, 4 males, 4 females; 130 meters south of Saint Theresa Catholic Church, 1 male, 2 females; Dimond Canyon Park, 100 meters uphill of Leimert Bridge, 2 males, 1 female; gardens at 2995 and 3003 Mountain Rd., at the intersection of Burdeck Drive (Dr.), 1 male; canyon slightly downhill at intersection of Butters Dr., under wood, 1 female; pine and eucalyptus wood near Food Hill Blvd. and Durant Ave., 1 female. Oakland, Redwood Regional Park, 28 May 1953, 3 larvae, E. Gilbert (Condé & Thomas 1957). **Butte County:** 3.7 miles N of Gridley, Rocklin clay, 1 male, 1 female, 24 Apr. 1959, F. Raney (BME). **Contra Costa County:** El Cerrito, garden near the intersection of Navellier St. and Scott St., 1 larva, 27 Mar. 1955, P. Remy; Acalanes Valley, in fallow garden 30 meters uphill of 847 Acalanes Rd., 2 females, 16 Mar. 1955, P. Remy; Lafayette canyon, entrance of Old Jonas Hill Rd. and Madrove Dr., 1 male, 11 Mar. 1955, P. Remy (Condé & Thomas 1957). **Fresno County:** Pinehurst, under litter, J. Lamiman (Silvestri 1933). **Marin County:** Inverness, forest at the coast of Tomales Bay, 4 males, 7 females, 1 larva, 8 Mar. 1955, A. Hill, J. MacSwain, P. Remy, and P. Wygodzinsky; Tocaloma, forest near the bridge, 1 female, 3 Mar. 1955, J. MacSwain and P. Remy; S. P. Taylor State Park, north entrance of park, 11 males, 11 females, 2 larvae, 24 Oct. 1953, V. Roth, and at South entrance, 1 male, 1 larva, 8 Mar. 1953, E. Gilbert, V. Roth, and R. Schuster; 4 miles south of Woodacre, 3 males, 6 females, 1 larva, 1 November 1953, E. Gilbert, V. Roth, and R. Schuster (Condé & Thomas 1957). **Monterey County:** Carmel, 25 males, 38 females, 2 larvae, 21 Dec. 1953, V. Roth (Condé & Thomas 1957). **Napa County:** Oakville, 2 males, 3 females, 14 Mar. 1954, J. Helfer; 7 miles west of Oakville, 4 males, 4 females, 15 Feb. 1954, V. Roth and R. Schuster (Condé & Thomas 1957); Napa, abandoned prune orchard, 14 Jan. 1959, numerous specimens, J. Skelsey (BME). **Placer County:** 4 miles W. of Newcastle, oak duff, 10 Mar. 1959, Smith & Schuster (BME). **San Mateo County:** 4 miles west of San Mateo, on the side of Highway 5, 3 males, 9 females, 46 larvae, 18 Apr. 1954, E. Gilbert and R. Schuster; entrance San Gregorio and Moss Beach, 1 female, 2 larvae, 4 Mar. 1955, E. Gilbert and P. Remy; Pescadero, Memorial State Park, 6 males, 5 females, 4 larvae, 18 Apr. 1954, E. Gilbert and R. Schuster (Condé & Thomas 1957); Palo Alto (Allen 1994); southeast of Half Moon Bay, Pescadero Creek, redwoods, 26 Apr. 1959, 2 specimens, R. Schuster (BME); Palo Alto, in black adobe soil, 2 males, 4 females, J. Gustafson (Bareth & Condé 1958). **Santa Cruz County:** Boulder Creek, 13 males, 20 females, 3 larvae, 23 Dec. 1953, V. Roth (Condé & Thomas 1957). **Sonoma County:** Armstrong Peak, 3 females, 14 Feb. 1954, J. Helfer (Condé & Thomas 1957).

Campodea linsleyi Condé & Thomas, 1957

Alameda County: Berkeley; Woolsey Canyon; Redwood Park (Allen 1994). **Contra Costa County:** El Cerrito; Acalanes Valley; Lafayette (Allen 1994). **Marin County:** Woodacre; Inverness; Tocaloma (Allen 1994). **San Benito County:** 14 miles north of Pinnacles National Monument, river right of San Benito creek, near the road, J. MacSwain and P. Remy, 1 female, 24 Mar. 1955 (Condé & Thomas 1957). Pinnacles National Monument, near headquarters and cabins, 1 female, 24 Mar. 1955, P. Remy (Condé & Thomas 1957). **San Mateo County:** San Gregorio and Moss Beach; Pescadero, Memorial State Park (Allen 1994). **Sonoma County:** Armstrong Peak; Oakland (Allen 1994).

Campodea michelbacheri Condé & Thomas, 1957

Alameda County: Berkeley, small private park at the intersection of Alameda Avenue and Capistrano Dr., in the front of 716 and 723 Alameda Ave., 22 Feb. 1955, 1 male, P. Remy (Condé & Thomas 1957). **Contra Costa County:** Lafayette, near Moraga Rd., around the Tofflemire Experimental Research Laboratory and in woods nearby, 1 female, 11 Feb. 1955, P. Remy (Condé & Thomas 1957). **Napa County:** 4 miles S. of Monticello, 6 Jan.

1957, B. Schuster (BME). **San Mateo County:** southeast of Half Moon Bay, Pescadero Creek, redwoods, 26 Apr. 1959, 1 specimen, R. Schuster (BME).

***Campodea monticola* Condé & Thomas, 1957**

Tuolumne County: 14 miles east of Strawberry, under Jeffrey pines, 18 July 1955, G. Marsh (Condé & Thomas 1957).

***C. m. helenae* Bareth & Condé, 1958**

Napa County: Mount Saint Helena near Lake County: line, loose serpentine soil underneath *Ceanothus*, 1 female, 27 Apr. 1949, C. Wood (Bareth & Condé 1958).

***C. m. obsoleta* Condé & Thomas, 1957**

Mono County: 1 mile north of Leavitt Lodge after Sonora Pass, 17 June 1954, 3 females, C. MacNeill (Condé & Thomas 1957).

***C. m. pilosa* Condé & Thomas, 1957**

Tuolumne County: 14 miles east of Strawberry, under Jeffrey pines, 18 July 1955, G. Marsh (Condé & Thomas 1957).

***Campodea montis* Gardner, 1914**

Los Angeles County: “in the hills south of Pomona”, “northeast of Claremont” (Gardner 1914; Hilton 1932; Bareth & Condé 1958). **Orange County:** “near Laguna Beach” (Hilton 1932). **Riverside County:** Mount San Jacinto, Pine Cove, under bark, 5 females, 1 undeterm., 2 June 1939, E. Ross (Condé & Thomas 1957); Strawberry Creek, 1 mile below Idyllwild, under bark of moist stump, 1 female, 1 Oct. 1947, C. Remington; Idyllwild, Saunders Meadow, in moist log, 5 males, 6 females, 1 larva, 31 July 1947, C. Remington (Bareth & Condé 1958); “back of Lake Elsinore” (Hilton 1932). **San Bernardino County:** Cucamonga canyon (Gardner 1914; Hilton 1932). **County unknown:** “Big Pines resort at about 7000 feet”, Tehapi [sic] (Hilton 1932) but “Tekapi, Big Pines” in Bareth & Condé (1958).

Common in southern California (Hilton 1936); also reported from Arizona (Bareth & Condé 1958).

***Campodea repentina* Condé & Thomas, 1957**

San Benito County: Pinnacles National Monument, near headquarters and cabins, 1 female, 24 Mar. 1955, P. Remy (Condé & Thomas 1957).

***Campodea scopigera* Condé & Thomas, 1957**

Monterey County: 4 miles north of Carmel, near the coastal road, 2 females, 25 Mar. 1955, P. Remy (Condé & Thomas, 1957).

Campodea teresiae Condé & Thomas, 1957

Alameda County: Oakland, 130 m south of Saint Theresa Catholic Church, 6 Mar. 1955, 4 males and 4 females, P. Remy (Condé & Thomas 1957). **Kern County:** 2 miles W of Isabella Reservoir, 31 Mar. 1959, F. Raney (BME).

Campodea usingeri Condé & Thomas, 1957

Del Norte County: Gasquet, 3 females, 1 June 1950, K. Christiansen (Bareth & Condé 1958). **Humboldt County:** 19.3 miles east of Green Point Ranch, 1 female, reported as *C. californiensis* by Condé & Thomas (1957). **Mendocino County:** Ryan Creek, 8 males, 6 females, 5 Mar. 1955, R. Graig (Condé & Thomas 1957). **Napa County:** Mount Saint Helena, 3 males, 2 females, reported as *C. californiensis* by Condé & Thomas (1957) (Bareth & Condé 1958); Mount Saint Helena, under former toll road and Highway 29, 5 males, 6 females, 31 Dec. 1953, G. Marsh, V. Roth, and R. Schuster; Oakville, 3 females, 14 Mar. 1954, J. Helfer; 7 miles west of Oakville, 1 male, 2 females, 15 Feb. 1954, V. Roth and R. Schuster (Condé & Thomas 1957). **Sonoma County:** Armstrong Peak, 12 males, 16 females, 1 larva, 14 Feb. 1954, J. Helfer (Condé & Thomas 1957).

Campodea sp.

Los Angeles County: San Clemente Island, under rocks, 10 specimens, C. Henne on 15 Feb. 1941 (LACM); El Segundo, Sand Dune Meadow, under board, 2 Apr. 1949, 10 specimens, W. Pierce (LACM); Topia Park, 17 Dec. 1960, J. Xaiz (LACM). **Kern County:** 14 miles west of Tehachapi, 31 Mar. 1959, F. Raney (BME). **San Bernardino County:** Upper Santa Anna River wash, under rocks, 1927–1928 (Ingles 1929).

Haplocampa Silvestri, 1912

Haplocampa is the dominant taxon in volcanic caves of western North America, and 26 species are known from caves, primarily in the Pacific Northwest (Ferguson 2009). The majority of *Haplocampa* appear to be cryophiles as they are often found at high elevations and in caves with ice, and are sympatric with cryobionts such as ice crawlers (Grylloblattodea: Grylloblattidae: *Grylloblatta*) (Ferguson 1983; Schoville and Graening 2013).

Haplocampa wheeleri Silvestri, 1912

Siskiyou County: Shasta Springs, in wet soil around springs, 1 female, 21 Aug. 1947, C. and E. Remington (Silvestri 1912a; Bareth & Condé 1958).

Silvestri erected a new subspecies—*H. w. intermedia* Silvestri, 1933—for specimens in Portland, Oregon.

Haplocampa “Roth’s Cave Dipluran”

Siskiyou County: Lava Beds National Monument, Indian Wells Ice Cave, extreme twilight zone, female type, female paratype, 1 paratype male, 8 Jul. 1959, J. Helfer (BME).

BME records indicate that L. Smith was describing two species from the Lava Beds National Monument cave region: *Haplocampa* “Helfer’s Cave Dipluran” and *Haplocampa* “Roth’s Cave Dipluran.” Helfer’s Cave Dipluran appeared to be more widespread, and may be the same taxon that Ferguson (1992) reported to be common and endemic to the Lava Beds National Monument area: *Haplocampa* “Lava Beds N.M.”

***Haplocampa* “Helfer’s Cave Dipluran”**

Following are determinations by L. Smith from slide-mounted material from BME:

Lassen County: Eagle Lake Ice Cave, 21 miles northwest of Susanville, 5 Sep. 1959, V. Roth. **Siskiyou County:** Lava Beds National Monument: Merrill Ice Cave, 1 Sep. 1959, 2 female paratypes, etc., V. Roth; Indian Wells Ice Cave, extreme twilight zone, various types and paratypes, etc., 8 July 1959, J. Helfer; 3 paratype females, 2 juveniles, 1 Sep. 1959, V. Roth.

***Haplocampa* “Lava Beds N.M.”**

Modoc County: Lava Beds National Monument: Fern Cave, Dec. 1989, R. Crawford (Ferguson 1992). **Siskiyou County:** Lava Beds National Monument: Angleworm/Lost Pinnacle Cave, 1989, R. Crawford (Ferguson 1992); Boulevard Cave, 2005 (Taylor and Krejca 2006); Bowling Alley Cave, 2010, Graening *et al.*; Caldwell Ice Caves, 1980, D.P. Chivers and D.D. Chivers (CAS); Catacombs Cave, 1989, R. Crawford (Ferguson 1992); Catacombs Cave, 1989, R. Crawford (Crawford 1998); Coda Cave, 2005 (Taylor and Krejca 2006); Coral Reef Cave, 2005 (Taylor and Krejca 2006); Cox Ice Cave, 1989, R. Crawford, 1989 (Crawford 1998); Cox Ice Cave, 2005 (Taylor and Krejca 2006); Craig Ice Cave, 2005 (Taylor and Krejca 2006); Crazy Cave, 2005 (Taylor and Krejca 2006); Crystal Ice Cave, 2005 (Taylor and Krejca 2006); Deep Cavern Cave, 2005, S. Dunn (Taylor and Krejca 2006); Glacier Cavern, 2010, G.O. Graening and B. Broeckel; Lazaroff’s Hole, 2005 (Taylor and Krejca 2006); Lyon’s Road Cave, 2005 (Taylor and Krejca 2006); Maze Cave, 2005 (Taylor and Krejca 2006); Merrill Ice Cave, 1982, L. Ferguson, and 1989, R. Crawford (Ferguson 1992), and 2005 (Taylor and Krejca 2006); Mushpot Cave, 1989, R. Crawford (Crawford 1998); Nirvana Cave, 2005 (Taylor and Krejca 2006); Pearl Cave, 2005 (Taylor and Krejca 2006); Rollercoaster Cave, 2005 (Taylor and Krejca 2006); Tichnor Cave/Bertha’s Cupboard Cave, 2010, G.O. Graening *et al.*; Upper Heppe Cave, 2005 (Taylor and Krejca 2006); Valentine Cave, 1989, R. Crawford (Crawford 1998); Valentine Cave, 2005 (Taylor and Krejca 2006).

***Haplocampa* sp. “B”**

Plumas County: Sunnyside Mine (Ferguson 1975, 1981b, 1992).

***Meiocampa hermsi* (Silvestri, 1933)**

Los Angeles County: Mount Lowe, as *Parallocampa (Meiocampa) hermsi* (Silvestri 1933). **Riverside County:** Mount San Jacinto, *Artemisia* litter, 20 Apr. 1958, J. Helfer (BME).

***Meiocampa mickeli* (Silvestri, 1933)**

Contra Costa County: Marsh Creek, under stone, 1 male, 21 November 1937, E. Ross, as *Parallocampa mickeli* (Bareth & Condé 1958). **San Mateo County:** Palo Alto, in black adobe soil, 1 young female, 14 July 1947, C. Remington, as *Parallocampa mickeli* (Bareth & Condé 1958). **Santa Clara County:** Saratoga, 2 females, as *Parallocampa (Meiocampa) mickeli* (Silvestri 1933; Bareth & Condé 1958).

***Meiocampa wilsoni* (Silvestri, 1912)**

Los Angeles County: Mount Lowe, as *Eutrychocampa wilsoni* (Silvestri 1912a); Claremont, Pomona, San Dimas Canyon, and South Hills as *E. wilsoni* (Gardner 1914; Hilton 1932). **San Bernardino County:** Cucamonga Canyon (Gardner 1914; Hilton 1932).

Known from central California and also Arizona (Silvestri 1911a; Bareth & Condé 1958; Allen 2002). Although Bareth & Condé (1958) assigned *wilsoni* to *Parallocampa*, Allen (1994) assigned it to *Meiocampa*.

***Metriocampa packardi* Silvestri, 1912**

Alameda County: Oakland, John Garber Park, on Fish Ranch Rd., 1 male, 3 females, 5 Mar. 1955, P. Remy (Condé & Thomas 1957); Oakland, near Strawberry canyon, and at Dimond Canyon Park and at Redwood Park as *M. allura* (Condé & Thomas 1957). **Contra Costa County:** Acalanes Valley, garden in fallow land 30 meters uphill of 847 Acalanes Rd., 1 larvae, 16 Mar. 1955, P. Remy (Condé & Thomas 1957); El Cerrito, garden near intersection of Navellier St. and Scott St., and Lafayette, canyon at Old Jonas Hill Rd. and Madrove Dr., and Lafayette, near Moraga Rd., around the Tofflemire Experimental Research Laboratory and in woods nearby, 11 Mar. 1955, P. Remy, and at Lafayette, near the intersection of Mount View Dr. and Mariposa Rd., and woods near Moraga Rd., as *M. allura* (Condé & Thomas 1957). **Del Norte County:** Gasquet, 3 males, 3 females, 28 larvae, 1 June 1950, K. Christiansen (Bareth & Condé 1958); 2 miles north of Fort Dick, 73 males, 120 females, 3 larvae, 21 Sep. 1953, V. Roth; 18 miles south of Klamath, 10 females, 6 larvae, 19 Sep. 1953, E. Gilbert and R. Schuster, as *M. allura* (Condé & Thomas 1957). **Humboldt County:** 1/2 mi. S of Founder's Tree, near Dyerville, in soil, under logs and around Sequoia tree bases, 1 male, 1 female, 18 Aug. 1957, C. L. and J. E. Remington (Bareth & Condé 1958). 14 miles east of Blue Lake, 4 males, 12 females, 2 larvae, 19 April 1953; Freshwater, 2 males, 9 females, 1 larva, 13 Aug. and 10 Oct. 1953, G. Marsh and R. Schuster; 1.5 miles of Dyerville, 2 males, 3 females, 1 larva, 13 Aug. 1953, G. Marsh and R. Schuster; 1 mile south of Dyerville, 22 males, 38 females, 3 larvae, 19 Sep. 1953, E. Gilbert and R. Schuster; 19.3 miles east of Green Point Ranch, 2 males, 14 females, 6 larvae, 11 Aug. 1954, E. Gilbert and R. Schuster (Condé & Thomas 1957). **Lassen County:** 10 miles north of Manton, 26 males, 35 females, 23 larvae, 18 June 1954 (Condé & Thomas 1957). **Marin County:** Inverness, 1 female, 8 November 1953, L. G. Marsh and R. Schuster (Condé & Thomas 1957). Tocaloma, forest near bridge, as *M. allura* (Condé & Thomas 1957). **Mariposa County:** Ostrander Lake, as *M. allura* (Condé & Thomas 1957). **Mendocino County:** Caspar, 36 males, 16 females, 10 larvae, 7 Mar. 1954, J. Helfer; Mendocino, 19 males, 18 females, 16 Nov. 1953, J. Helfer; Hartsook Grove, 21 males, 60 females, 7 larvae, 19 Nov. 1953, E. Gilbert and R. Schuster; Ryan Creek, 14 males, 22 females, 8 larvae, 5 Mar. 1955, R. Craig; Franklin Lane Park, 17 males, 27 females, 4 larvae, 10 Oct. 1953, J. MacSwain (Condé & Thomas 1957); Pygmy Forest, Mendocino Forest, as *M. allura* (Condé & Thomas 1957). **Napa County:** Oakville, 14 Mar. 1954, 8 males, 5 females, 4 larvae, J. Helfer; 7 miles west of Oakville, 15 Feb. 1954, 11 males, 13 females, V. Roth and R. Schuster (Condé & Thomas 1957); Mount Saint Helena, old toll road at Highway 29, as *M. allura* (Condé & Thomas 1957); 7 miles east of Rutherford, 6 Jan. 1957, several specimens, R. Schuster (BME). **Placer County:** Soda Springs Resort, 19 May 1959, F. Raney, as *M. allura* (L. Smith, unpub. data, BME). **San Mateo County:** near Moss Beach, private garden, 1 male, 4 Mar. 1955, E. Gilbert and P. Remy; between Crystal Springs Reservoirs and the Honda, 1 female, 4 Mar. 1955, E. Gilbert and P. Remy (Condé & Thomas 1957); 1 mile south of Sharp Park, as *M. allura* (Condé & Thomas 1957). **Shasta County:** Burney Falls, 18 males, 31 females, 2 larvae, 18 June 1954, R. Schuster (Condé & Thomas 1957); Lassen National Forest, Hat Lake, 22 males, 41 females, 3 larvae, 18 June 1954 (Condé & Thomas 1957). **Siskiyou County:** Shasta Springs, in wet soil around springs, 2 males, 1 female, 21 Aug. 1947, C. L. and J. E. Remington (Bareth & Condé 1958). **Sonoma County:** Armstrong Redwoods State Park, under Sequoia log, 1 female, 17 Oct. 1947, C. Remington, as *Metriocampa packardi allura* Silvestri, 1933 (Silvestri 1933; Bareth & Condé 1958). **Tuolumne County:** 14 miles east of Strawberry, under Jeffrey pines, as *M. allura* (Condé & Thomas 1957).

Metriocampa packardi and *M. p. allura* are also reported from Idaho, Oregon, and Washington (Silvestri 1912a, 1933; Bareth & Condé 1958; Allen 2002).

***Tricampa litura* (Condé & Thomas, 1957)**

Tulare County: Sequoia National Park, General Grant Grove, under stone at edge of tiny marsh, 1 male, 1 female, 10 Aug. 1947, C. Remington (Bareth & Condé 1958). **Tuolumne County:** 14 miles east of Strawberry under Jeffrey pines, as *Metriocampa (Tricampa) litura* Conde & Thomas, 1957 (Bareth & Condé 1958).

Tricampa rileyi (Silvestri, 1933)

Bareth & Condé (1958) reported this species from California as *Metriocampa (Tricampa) rileyi*, but gave no specific locales. It is reported from Colorado, Illinois, Louisiana, Montana, Utah, Washington, Wyoming, and Canada (Alberta and British Columbia) (Silvestri 1933; Bareth & Condé 1958; Condé 1973; Ferguson 1981, 2009; Allen 2002).

Subfamily Lepidocampinae Condé, 1956

Lepidocampa weberi Oudemans, 1890

San Bernardino County: Camp Baldy, edge of Cucamonga Primitive Area, under large stone in creek bed in campground, 1 female, 1 male, 1 undeterm., 2 Aug. 1974, C. Remington (Bareth & Condé 1958).

Bareth & Condé (1958) believe that this record is an accidental introduction from vegetation imported from the Orient. This species has a worldwide distribution: Africa, China, Japan, Madagascar, Malaysia, and New Guinea (Allen 2002).

Subfamily Undetermined

Genus Undetermined

Alameda County: Berkeley, elev. 100 ft, 17 Jan. 1947, H. Chandler; Berkeley, "UL. Camp", 18 Dec. 1946; Berkeley, Strawberry Canyon, elev. 100 ft., 28 Dec. 1946, H. Chandler; Berkeley, 1959, 22 specimens, D. Linsdale and 1956, 9 specimens, B. Adelson (EME); Oakland hills, leaf litter, 17 Jan. 2010 (BME); Oakland, 1953 and 1958, collections by D. Linsdale and W. Bentinck (EME); Redwood Regional Park in Oakland in soil with needles/duff under redwoods and pines, 17 Jan. 2010 (EME). **Amador County:** Mushroom Cave, 23 Dec. 2010, 3 specimens, G.O. and G.J. Graening (this study). **Butte County:** "Nr Stringtown Hill NE of Oroville", "Table Mtn N. of Oroville", "Oroville," and "W. of Feather Falls", 1955–1956, R. Schuster (EME); "E. of Feather Falls", 27 Nov. 1955, several specimens, R. Schuster (BME). **Calaveras County:** Carlito's Cave, 22 Jan. 2011, 1 specimen, G.O. Graening and C. Ward (this study); Calaveras and Dorrington, 16 June 1959, L. Smith and R. Schuster (EME). **Contra Costa County:** South boundary of Mt Diablo St. Park (canyon off road), elev. 1200 ft., 13 Jan 1964, V. Roth and P. Craig (CAS). **Del Norte County:** 18 miles south of Klamath, 19 Sep. 1953, 17 specimens, R. Schuster and E. Gilbert (EME). **El Dorado County:** Blodgett Forest, 13 miles east of Georgetown, 18 June 1967, 5 specimens, A. Neumann (EME). **Fresno County:** Church Cave, 16 Sep. 2011, M. Koczera, J. Hogan, J. and M. Rassmussen (D. Ryan unpub. data); Kaiser Pass, northeast of Huntington Lake, 6 Aug. 1956, 3 specimens, R. Schuster (EME). **Humboldt County:** N end of Richardson Grove State Park (CAS); S. Fork of Eel River, Hwy 101, 18 Apr. 1976, P. Craig, D. Green (CAS); Arcata, 10 Feb. 1966, L. Edsoiv (CAS); Arcata, in redwood duff, 1969, collections by W. Goodman, D. Levin, and J. Pearson (EME); Carlotta, 1 Oct. 1959, V. Roth (BME); Freshwater [a town], 10 Oct. 1953, 5 specimens, J. MacSwain (EME). **Kern County:** 1 mi. E. Keene, 16 Apr. 1960, 2 specimens, C. Toschi (EME); 30 miles east of Bakersfield, 12 May 1959, L. Smith (BME); Kern River, 10.5 miles east of Cottonwood Creek Bridge, 31 Mar. 1959, F. Raney (Smith 1960a). **Lake County:** Cobb Mtns, Adam Springs, 22 November 1953, J. Helfer (CAS); 9 mi. NE Upper Lake, 12 Feb. 1955, 2 specimens, D. Burdick (EME). **Marin County:** Mill Valley, 427 Rose Ave, in duff of *Sequoia/Ceanothus*, 1 Mar. 1954, H.B. Leech, 2 vials; Mill Valley, duff on the forest floor, 28 May 1952, H. Leech; Tennessee Valley Rd nr. Marin Ave., ex duff oak woodland, 11 May 1974, R. Schick; Novato, 17 June 1952, H.B. Leech; Mill Valley, "by sifting debris under trees", June 1952, H.B. Leech (all CAS records); Bolinas, 7 Apr. 1960, R. Schuster (BME); San Anselmo, 22 Nov. 1959, L. Smith (BME); Mt. Tamalpais, 5 Oct. 1958, F. Raney (BME); S.P. Taylor State Park, 11 May 1968, 2 specimens, J. Doyen (EME); 0.1 mi. south of S.P. Taylor State Park, 1959–1960, 22 specimens, D. Linsdale (EME); 1 mi. S. Inverness, 1958 and 1959, 73 specimens, D. Linsdale and C. O'Brian (EME); 4 mi. S. Fairfax, under moss, 29 Apr. 1967, 1 specimen, P. Opler (EME); Carson Ridge, in moss, 14 Feb. 1959, 3 specimens, J. Powers (EME);

San Rafael, 30 Jan 1959, 2 specimens, D. Linsdale (EME); Point Reyes, 1 Mar. 1960, L. Smith (BME). **Mariposa County:** Mt. Hoffman, May Lake, Hoffman Creek (road to May Lake) (CAS); Yosemite, alt. 3800–4000 ft., 4 Apr. 1953, 1 specimen, R. Schuster (EME). **Mendocino County:** Talmage, 16 June 1959, L. Smith and R. Schuster; Fort Bragg, 27 June 1959, L. Smith (EME); Caspar, 7 Mar. 1954, 14 specimens, J. Helfer (EME); May–June 1980, NCCRP 3 mi. N of Branscomb, leaf litter, 1 specimen, C. Parisek (EME). **Mono County:** 11 miles of Bridgeport, 11 May 1959, L. Smith (BME). **Monterey County:** Pebble Beach, 19 Sep. 1959, L. Smith (BME); Bixby Canyon, willow duff, 23 Feb. 1959, 14 specimens, E. Lindquist (EME); Hastings Reservation, near Jamesburg, oak duff, 29 Mar. 1959, 71 specimens, D. Linsdale (EME). **Napa County:** Pope Creek, jct w/ Walter Springs Rd, 8 May 1981, elev. 170 m., C. Philip, R. Lane, V. Lee (CAS); Monticello Dam, 1 Feb. 1964, W. Lange (BME); 7 miles W. of Oakville, redwood duff, 1 female, 15 Feb. 1954, R. Schuster and V. Roth (BME). **Nevada County:** Sagehen Creek, July 1989, L. West (BME). **Placer County:** Tahoe National Forest, 2.2 mi. N of Finning Mill and Foresthill Rds, McBride Creek, elev. 1050 m., 27 Dec. 1986, T. Briggs, V. Lee, D. Ubick (CAS). **Riverside County:** San Gorgonio Mts., Banning, 7,000 ft, 1 Aug. 1924, W. Pierce. **San Bernardino County:** Cajon Pass, 25 Mar. 1960, P. Saint Laurence (BME). **San Diego County:** 2 mi. E. Lyon's Valley, ex. duff of *Quercus*, 26 Mar. 1961, 1 specimen, E. Lindquist (EME); 3 mi. S. Laguna P.O., 27 Mar. 1961, 4 specimens, E. Lindquist (EME). **San Francisco County:** Farallon Islands, 29 Oct. 1961, W. Cothran (BME). **San Luis Obispo County:** 1 mi. W of Los Osos Valley Rd on Prefumo Cyn Rd, 14 Feb. 1987, T. Briggs, V. Lee, *Quercus agrifolia* leaf litter. **San Mateo County:** Redwood City, 14 Apr. 1956, P. Arnaud Jr.; Cahill Ridge, 10 Mar. 1958, D. Price (BME); 6.5 miles south of Half Moon Bay, 18 Apr. 1954, 1 specimen, A. Gilbert and R. Schuster (EME). **Santa Barbara (or Ventura) County:** Santa Ynez Mountains, 24 June 1959, P. Marsh (BME). **Santa Clara County:** 3.3 mi. west of junction of Montebello Rd and Stevens Cyn Rd, elev. 560 m., 23 Oct. 1982 (CAS); Mt. Madonna State Park, redwood duff, 7 Feb. 1959, 15 specimens, C. O'Brien and D. Burdick (EME); Sveadal, 7 Feb. 1959, redwood duff, 2 specimens, D. Burdick (EME). **Santa Cruz County:** Felton, 6 Feb. 1949, P. Arnaud Jr. (CAS). **Shasta County:** Christmas Tree Cave, 21 Apr. 2012, 15 specimens, G.O. Graening *et al.* (this study); North Christmas Tree Cave, 21 Apr. 2012, 1 specimen, G.O. Graening *et al.* (this study); 3 miles southeast of Mt. Lassen, 8 July 1955, 3 specimens, J. MacSwain (EME). **Siskiyou County:** Bigfoot Cave, 3 July 2010, 7 specimens, G.O. Graening, D. Weaver, R. Baker; 3 Sep. 2010, 1 specimen, G.O. and G.J. Graening; 4 Sep. 2011, 2 specimens, G.O. and G.J. Graening, R. Hendricks, and G. Eor (this study); Upstairs-Downstairs Cave, 4 Sep. 2010, 1 specimen, G.O. and G.J. Graening (this study); Dunsmuir, 18 July 1959, F. Raney (BME). **Solano County:** Stebbins Cold Canyon reserve, 21 June 2009, 2 specimens, G.O. Graening, N. Sharma, and J. Flores, (this study); Dixon, 17 Sep. 1959, C. Judson (BME). **Sonoma County:** Guerneville, 12 May 1967, J. Spencer (CAS); Glen Ellen and Kenwood, 15 Apr. 1960, L. Smith (BME). **Stanislaus County:** Hill north of Frank Raines Park, 32 Km W of Patterson, elev. 366 m., 2 Feb. 1971, W. Azevedo, C. Mullinex, V.F. Lee (CAS). **Trinity County:** Coffee Creek Ranger Station, 14 July 1955, 1 specimen, J. MacSwain (EME). **Tulare County:** Ursa Minor Cave (Krejca 2009). **Tuolumne County:** Chipmunk Flat, Sonora Pass, 12 June 1969. **Yolo County:** Rumsey, 29 July 1959, L. Smith (BME); Winters, 15 Apr. 1960, F. Raney (BME); 5 and 8 miles north of Rumsey, under stones, 1960, Smith & Schuster (BME); Putah Creek, 5.4 mi. southwest of Winters, 17 Jan. 1960, Smith & Schuster (BME); Knights Landing, 27 Sep. 1960, H. McKenzie (BME).

Family Procampodeidae Silvestri, 1948

***Procampodea macswaini* Condé and Pagés, 1956**

San Benito County: Pinnacles National Monument, 24 Mar. 1955, 1 male, 1 female, P. Remy (Condé & Pagés 1956).

Suborder Dicellurata Pagés, 1959

Superfamily Japygoidea Ewing, 1943

Family Japygidae Lubbock, 1873

Subfamily Evallipyginae Silvestri, 1948

Evalljapyx is most common dipluran genus in California and the dominant japygid genus in western North America (Reddell 1983, Smith 1959d, 1960a).

Evalljapyx adonis Smith, 1960

Kern County: Kern River, 10.5 miles east of Cottonwood Creek Bridge, type female and paratype male, 31 Mar. 1959, F. Raney (Smith 1960a).

Evalljapyx anombris Smith, 1960

Following are determinations by L. Smith from slide-mounted material from BME:

Alameda County: Corral Hollow, near Livermore, under stones, type female and 7 females and 1 male paratypes, 23 Jan. 1958, L. Smith; 51 paratype male and female, same place, 10 Mar. 1958, Smith & Schuster (Smith 1960a), and previously 24 Mar. 1945, by R. Smith; Corral Hollow, 1 mile west of county line, under stone, 10 Mar. 1958, Smith & Schuster; Livermore, 14 Mar. 1937, G. Ferguson; 6 miles north of Livermore, Vasco Road, under stone, 10 Mar. 1958, Smith & Schuster; 15 miles west of Tracy, Altamont Pass, 15 Feb. 1963, W. Lange and H. Michalk; Fremont Canyon, near Niles, under cement slab, 27 Oct. 1960, W. Tyson. **Contra Costa County:** 13 miles south of Brentwood, 10 Mar. 1958, Smith & Schuster; Russelman Park, 20 May 1956, J. MacSwain and R. Smith; Mount Diablo, 26 Mar. 1953, J. MacSwain. **El Dorado County:** 19 miles west of Placerville, under stone, 18 May 1961, P. Wygodzinski. **Napa County:** Napa, 21 Feb. 1960, L. Smith. **San Joaquin County:** 6 miles west of Tracy, 30 Mar. 1949, J. MacSwain; Corral Hollow, 20 Feb. 1946, C. Barr. **Santa Clara County:** San Jose, Alum Rock Park, 29 Feb. 1960, J. Edwards; San Jose, Hillside Ave., 11 Dec. 1958, J. Edwards; 4 miles south of San Jose, under rocks on bare dry hillside, 15 Dec. 1956, J. Edwards; San Antonio Valley, 11 Mar. 1948, P. Hunt. **Stanislaus County:** Adobe Creek, 7 Mar. 1956, D. Burdick. **Yolo County:** Davis, 1025 North Street, 2 inches deep in soil, grass, 7 Jul. 1958, R. Schuster.

Smith (1960) describes this taxon's distribution as primarily the "open grassland in semi-arid regions of low annual rainfall and no summer rain, i.e., the eastern foothills of the Coast Range Mountains..."

Evalljapyx decorus Smith, 1960

Santa Clara County: Stevens Creek in damp humus, 2 June 1957, 2 females and 1 male, R. Schuster (Smith 1960b).

Evalljapyx dispar Silvestri, 1947

Monterey County: Monterey, as *E. propinquus* (Silvestri 1911, 1947). **Santa Barbara County:** Santa Cruz Island, La Playa Canyon, Apr. 1915 (Silvestri 1947).

Evalljapyx diversipleura Silvestri, 1911

Following are determinations by L. Smith from slide-mounted material from BME:

Del Norte County: 2 miles northeast of Patrick Creek Post Office, in fir and elm humus, 19 paratype males and females, 10 July 1958, J. Powell (Smith 1959d); 18 miles south of Klamath, 13 Aug. 1953, G. Mersh and R. Schuster; 6 miles east of Crescent City, in redwood litter, 10 Jul. 1959, J. Powell. **Humboldt County:** Prairie Creek State Park, in redwood humus, 9 Sep. 1958, L. Smith (Smith 1959d); 5 miles south of Scotia, 1 Oct. 1959, V. Roth;

Richardson Grove State Park, 4 inches deep, in clay, 9 Sep. 1958, L. Smith. **Mendocino County:** Eel River ridge near Potter Valley, in dry soil, 29 Jul. 1959, Smith & Schuster. **Siskiyou County:** McCloud, type locale (Silvestri 1911b); 12 miles south of Callahan, 25 Jul. 1960, J. Campbell; Dunsmuir, Mott Airport, 19 Oct. 1960, H. Forbes.

L. Smith (unpub. data, BME) also identified specimens from Oregon and Washington.

Evalljapyx facetus Smith, 1959

Following are determinations by L. Smith from slide-mounted material from BME: **Alameda County:** Berkeley, Evergreen Lane and other locations, several specimens, 2 Mar. 1958, L. Smith. **Lake County:** Middle Creek 6 miles north of upper Lake, 12 Feb. 1955, D. Burdick. **Marin County:** Black Point, 24 Mar. 1969, R. Schuster. **Napa County:** 7 miles west of Oakville, redwood duff, Mar. and Dec. 1957, Smith & Schuster; 3 miles west of Oakville, 1 female, 3 Jan. 1958, F. Raney and R. Schuster; 5 miles northwest of Spanish Flat, 1 Mar. 1961, H. McKenzie, Rutherford, 3 Jan. 1958, R. Schuster and F. Raney; Mount Saint Helena, 3 Feb. 1959, R. Schuster; 3 miles north of St. Helena, 31 Dec. 1953, R. Schuster; Napa Valley Ranch Club, soil under oak, several specimens, 12 Apr. 1958, L. Smith; 9 miles south of Monticello, sand oak, several specimens, 1956 to 1958, L. Smith, J. Raney and R. Schuster; 11 miles south Monticello, grassy soil 4 inches deep, 13 Dec. 1957, Smith & Schuster; Anguin, several specimens, 29 Apr. 1962; Napa, abandoned prune orchard, 14 Jan. 1959, J. Skelsey, and 24 Feb. 1959, R. Schuster. **Placer County:** 4 miles west of Newcastle, type female and 55 paratype males and females in damp humus and surface soil under oaks, 1958 and 1959, Smith & Schuster (Smith 1959d); 5 miles W. of Newcastle, loam and litter, 1 paratype female, 12 Mar. 1958, Smith & Schuster; 5 miles west of Foresthill, several specimens, 21 May 1961, M. Irwin; near Folsom Lake, 2 May 1958. **Sacramento County:** Folsom Lake State Park, Horseshoe Bar, 15 Apr. 1958, Smith & Schuster. **Santa Clara County:** 1 mile south of Santa Clara, UCDF Sta., 10 inches deep in soil, 23 Jan. 1958, L. Smith. **Solano County:** Mix Canyon, 12 Mar. 1960, F. Parker and A. Menke; near Cordelia, several specimens, 4 Apr. 1961, F. Raney; 1 mile west of Cordelia, 11 Mar. 1960, F. Raney; Monticello Dam, 9 Feb. 1963, J. Buckett; near Vallejo, arborvitae litter, 25 Mar. 1958, F. Raney. **Sonoma County:** west of Mark West Reservoir, soil, Douglas fir, 3 females, 3 males, 22 Jan. 1958, F. Raney and R. Schuster; 2 miles east of Santa Rosa, several specimens, 3 Feb. 1962, J. Buckett; junction of Porter Creek Rd. and Calistoga Rd., nest of *Neotoma*, 15 Feb. 1969, J. Buckett; 6 miles east of Petaluma, 15 Jan. 1962, J. Buckett; 6 miles east of Petaluma, 29 Dec. 1961, J. Buckett; near Kenwood, near highway bridge, 3 Sep. 1957, Smith & Schuster; 1 mile south of Trenton, 7 Aug. 1957, Smith & Schuster. **Sutter County:** Sutter Buttes, soil under viburnum, 1 male, 12 Mar. 1958, Smith & Schuster. **Yolo County:** Davis (Smith 1961); Winters, 24 Feb. 1959, R. Schuster; 5.4 miles southwest of Winters, above creek, soil under pine, several specimens, 29 May 1959, L. Smith, F. Raney and R. Schuster 721 Hunt Way, Davis, 1957 and 1959, several specimens, L. Smith; 3 miles north of Woodland, oak forest, several specimens, 2 Feb. 1959, W. Crites and R. James; 3 miles west of Winters, 25 Dec. 1959, F. Raney.

Evalljapyx helferi Smith, 1959

Following are determinations by L. Smith from slide-mounted material from BME: **Alameda County:** Oakland, 11 Oct. 1953, G. Marsh and R. Schuster; Oakland Hills, 1 Sep. 1957, G. Marse; Berkeley, 21 Oct. 1956, Hoyerg; Berkeley, Woolsey Canyon, 19 Dec. 1959, A. Gray; south side of Woolsey Canyon, soil, near top, 6 Apr. 1959, A. Gray; Berkeley, Strawberry Canyon, top soil, grass cover, 17 Jan. 1959, A. Gray. **Contra Costa County:** Redwood Park, 18 May 1953, R. Schuster and Gilbert. **Marin County:** Samuel P. Taylor State Park, 3 Feb. 1958, J. Helfer; Samuel P. Taylor State Park, south entrance, 8 Nov. 1953, E. Gilbert, V. Roth, R. Schuster; Mill Valley, sifting forest floor, 30 May 1952, H. Leech; Mill Valley, 427 Rose Avenue, 3 Mar. 1954, H. Leech; Mount Tamalpais, 18 Jul. 1953, R. Schuster; Mount Tamalpais, half mile from top, 1 Apr. 1958, W. Lange; Mount Tamalpais, 4 miles from top, 500 feet elevation, soil and humus, 1 Apr. 1958, W. Lange; Alpine Lake, 18 Jun. 1953, D. MacNeill and R. Schuster; Bolinas, 24 Mar. 1960, R. Schuster; base of Hicks Mountain, 21 Jun. 1959, J. Buckett; 8 miles east of Marshall, 12 Nov. 1962, J. Buckett; Tomales Bay State Park, bishop pine litter, 12 Feb. 1961, M. Irwin and D. Cavagnaro; Corte Madera, 10 Sep. 1957, J. Helfer. **Mendocino County:** Holotype female and 36 male and female paratypes, J. Helfer, 19 Oct. 1957, in redwood humus; "near Mendocino", an additional 1,500 specimens, J. Helfer

(Smith 1959d); Mendocino, 24 Aug. 1959, J. Helfer; Little River, 3 Aug. 1957, J. Helfer and G. Marsh; Cleone, MacKerricher Beach State Park, 7 Mar. 1958, J. Helfer; 3 miles east of Little River, redwood forest, 26 Oct. 1960, D. Price; Hartsook Groove, 19 Oct. 1953, E. Gilbert and R. Schuster. **San Mateo County:** Kings Mountain, 1957 to 1959, various specimens, D. Price and R. Schuster; 1 mile east of Sharp Park, chaparral, Feb. 1958, D. Price; 3 miles north of Sharp Park, chaparral hummus, Feb. 1958, D. Price; near Millbrae, live oak, 9 Mar. 1958, D. Price; 1 mile south of Pilarcitos Lake, Nov. 1956, D. Price; San Andreas Lake, 1956 and 1957, D. Price; H. Wolf Ranch, 25 Apr. 1958, W. Lange and Schoepner; Mairmar, 5 Dec. 1953, V. Roth; San Bruno Mountains, chaparral, Jan. 1957, D. Price; 1 mile south of San Pedro, Oct. 1957, D. Price; Belmont, 5 Mar. 1961, R. Schuster; Memorial Park, 12 July 1958, D. Price; Crystal Springs Park, 27 Oct. 1921, W. Pierce. **Santa Clara County:** Stevens Creek, 2 Jun. 1957, R. Schuster. **Santa Cruz County:** 12 miles north of Boulder Creek, 22 Jan. 1955, Burdick and M. Wasbauer. **Sonoma County:** Plantation, 22 May 1954, J. Helfer; Armstrong State Park, 14 Mar. 1954, J. Helfer, and 24 May, 1958, F. Raney.

Evalljapyx leechi Smith, 1960

Tulare County: Lemon Cove, 2 females and 5 males, under stones on a grassy hillside, 5 Mar. 1957, H. Leech (Smith 1960b).

Evalljapyx mckenziei Smith, 1960

Los Angeles County: 5 miles south of Gorman, from soil under chaparral, 1 male and 1 female, 25 Mar. 1959, H. McKenzie (Smith 1960b).

Evalljapyx newelli Smith, 1960

Los Angeles County: Angeles National Forest, live oak, 7 Apr. 1957, I. Newell (BME); Angeles Nat'l Forest, Blue Ridge, Gaffey Camp, 10 June 1957, I. Newell (BME). **Riverside County:** Mount San Jacinto, in *Artemisia* litter, type female, 7 paratype females, 9 paratype males, 20 Apr. 1958, I. Newell; Mount San Jacinto, Strawberry Creek, elev. 3,000 feet, in willow litter, 1 paratype male, 21 Apr. 1957, I. Newell (Smith 1960a).

Evalljapyx ombris Smith, 1960

Following are determinations by L. Smith from slide-mounted material from BME:

Marin County: 2 miles south-southwest of Inverness, 30 Dec. 1961; between Boulder Creek and Big Basin, 27 Mar. 1954, J. Helfer; Big Basin, 23 Dec. 1953, V. Roth. **Monterey County:** Point Cypress (Smith 1960a; BME); Point Cypress, 4 miles northwest of Carmel, 3 May 1957, G. Marsh; 26 miles north of Salinas, 11 May 1961, R. Schuster and F. Raney; near Cruickshank Estate, 17 Mile Drive, 20 Sep. 1959, L. Smith. **San Mateo County:** 6 miles of southeast Half Moon Bay, in redwood and fern litter, type female, 4 paratype males, and 1 juvenile, 1 June 1957, R. Schuster; 2 females, 3 males, and 5 juveniles, same place, 5 Dec. 1953, V. Roth; 5 females, 6 males, 14 juveniles, same place, 21 July 1957, same place, R. Schuster; 1 male, same place, 4 May 1958, W. Lange (Smith 1960a; BME); Pescadero Creek, southeast of Half Moon Bay, redwood, 26 Apr. 1959, R. Schuster; Pigeon Point, chaparral, 12 Jul. 1958, D. Price; 0.8 miles from Skyline Road and Tunitas Road junction, 4 May 1958, W. Lange. **Santa Clara County:** Santa Cruz Mountains, Page Mill Road, under madrone duff, 1 Dec. 1956, J. Edwards. **Santa Cruz County:** 12 miles north of Boulder Creek, 22 Jan. 1955, D. Burdick and M. Wasbauer; 2 miles north of Boulder Creek, 22 Jan. 1955, D. Burdick and M. Wasbauer; Boulder Drive, 23 Dec. 1953, V. Roth; 7 miles east of Capitola, Seacliff State Park, 25 Jul. 1961, H. McKenzie; Davenport, 21 Feb. 1929, O. Cook; Waddell Creek, under pine bark, 11 Mar. 1956, D. Burdick; 1 mile north of Santa Cruz, 23 Dec. 1953, V. Roth; Big Basin State Park, inside old redwood log, 19 Mar. 1960, K. Hare and R. Miller; between Boulder Creek and Big Basin, 27 Mar. 1954, J. Helfer; Ben Lomond, 22 Jan. 1955, D. Burdick and M. Wasbauer.

This species is found only in damp humus in heavily forested areas, particularly redwood forests; distributed along the western Coastal Ranges (Smith 1960a). L. Smith (unpub. data, BME) has several determinations of *E. ombris* specimens from Victoria Island and Vancouver, B.C.

***Evalljapyx propinquus* Silvestri, 1911**

Los Angeles County: Mount Lowe (type locale), Lancaster, San Dimas Canyon, Palmer's Canyon, Live Oak Canyon, and other canyons in the vicinity (Silvestri 1911b; Gardner 1914, Reddell 1983; Allen 2002). **Monterey County:** Near the shores of Monterey (Silvestri 1911). **San Bernardino County:** Cucamonga Canyon, San Antonio Canyon, South Hills, Blanchard Park, and other canyons in the vicinity (Silvestri 1911; Reddell 1983; Allen 2002).

***Evalljapyx raneyi* Smith, 1959**

San Diego County: Monte Vela Jamul, 4–8 cm. deep under *Quercus agrifolia*, 2 males, F. Raney, 30 Dec. 1958 (Smith 1959d).

***Evalljapyx sonoranus* Silvestri, 1911**

Following are determinations by L. Smith (unpub. data) from slide-mounted material from BME which apparently expand this taxon's range beyond Arizona (Smith 1960a): **Marin County:** Point Reyes, 1 Aug. 1955, E. Ordway, and 4 Aug. 1958, Smith & Schuster; Bolinas, 6 Aug. 1958, Smith & Schuster; Inverness, 9 Sep. 1950 and 23 Aug. 1955, W. Gertsch; San Rafael, 8 Aug. 1958, R. Schuster. **Mariposa County:** Briceburg, 4 Aug. 1955, W. Gertsch; Midpines, 4 Aug. 1958, R. Schuster and L. Smith. **Mendocino County:** Cleone, 5 Aug. 1955, W. Gertsch. **Yolo County:** Rumsey, 6 Aug. 1958.

***Evalljapyx* sp.**

Kern County: Caliente, 22 Jan. 1964, W. Lange (BME). **Orange County:** Cleveland National Forest, *Ilex* litter, 15 June 1957, I. Newell (BME). **San Bernardino County:** Upper Santa Anna River wash, 1928 (Ingles 1929). **San Mateo County:** Sweeney Ridge, 2 Oct. 1960, D. Price (BME).

Subfamily Japyginae Womersley, 1939

***Hecajapyx bucketti* Smith, 1964**

Fresno County: McKinley Grove, near Dinkey Creek, under redwood duff, 29 Apr. 1961, holotype, paratypes, etc., J. Edwards (Smith 1964).

***Hecajapyx vulgaris* Smith, 1959**

Following are determinations by L. Smith from slide-mounted material from BME, unless otherwise noted: **Del Norte County:** 2 miles northeast of Patrick Creek P. O., 10 July 1958, J. Powell; 5 miles south of Crescent City, 8 Sep. 1958, L. Smith; 2 miles north of Fort Dick, 21 Nov. 1953, V. Roth; Gasquet, 1 June 1950, K. Christiansen. **Lake County:** Bushy Ridge, Cow Mtn., 3,000 feet, 12 Feb. 1956, D. Burdick; Upper Lake, 21 Feb. 1955, D. Burdick; 9 miles northeast, and 6 miles northwest, of Upper Lake, 12 Feb. 1955, D. Burdick; Middle Creek, 6

miles northwest Upper Lake, 12 Feb. 1955, D. Burdick; Kelsey Creek, Cobb Mtn., 13 Mar. 1962, J. Buckett and M. Irwin. **Marin County:** San Anselmo, in oak duff and 3 inches of surface soil, type female, 5 paratype females, 4 paratype males, 21 Dec. 1957, E. Smith (Smith 1959c); 1.5 miles east of Alpine Dam, 23 Jan. 1963, M. Irwin and D. Cavagnaro; 3 miles north of, and 1 mile west of Inverness, Feb.–Mar. 1960, J. Buckett; 6 and 7 miles east of Pt. Reyes Station, 1 Mar. 1960, several collections, L. Smith, A. Grigarick, R. Schuster; 1 mile west of Inverness, Jan. and Mar. 1960, L. Smith, A. Grigarick, R. Schuster; 3 miles north of Inverness, 18 Feb. 1960, J. Buckett (BME); Bolinas, 24 Mar. 1960, R. Schuster; S. P. Talyor State Park, 3 Feb. 1958, J. Helfer; Point Reyes, 1 Mar. 1960, L. Smith. **Mendocino County:** Mendocino, 1957–1958, various specimens, J. Helfer; Little River, 19 Jan. 1958, J. Helfer. **Napa County:** 7 miles west of Oakville, in redwood duff, paratypes, etc., 1957–1958, Smith & Schuster (Smith 1959c); 7 miles west of Oakville, 15 Feb. 1954, V. Roth and R. Schuster; 6 miles west of Oakville, 23 Feb. 1960, T. Haig; 9 miles south of Monticello, Jan. 1958, F. Raney and R. Schuster; 3 miles south of Muskowite Corner, manzanita litter, 19 Feb. 1962, M. Irwin; Monticello, 17 Feb. 1957, R. Schuster; Mt. St. Helena, 3 Feb. 1959, R. Schuster; 12 miles east of Rutherford, Route 128, 22 Jan. 1961, D. Price; 5 miles northwest of Spanish Flat, 1 Mar. 1961, R. Schuster. **Shasta County:** Backbone Road 5 miles northeast of Ingot, 22 Dec. 1962, A. Grigarick. **Solano County:** Monticello Dam, 9 Feb. 1963, J. Buckett; Mix Canyon, 3 Feb. 1962, M. Irwin; Mix Canyon, 12 Mar. 1960, F. Parker and A. Menke; Green Valley, 16 Jan. 1958, R. Schuster and F. Raney. **Sonoma County:** 6 miles east of Petaluma, 29 Dec. 1961, 130 specimens, J. Buckett (Smith 1964); Mark West, 1 Mar. 1960, A. Grigarick; Vannucci Vineyards, 6 miles east of Sebastopol, Mar.–May 1957, Smith & Schuster; junction of Porter Creek Rd. and Calistoga Rd., nest of *Neotoma*, 15 Feb. 1960, J. Buckett; 3 miles west of Graton, 20 Feb. 1960, C. Judson; Santa Rosa, Dec. 1961, J. Buckett; 3 miles northwest of Glen Ellen, 13 Feb. 1954, V. Roth and R. Schuster.

Distributed throughout California's Coast Ranges, northward into Douglas, Josephine, and Klamath Counties, Oregon (Reddell 1983; Smith 1964; Allen 2002; L. Smith, unpub. data, BME).

***Hecajapyx* sp. nov. Smith, in prep.**

Kern County: 2 miles west of Isabella Reservoir, 31 Mar. 1959, 2 juv., 6 males, F. Raney (L. Smith determ., BME).

***Holjapyx calaverasae* Smith, 1959**

Calaveras County: 2 miles west of San Andreas, altitude 1,000 feet, sandy clay loam soil, under *Quercus wislizenii*, holotype female, 1 male paratype, 7 female paratypes, 1 juvenile, 25 Mar. 1958, Smith & Schuster (Smith 1959b).

***Holjapyx conspersus* Smith, 1959**

San Mateo County: 3 miles north of Sharp Park, in humus under chaparral, holotype female, allotype male, Feb. 1958, D. Price (Smith 1959b).

***Holjapyx diversiunguis* (Silvestri, 1911)**

Alameda County: Berkeley, 1 male, 24 Mar. 1938, A. Michelbacher (Smith 1959b; BME). **Fresno County:** Pinehurst (Reddell 1983). **Marin County:** Mill Valley, 427 Rose Ave, in damp soil, 5 and 9 May 1950, 1 male and 1 female, H. Leech (Smith 1959b); 6 miles east of Pt. Reyes Station, 1 Mar. 1960, A. Grigarick, L. Smith, and R. Schuster (BME). **Mariposa County:** Yosemite Park (type locale) (Silvestri 1911). **San Mateo County:** Woodside (Reddell 1983).

***Holjapyx humidus* Smith, 1959**

Mendocino County: Mendocino, holotype female, 25 Dec. 1958; paratype male, 4 June 1954, J. Helfer (Smith 1959b).

***Holjapyx hyadis* Smith, 1959**

Following are determinations by L. Smith from slide-mounted material from BME: **Colusa County:** 8 miles north of Rumsey, under stone, 9 Feb. 1960, Smith & Schuster; 5 miles north of Rumsey, 9 Feb. 1960, Smith & Schuster. **Marin County:** near Bolinas, young male, 24 Mar. 1960, Smith & Schuster. **Napa County:** Mount St. Helena, 3 Feb. 1959, Smith & Schuster. **San Mateo County:** Kings Mountain, 4 miles north of Lahonda, in deep humus of redwood, madrone, and tan bark oak, holotype female, allotype male, Dec. 1957, D. Price (Smith 1959b). **Yolo County:** 5.4 miles south west of Winters, Putah Creek, one female juvenile, 17 Jan. 1960, L. Smith and R. Schuster.

***Holjapyx imbutus* Smith, 1959**

Calaveras County: 1 mile north of Murphys, in humus under oak tree, holotype male, 5 Mar. 1958, Smith & Schuster; 3 miles west of San Andreas, in wet humus and soil, paratype male, 1 juvenile, Smith & Schuster; Calaveras Big Trees, in rotten redwood log, paratype male, 5 Mar. 1958, Smith & Schuster (Smith 1959b).

***Holjapyx insiccatus* Smith, 1959**

Napa County: 9 miles south of Monticello, on grassy slope under stones, holotype female, paratype female, 13 Dec. 1957 and one juvenile (same locality) 12 May 1957, Smith & Schuster (Smith 1959b); 9 miles south Monticello, 3 Jan. 1958, L. Smith, F. Raney and R. Schuster (BME). **San Mateo County:** San Bruno Mountains, chaparral, atypical female specimen, Jan. 1957, L. Smith and D. Price (BME). **Solano County:** Mix Canyon, 28 Feb. 1960, A. Menke and F. Parker (BME).

***Holjapyx irroratus* Smith, 1959**

Butte County: North Fork Feather River, 1 mile above Caribou Power House, 31 Dec. 1956, J. Edwards (BME). **Sonoma County:** Armstrong State Park, in humus under redwood trees, holotype female, paratype female, 14 Mar. 1954, J. Helfer (Smith 1959b).

Also noted from Oregon (L. Smith, unpub. data, BME).

***Holjapyx madidus* Smith, 1959**

El Dorado County: near Nashville, in rocky soil, holotype male, 5 Mar. 1958, Smith & Schuster (Smith 1959b).

***Holjapyx schusteri* Smith, 1959**

Contra Costa County: Mount Diablo, 1 male, G. Marsh, 15 Feb. 1953 (Smith 1959b). **San Mateo County:** 1 mile west of San Andreas Lake, in soil, open grassland and under live oak, 1 male, 1 female, 1 juvenile, Nov. 1956, Nov. 1957, and Jan. 1957, D. Price (Smith 1959b).

Holjapyx sp.

Alameda County: Berkeley, Dwight Way Hill, two feet down in ground, 2 April 1947, MacSwain (BME). **Butte County:** Stringtown Hill northeast of Oroville, 9 Feb. 1956, several specimens coll. by R. Schuster and determ. by L. Smith as “*Holjapyx* nr. *insiccatus*” (BME). **Santa Clara County:** Mt. Madonna State Park, 7 Feb. 1959, several specimens coll. by C. O’Brien and D. Burdick and determ. by L. Smith as “*Holjapyx* nr. *insiccatus*” (BME).

Occasjapyx californicus Silvestri, 1948

Marin County: Mill Valley (Silvestri 1948). **Mendocino County:** Unspecified locale, in soil and humus, 4 males, 8 females, J. R. Helfer (Smith 1959c); Mendocino, allotype and other specimens, 4 June 1954, J. Helfer (BME); Hartsook Grove, one female, 19 Sep. 1953, E. Gilbert and R. Schuster (BME). **Yolo County:** Berryessa, just below dam, one female, 4 Feb. 1962, M. Irwin (BME).

Occasjapyx kofoidi (Silvestri, 1928)

Shasta County: Potter Creek Cave (type locality), 3 specimens, 1903, W. Sinclair, as *Japyx kofoidi* (Silvestri 1928), and 8 June 1995, D. Ubick, 1 indiv. (CAS).

Reddell (1983) does not consider this species to be cave-adapted (troglomorphic). Rudolph *et al.* (1985) reported a collection of Japygidae in Samwel Cave, which is only 16 km from the type locality. G.O. Graening inventoried both caves in 2012 and could not find any diplurans.

Occasjapyx sierrensis Smith, 1959

El Dorado County: 3 miles north of Nashville, in soil, 2 paratype females, 2 paratype males, 25 Apr. 1958, Smith & Schuster (BME; Smith 1959c); 4 miles west of Newcastle, 1958 and 1959, paratypes and other specimens, Smith & Schuster (BME). **Placer County:** Folsom Lake, under oak trees, 1 paratype female, 2 May 1958, W. Lange, R. James, and W. Crites (Smith 1959c); 4 miles west of Newcastle, paratypes, etc., Mar. and Apr. 1958, Smith & Schuster (Smith 1959c); Folsom Lake State Park, Rattlesnake Bar Road, under oaks, 2 May 1958, Lange and Crites (BME).

Occasjapyx sp.

Alameda County: Berkeley, Dwight Way Hill, 12 Apr. 1947, J. MacSwain (BME). **Marin County:** S.P. Taylor State Park, 3 Feb. 1958, J. Helfer (BME). **Napa County:** 2 miles west of Oakville, 31 Dec. 1953, G. Marsh and R. Schuster (BME).

Japyginae genus nov. Smith, in prep.

Sacramento County: Fair Oaks, 27 Mar. 1935, “new genus near *Occasjapyx*,” 1 specimen coll. in leaf mold by H. Keifer (L. Smith determ., 1961: BME).

Subfamily Provalljapyginae Smith, 1959

Nanojapyx coalingae Smith, 1959

Fresno County: near Coalinga, in juniper leaf mold, holotype female, 22 Jan. 1958, H. Wilson (Smith 1959a).

Nanojapyx gentilei Smith, 1959

Sonoma County: near Trenton, 10 to 12 inches deep in sandy soil in a growth of poison oak, holotype female, paratype female and juvenile, 7 Aug. 1957, Smith & Schuster (Smith 1959a).

Nanojapyx hamoni Smith, 1959

Following are determinations by L. Smith from slide-mounted material from BME:

Marin County: 1 mile west of Inverness, 1 Mar. 1960, numerous specimens, A. Grigarick, L. Smith, and R. Schuster; Half Moon Bay, clay-loam and Monterey cypress, one paratype female, 24 April. 1958, W. Lange and R. Schuster; 1 miles west of Inverness, 1 Mar. 1960, A. Grigarick, L. Smith, and R. Schuster; Mt. Tamalpais, 4 miles from top, 500 foot elev., soil and humus, 1 Apr. 1958, W. Lange. **San Mateo County:** near Half Moon Bay, in redwood leaf mold, holotype female, 21 July 1957, R. Schuster; Half Moon Bay, 24 Apr. 1958, female paratype, W. Lange and Schoeppner; Wolf Ranch, in clay-loam soil and humus under Monterey cypress, 24 Apr. 1958, W. Lange and R. Schoeppner (Smith 1959a); Memorial Park, redwood, 12 July 1958, D. Price; 3 miles north of Sharp Park, chaparral humus, Feb. 1958, D. Price; 0.8 miles from junction of Skyline and Tunitas Roads, 4 May 1958, W. Lange; Pigeon Point, 12 July 1958, D. Price; 5 miles north of La Honda, 1 Dec. 1956, D. Price. **Santa Clara County:** Santa Cruz Mountains, 7.5 miles south of Los Gatos, 23 Feb. 1963, I. Westcott.

Nanojapyx pagesi Smith, 1959

Following are determinations by L. Smith from slide-mounted material from BME: **Alameda County:** in leaf mold near Oakland, holotype female, allotype male, paratype male and female, 30 Jan. 1953, R. Schuster (Smith 1959a); Berkeley, south side of Woolsey Canyon, June 1959, A. Gray; Berkeley, south rim of Woolsey canyon, young male specimen, 14 Mar. 1959, L. Smith and A. Gray; Woolsey canyon, juvenile specimen, 2 Mar. 1959, L. Smith and A. Gray; south side Woolsey canyon, Feb., Apr., and Dec. 1959, L. Smith and A. Gray; Woolsey canyon, June 1959, L. Smith and A. Gray. **Yolo County:** 5.4 miles southwest of Winters, 29 May 1959, L. Smith, F. Raney, and R. Schuster.

Nanojapyx pricei Smith, 1959

San Mateo County: San Bruno Mountains, in chaparral leaf mold, holotype female, allotype male, 18 paratypes, Jan. 1957, D. Price (Smith 1959a); Cahill Ridge, chaparral, 4 May 1958, D. Price (BME); 1 mile east of Sharp Park, leaf mold, chaparral, Feb. 1958, D. Price (BME).

Nanojapyx sp.

Butte County: 3.7 miles north of Gridley, 24 April 1959, F. Raney (BME). **Contra Costa County:** Mount Diablo, 10 July 1958, Smith & Schuster (BME); Mount Diablo, 2 miles below park border, elev. 2,500 ft., 10 July 1958, Smith & Schuster (BME). **Riverside County:** 1 mile ESE of Aguanga, 31 Mar. 1959, F. Raney (BME). **San Diego County:** Descanso Ranger Station, 31 Mar. 1961, W. Steffen (BME). **Yolo County:** N.W. Capay, 3 June 1960, R. Schuster (BME); 5.4 miles south west winters, Putah Creek, 23 April 1959, F. Raney (BME); 5.4 miles south west of winters, 17 Jan. 1960, Smith & Schuster (BME).

Subfamily Undetermined

Genus Undetermined

Alameda County: Berkeley, D. Lindsdale, undated, and 1950, J. MacSwain (EME); Strawberry Canyon, 20 Mar. 1957, W. Nisbet (EME); Oakland, 5 Feb. 1953, R. Schuster (EME).

Amador County: Chrome Cave and Connie's Cave (Rudolph *et al.* 1985). **Calaveras County:** Grapevine Gulch Cave, Poison Oak Cave, and Rabbit Cave (Rudolph *et al.* 1985); Keith's Chasm (limestone cave), 3 specimens, EGPT 6 Aug. 1988, R. Aalbu (unpub. data). **Fresno County:** Fresno, 0.3 mi. S of Hwy 480 along Hwy 63, oak grove, under granite, 29 Mar. 1991, D. Ubick (CAS). **Humboldt County:** Arcata, under redwood duff, 1969, W. Goodman, L. Boulet, and J. Pearson (EME). **Kern County:** Keene, Digger pine/ oak forest, under granite, 25 Mar. 1991, D. Ubick (CAS). **Lake County:** 1 mi. SW of Lake Pillsbury resort, coniferous forest, 21 Jan. 1991, D. Ubick (CAS); Upper Lake, 12 Feb. 1955, D. Burdick (BME). **Marin County:** Mill Valley, 3 inches underground, June 2002, E. Ross (CAS); Mill Valley, manzanita duff, 15 Jan. 1961, C. O'Brien (EME); Mill Valley, 427 Rose Ave., 1 June 1948, H. Leech (BME); Inverness, 14 July 1960, S. Bailey and L. Tange, and 14 Sep. 1960, W. Iltis (BME); Nicasio, 14 Apr. 1961, D. Cavagnaro (BME); Point Reyes and S.P. Taylor State Park, various collections (BME and EME); San Rafael, 7 Aug. 1958, Smith & Schuster (BME). **Mariposa County:** 3 miles east of Briceburg, 6 Feb. 1954, R. Schuster (EME). **Mendocino County:** Caspar, 14 July 1957, J. Helfer (BME), Russian Gulch State Park, 22 Dec. 1964, M. Gardener (BME); Ryan Creek, 11 Aug. 1951, J. MacSwain (EME); Caspar, 7 Mar. 1954, J. Helfer (EME). **Monterey County:** Jolor [Jolon?], 11 May 1961, R. Schuster and F. Raney (BME). **Napa County:** 7 miles west of Oakville, 15 Feb. 1954, V. Roth and R. Schuster (EME). **Nevada County:** Grass Valley, 22 Oct. 1966, W. Lange (BME). **Placer County:** Newcastle, 1959, F. Raney, Smith & Schuster (BME). **Plumas County:** Juniper (Kloppenber) Cave, 7 mi. SE of Quincy, 3 Sep. 1988, D. Ubick (CAS). **San Bernardino County:** New York Mountains, Keystone Canyon, 21 Apr. 1977, J. Powell (EME). **San Francisco County:** Potier Hill, 21 Dec. 1990, D. Ubick and T. Briggs (CAS); Hunters Pt. (Innes Ave. at Earl St.), under serpentine, 3 Feb. 1991, D. Ubick (CAS). **San Mateo County:** Portola Valley, Sep. 1995, K. Human (unpub. thesis, Stanford Univ.); San Bruno Mountains, 9 Mar. 1962, J. Powell (EME); Half Moon Bay, 18 Apr. 1954, E. Gilbert and R. Schuster (BME); Cahill Ridge, 26 Mar. 1960, D. Price (BME); near Pescadero, 29 Mar. 1960, J. Bailey (BME). **Santa Cruz County:** Glory Cave, 21 Sep. 1985, D. Clardy (CAS); Dolloff Cave (Briggs and Ubick 1988); Ben Lomond, 22 Jan. 1955, D. Burdick (BME); Boulder Creek, 22 Jan. 1955, D. Burdick (BME). **Siskiyou County:** 3.5 mi W of Gazelle, True Shasta View Cave, about 12 specimens, 17 June 1989, D. Ubick and D. Cowan (CAS); Powder Hill, Bobcat Cave, 4 July 1982, T. Briggs (CAS). **Solano County:** Dixon, 16 Nov. 1968, J. Lauck; Elmira, 23 Nov. 1960, T. Fenner; Mix Canyon [=Weldon Canyon?], 17 Aug. 1960, A. Bray and J. Campbell (all BME records). **Sonoma County:** Kruse Rhododendron State Natural Reserve, 30 Jan. 1959, D. Linsdale; Kruse Rhododendron State Natural Reserve, 31 Jan. 1959, C. O'Brien; Santa Rosa, 30 Jan. 1959, D. Linsdale; Petaluma, 15 Jan. 1962, J. Buckett (all BME records). **Stanislaus County:** Minnier Park, digger pine, under serpentine, 7 Apr. 1991, D. Ubick (CAS). **Trinity County:** Weaverville, 21 Dec. 1966, J. Buckett (BME). **Tulare County:** North slope Tennessee Ridge (2.3 mi E of Ave. 264 on Ave. 120), "grassland, under serpentine", 28 Mar. 1991, D. Ubick (CAS); Clough Cave, 27 Apr. 2004, 1 specimen, J. Krejca (Krejca 2006); Lost Soldier's Cave (Rudolph *et al.* 1985); 7 May. 2004, 2 specimens, J. Krejca (Krejca 2006); 6 July 2004, 2 specimens, J. Krejca (Krejca 2006). **Tuolumne County:** McLean's Cave, 27 Feb. 1978, 4 specimens (Elliott 1978); Transplant Mine (Rudolph *et al.* 1985). **Yolo County:** Capay, various collections (BME).

Family Parajapygidae Womersley, 1939

This family does not appear to be native to California.

Parajapyx isabellae (Grassi, 1886)

Following are determinations by L. Smith from slide-mounted material from BME:

Amador County: Martel, 21 Mar. 1959, L. Smith. **Calaveras County:** 6 miles North of Ione, 25 June. 1958, Smith & Schuster. **El Dorado County:** near Nashville, 25 Apr. 1958, Smith & Schuster. **Lassen County:** Bieber, 3 specimens, 17 Apr. 1958, R. Gerhardt. **Marin County:** 1 mile west of Inverness, 1 Mar. 1960, A. Grigarick, L. Smith, and R. Schuster. **Sacramento County:** Folsom Lake State Park, Horseshoe Bar, 15 Apr. 1958, Smith & Schuster. **San Diego County:** Borrego Springs, 25 Mar. 1959, L. Smith and A. Grigarick. **Solano County:** Mix Canyon, 12 Mar. 1960, F. Parker and A. Menke. **Sonoma County:** 8 miles west Santa Rosa, soil alfalfa field, 12

Nov. 1958, W. Lange and H. McKenzie; Fort Ross, McKenzie's pasture, soil/Indian middens, 27 Apr. 1959, A. Gray. **Yolo County:** In a barley field near Davis (Smith 1961); Winters, 23 Apr. 1959, F. Raney; Davis, Covell Ranch, Aug. 1944.

Also reported from Arizona, Arkansas, Hawaii, Indiana, Louisiana, Maryland, Missouri, Nebraska, New York, North Carolina, Oklahoma (Allen 2002; L. Smith, unpub. data, BME). This exotic, cosmopolitan species is associated with potting soil, probably distributed by the greenhouse industry; the type locality is Italy (Reddell 1983).

***Parajapyx* sp.**

Following are determinations by L. Smith from slide-mounted material from BME: **Alameda County:** Corral Hollow, 10–12 Mar. 1958, Smith & Schuster. **Amador County:** 10 miles east of Ione, Martel, 21 Mar. 1959, L. Smith. **Butte County:** Chico, 4 Sep. 1985, and Bidwell Park, Chico Creek, 4 Sep. 1985, Smith & Schuster; 3.7 miles north of Gridley, Rocklin clay, 5 specimens, 24 Apr. 1959, F. Raney; 6.7 miles north of Gridley, Highway 99 East and Hazel Ave., 8 May 1959, F. Raney. **Fresno County:** Jacalitos Canyon, 20 May 1959, H. Wilson. **Kern County:** Kern River Canyon, 10 miles west of Isabella, 12 May 1959, L. Smith. **Los Angeles County:** 5 miles north of San Fernando, 25 Mar. 1959, H. MacKenzie. **Mendocino County:** Russian Gulch State Park, 30 Dec. 1964, R. Rice. **Placer County:** 4 Miles of Newcastle, 15 Apr. 1958, Smith & Schuster. **Sutter County:** Sutter Buttes, W. Butte Rd., 12 Mar 1958, Smith & Schuster. **Tulare County:** 1 mile east of Lemon Cove, 13 May 1959, L. Smith. **Yolo County:** 7 miles west of Winters, one female, 11 Mar. 1959, F. Raney; Davis, 721 Hunt Way, 1957 and 1959, several specimens, L. Smith; 5.4 miles south of Winters, 29 May 1959, L. Smith, F. Raney, and R. Schuster; Putah Creek ranchette near Winters, 23 Apr. 1959, F. Raney.

Taxa not recognized

The following taxa are removed from the California Checklist:

***Plusiocampa* Silvestri, 1912**

Peck (1973) reported *Plusiocampa* sp. from Craig Ice Cave and Frozen River Cave (Siskiyou County); these may instead be *Haplocampa* “Lava Beds N.M.” We know of no specimens of *Plusiocampa* from California; Allen (2002) reports this genus only from Mexico; these records should be confirmed before this genus is confidently added to the California checklist.

***Campodea eureka* Hilton, 1932**

Hilton (1932) described this species from Humboldt County: “collected under redwoods above Eureka.” Condé & Thomas (1957) considered it a *nomen nudum*, and Allen (2002) doubted the taxon was valid.

***Campodea folsomi* Silvestri, 1911**

This species was reported from the same region as the *C. montis* type locality—Claremont and Pomona—by Gardner (1914), but *C. folsomi* is currently understood to be restricted to Mexico (Hilton 1937; Condé & Thomas 1957; Allen 2002).

***Campodea staphylinus* Westwood, 1842**

Schött (1897) reported the first published collection of a dipluran in California (in San Francisco by G. Eisen), but this is probably erroneous, according to Condé & Thomas (1957). *C. staphylinus* is understood to be limited to Europe (Lock *et al.* 2010).

***Campodea kerni* Hilton, 1932**

Tulare County: “in the Kern River Canyon at an altitude of about five thousand feet” (type in the Pomona College Collection) (Hilton 1932). Allen (2002) doubted that this was a valid taxon. Condé & Thomas (1957) reported it as a *nomen nudum*.

***Japyx* Haliday, 1864**

The description of a “*Japyx* sp.” specimen from “California,” figured by Kellogg (1908), is too vague to be recognizable, according to Reddell (1983). A specimen labeled *Japyx* sp. was collected in Crystal Springs Park, San Mateo, 27 Oct. 21, W. Pierce (LACM). The “*Japyx* sp. nov.” from Ventura County described by Cook (1898) is probably a mistaken locale, according to Reddell (1983). *Japyx* is currently understood to be limited to Europe and northern Africa (Reddell 1983).

Discussion

California hosts 63 species in 5 dipluran families, with 51 of those species endemic to the State, and half of these endemics limited to single locales. There is also endemism at higher taxonomic levels: the genera *Nanojapyx*, *Hecajapyx*, and *Holjapyx* are all primarily restricted to California (Reddell 1983; L. Smith, unpub. data). Also of note is that L. Smith was in the process of describing a new genus in the subfamily Japyginae (unpublished data, BME). Two species are understood to be exotic, and six dubious taxa are excluded from the State checklist. Condé & Thomas (1957) were surprised that *Campodea fragilis* Meinert, 1865 was not recorded from California, because it is widespread in northern North America, including Washington, and apparently on other continents as well (Paclt 1957; Allen 1994, 2002).

Sympatry in diplurans is common, especially among campodeids (Lock *et al.* 2010; this study). Certain locales, such as Mount Lowe (Los Angeles County) and Pinnacles National Monument (San Benito County), are unusually diverse in dipluran taxa, or represent errors in taxonomic determinations. For example, in one collection event (24 Mar. 1955), P. Remy apparently collected four different diplurans at Pinnacles National Monument, including 2 new species endemic to the locale: *Campodea californiensis*, *C. linsleyi*, *C. repentina*, and *Procampodea macswaini* (Condé and Pagés 1956; Condé & Thomas 1957). Because these specimens are lost, the taxonomy and sympatry of these species cannot easily be confirmed at this locale.

Species richness per county was plotted (Fig. 1), and shows that counties in the central Coastal Ranges have the highest diversity of diplurans. This may also indicate sampling bias, where regions near universities are typically better sampled, while some regions of California have yet to be sampled. Caves and mines harbor unique and endemic dipluran species (Ferguson 2009), and are under-sampled in California. However, most diplura are endogean and many may be incidental to caves, with only a few California species exhibiting obvious troglomorphy and being true cave obligates: *Haplocampa* “Roth’s Cave Dipluran”; *Haplocampa* “Helfer’s Cave Dipluran”; *Haplocampa*. “Lava Beds N.M.”; and *Haplocampa* sp. “B.” Troglomorphic features are understood to consist of the following: increase in body size; increase in appendage size (legs, antennae, cerci, urites); presence in some genera of well-developed latero-tergal crests on pretarsal claws; and increase in number of sensilla in the cupuliform organ of the apical antenna segment (Condé 1956; Pagés 1964; Ferguson 1981b, 1992). Pagés (1964) noted that among the Diplura and Myriapoda, the phytophagous or saprophagous species (campodeid diplurans and millipedes) display extensive troglomorphy or cave endemism, while the carnivorous species (japygid diplurans and centipedes) display very little troglomorphy or cave endemism.

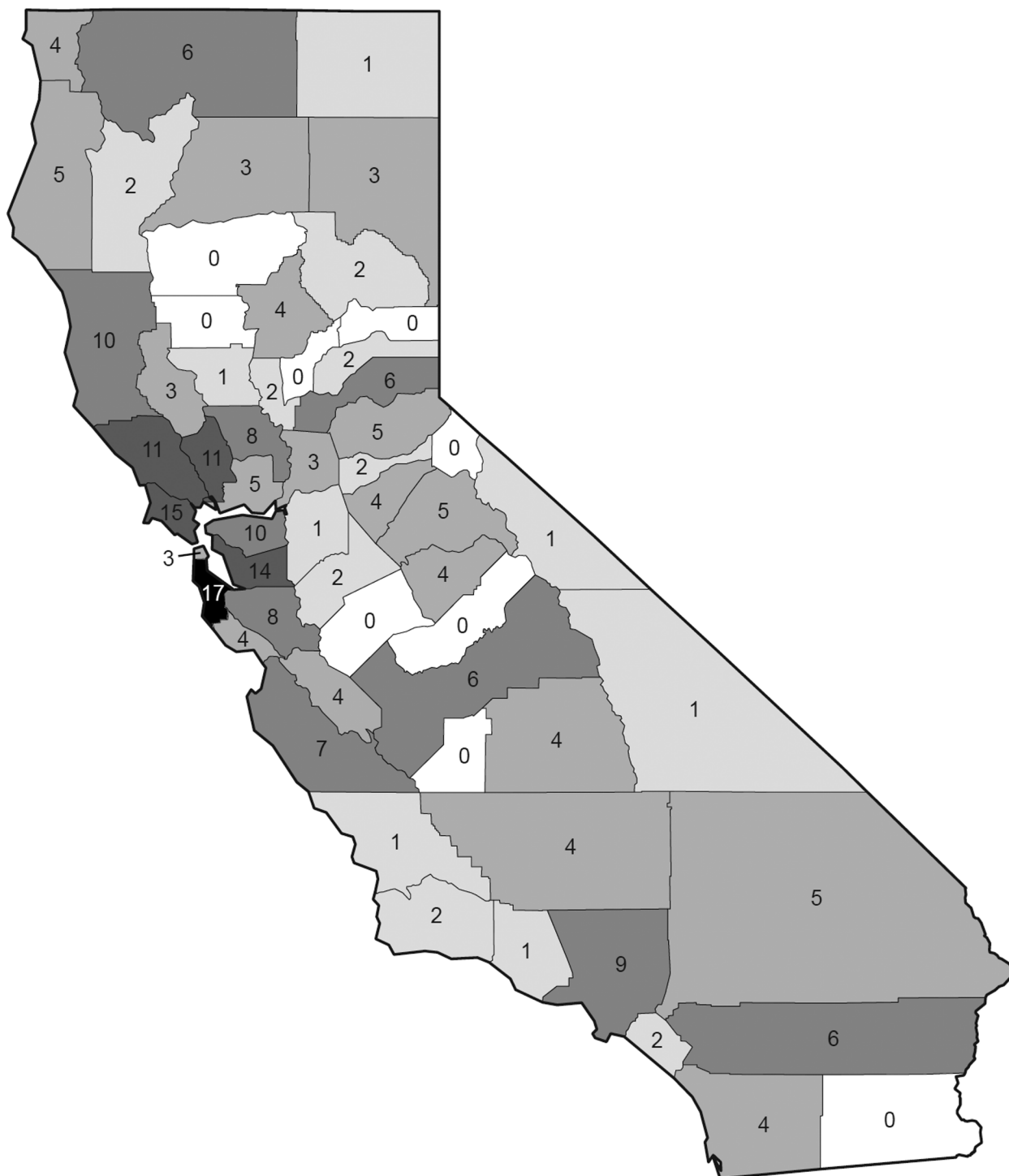


FIGURE 1. Dipluran species richness for each California county.

In general, the North American dipluran fauna is still under-inventoried, especially in subterranean habitats. The shortage of taxonomists, a global crisis (Agnarsson and Kuntner 2007), hampers the identification of additional, novel Californian taxa as well as the enumeration of true alpha and gamma richness. Since genera such as *Campodea* are morphologically very uniform, but genetically highly diverse, genetic analyses will need to be incorporated into future taxonomic descriptions (Podsiadlowski *et al.* 2006).

Based upon our current understanding of the distribution of diplurans in California, and the Natural Heritage Program conservation status assessment criteria established by Master (1991) and NatureServe (2013),

conservation rankings were assigned and should be adopted (Table 1). Equivalent IUCN Red List conservation rankings should also be assigned and adopted (IUCN 2013). Based upon these criteria, most of California taxa are considered globally rare or endangered. The use of diplurans as bioindicators of habitat quality and ecosystem integrity should be explored.

TABLE 1. Suggested Natural Heritage Program conservation status ranks with notes on endemism and distribution. Asterisks indicate taxa found in only one or two sites and from only a single county.

Taxon	Suggested Heritage Ranks ^a	Notes
Anajapygidae		
<i>Anajapyx hermosus</i> *	G1S1	single site endemic
Campodeidae		
<i>Campodea californiensis</i>	G3S3	CA endemic; 17 counties
<i>Campodea essigi</i> *	G1S1	CA endemic; only 2 sites
<i>Campodea insidiator</i>	G1S1	CA endemic; 5 sites
<i>Campodea kelloggi</i>	G3S2	Southern CA, AZ, and Mexico
<i>Campodea lamimani</i>	G2S2	CA endemic; 11 counties
<i>Campodea linsleyi</i>	G2S2	CA endemic; 6 counties
<i>Campodea michelbacheri</i>	G1S1	CA endemic; 4 counties, 4 sites
<i>C. monticola helenae</i> *	G1S1	single site endemic
<i>C. m. obsoleta</i> *	G1S1	single site endemic
<i>C. m. pilosa</i> *	G1S1	single site endemic
<i>Campodea montis</i>	G3S3	Common in southern CA; also in AZ
<i>Campodea repentina</i> *	G1S1	single site endemic
<i>Campodea scopigera</i> *	G1S1	single site endemic
<i>Campodea teresiae</i>	G1S1	CA endemic; 2 counties; 2 sites
<i>Campodea usingeri</i>	G2S2	CA endemic; 5 counties, 6 sites
<i>Haplocampa wheeleri</i> *	G1S1	Single site endemic
<i>Haplocampa</i> "Roth's Cave Dipluran"*	G1S1	single site endemic
<i>Haplocampa</i> "Helfer's Cave Dipluran/Lava Beds N.M."	G2S2	CA endemic; 3 counties; about 40 sites
<i>Haplocampa</i> sp. "B"*	G1S1	single site endemic
<i>Meiocampa hermsi</i>	G1S1	CA endemic; 2 counties; 2 sites
<i>Meiocampa mickeli</i>	G1S1	CA endemic; 3 counties; 3 sites
<i>Meiocampa wilsoni</i>	G3S2	Known from central CA and also AZ
<i>Metriocampa packardii</i>	G4S3	CA, ID, OR, WA
<i>Tricampa litura</i>	G1S1	CA endemic; 2 counties; 2 sites
<i>Tricampa rileyi</i>	G4S1?	CA, CO, IA, IL, LA, MT, OR, UT, WA, WY, Canada
Procampodeidae		
<i>Procampodea macswaini</i> *	G1S1	single site endemic
Japygidae		
<i>Evalljapyx adonis</i> *	G1S1	single site endemic
<i>Evalljapyx anombris</i>	G2S2	CA endemic; 8 counties
<i>Evalljapyx decorus</i> *	G1S1	single site endemic
<i>Evalljapyx dispar</i>	G1S1	CA endemic; 2 counties; 2 sites

.....continued on the next page

TABLE 1. (Continued)

Taxon	Suggested Heritage Ranks ^a	Notes
<i>Evalljapyx facetus</i>	G2S2	CA endemic; 11 counties
<i>Evalljapyx diversipleaura</i>	G3S2	10 sites in CA; also OR, WA
<i>Evalljapyx helferi</i>	G2S2	CA endemic; 7 counties
<i>Evalljapyx leechi</i> *	G1S1	single site endemic
<i>Evalljapyx mckenziei</i> *	G1S1	single site endemic
<i>Evalljapyx newelli</i>	G1S1	CA endemic; 2 counties; 4 sites
<i>Evalljapyx ombris</i>	G2?S2	4 counties in CA and possibly British Columbia
<i>Evalljapyx propinquus</i>	G2S2	CA endemic; 3 counties
<i>Evalljapyx raneyi</i> *	G1S1	single site endemic
<i>Evalljapyx sonoramus</i>	G2S1	4 counties in CA; also AZ
<i>Hecajapyx bucketti</i> *	G1S1	single site endemic
<i>Hecajapyx vulgaris</i>	G3S3	8 counties in CA and 3 counties in OR
<i>Hecajapyx</i> sp. nov.*	G1S1	single site endemic
<i>Holjapyx calaverasae</i> *	G1S1	single site endemic
<i>Holjapyx conspersus</i> *	G1S1	single site endemic
<i>Holjapyx diversiuuguis</i>	G2S2	CA endemic; 5 counties; 6 sites
<i>Holjapyx humidus</i> *	G1S1	single site endemic
<i>Holjapyx hyadis</i>	G2S2	CA endemic; 5 counties; 6 sites
<i>Holjapyx imbutus</i>	G1S1	CA endemic; 1 county; 3 sites
<i>Holjapyx insiccatu</i>	G1S1	CA endemic; 3 counties; 3 sites
<i>Holjapyx irroratus</i>	G2S1	2 counties, 2 sites in CA; also OR
<i>Holjapyx madidus</i> *	G1S1	single site endemic
<i>Holjapyx sheusteri</i>	G1S1	CA endemic; 2 counties; 2 sites
<i>Nanojapyx coalingae</i> *	G1S1	single site endemic
<i>Nanojapyx gentilei</i> *	G1S1	single site endemic
<i>Nanojapyx hamoni</i>	G1S1	CA endemic; 3 counties
<i>Nanojapyx pagesi</i>	G1S1	CA endemic; 2 counties; 4 sites
<i>Nanojapyx pricei</i>	G1S1	CA endemic; 1 county; 3 sites
<i>Occasjapyx californicus</i>	G1S1	CA endemic; 3 counties; 3 sites
<i>Occasjapyx kofoidi</i> *	G1S1 or GSHS	single site endemic; not detected in recent bioinventory
<i>Occasjapyx sierrensis</i>	G1S1	CA endemic; 2 counties; 5 sites
Japyginae genus nov.*	G1S1	single site endemic

^a The abbreviations and rationale for these conservation status ranking systems is detailed in Master (1991) and NatureServe (2013) for the Natural Heritage Program.

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Literature cited

- Allen, R.T. (1994) An annotated checklist and distribution records of the subfamily Campodeidae in North America (Insecta: Diplura: Rhabdura: Campodeidae). *Transactions of the American Entomological Society*, 120, 181–208.
- Allen, R.T. (2002) A synopsis of the Diplura of North America: keys to higher taxa, systematics, distributions and descriptions of new taxa (Arthropoda: Insecta). *Transactions of the American Entomological Society*, 128 (4), 403–466.
- Agnarsson, I. & Kuntner, M. (2007) Taxonomy in a changing world: seeking solutions for a science in crisis. *Systematic Biology*, 56, 531–539.
- Bareth, B. & Condé, B. (1958) Campodéidés endogés de l'ouest des États-Unis (Washington, Oregon, Californie, Arizona). *Bulletin Mensuel de la Société Linnéenne de Lyon*, 27, 226–248, 265–276, 297–304.
- Briggs, T.S. & Ubick, D. (1988) Cavernicoles from Cave Gulch, Santa Cruz County. *California Caver*, 28 (2), 43–44.
- Cook, O.F. (1898) [untitled]. *Proceedings of the Entomological Society of Washington*, 4, 53.
- Condé, B. (1956) Matériaux pour une monographie des Diploures Campodéidés. *Mémoires du Muséum d'Histoire Naturelle, Série A Zoologie*, 12 (1955), 202 pp.
- Condé, B. (1973) Campodéidés endogés de l'Est des États-Unis. *Bulletin de la Société Linnéenne de Lyon*, 42 (special), 17–29.
- Condé, B. & Pagés, J. (1956) Un second représentant de la famille des Procampodeides: *Procampodea macswaini* n. sp., de Californie. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences (Paris)*, 242, 1530–1531.
- Condé, B. & Thomas, J. (1957) Contribution à la faune des Campodéidés de Californie (Insectes Diploures). *Bulletin Mensuel de la Société Linnéenne de Lyon*, 26, 81–96, 118–127, 142–155.
- Crawford, R.L. (1998) Report to Kelly Furhmann, Lava Beds National Monument, U.S. National Park Service, 4 pp.
- Dallai, R., Mercati, D., Carapelli, A., Nardi, F., Machida, R., Sekiya, K. & Frati, F. (2011) Sperm accessory microtubules suggest the placement of Diplura as the sister-group of Insecta s.s. *Arthropod Structure & Development*, 40, 77–92. <http://dx.doi.org/10.1016/j.asd.2010.08.001>
- Elliott, W.R. (1978) *Final report on the New Melones cave harvestman transplant*. Contract #DACW05-78-C-007, U.S. Army Corps of Engineers, Sacramento District, California, 62 pp.
- Ferguson, L.M. (1975) Subterranean campodeids (Insecta: Diplura: Campodeidae) from the northwestern United States. *Bulletin of the Association of Southeastern Biologists*, 22, 53.
- Ferguson, L.M. (1981a) Systematics, evolution, and zoogeography of the cavernicolous Campodeids of the genus *Litocampa* (Diplura: Campodeidae) in the United States. Ph. D. Dissertation, Virginia Polytechnic Institute, Blacksburg, Virginia, 371 pp.
- Ferguson, L.M. (1981b) Cave Diplura of the United States. In: Beck, B. (Ed.), *Proceedings of the Eighth International Congress of Speleology. Vol. 1*. Bowling Green, Kentucky, pp. 11–12.
- Ferguson, L.M. (1983) Diplura of volcanic caves. *NSS Bulletin*, 45, 8–9.
- Ferguson, L.M. (1990) Insecta: Diplura. In: Dindal, D. (Ed.), *Soil biology guide*. John Wiley and Sons, New York, pp. 951–964.
- Ferguson, L.M. (1992) Diplura of lava tube caves. In: Rea, G. (Ed.), *Proceedings of the 6th International Symposium on Vulcanospeleology*, August 1991, Hilo, Hawaii, pp. 281–284.
- Ferguson, L.M. (2009) Preliminary report on the cave diplura of Colorado (Hexapoda: Diplura: Campodeidae). In: White, W.B. (Ed.), *Proceedings of the 15th International Congress of Speleology, Kerrville, Texas. Vol. 3. Contributed Papers*. pp. 1283–1285.
- Gardner, R.E. (1914) Some notes on the distribution of *Cimura* in the vicinity of Claremont, with description of new species. *Journal of Entomology and Zoology (Claremont)*, 6, 86–92.
- Grassi, B. (1886) I progenitori degli Insetti e dei Mirapodi: 1. Sistematica, morfologica e notizie embrilogiche sull'*Japyx*. *Atti dell'Accademia Gioenia di Scienze Naturali*, Ser. 3, 19, 1–83.
- Hilton, W.A. (1932) The *Campodea* of California. *Journal of Entomology and Zoology (Claremont)*, 24, 47–51.
- Hilton, W.A. (1936) *Campodea* from the United States. *Journal of Entomology and Zoology (Claremont)*, 28, 5–10.
- Hilton, W.A. (1937) *Campodea* from Mexico: *Journal of Entomology and Zoology (Claremont)*, 29, 100–104.
- Ingels, L.G. (1929) The seasonal and associational distribution of the fauna of the upper Santa Anna River wash. *Journal of Entomology and Zoology (Claremont)*, 21, 1–48, 57–96.
- International Union for Conservation of Nature and Natural Resources (2013) The IUCN Red List of Threatened Species (Internet database). IUCN Red List Unit, Cambridge, United Kingdom. Available from: <http://www.iucnredlist.org/> (accessed 1 May 2013)
- Kellogg, V.L. (1908) *American insects, second edition, revised*. Henry Holt and County, New York, 694 pp.
- Krejca, J.K. (2006) *Final report for inventory of karst fauna in Sequoia, Kings Canyon and Yosemite National Parks*. Prepared for Sequoia, Kings Canyon and Yosemite National Parks, California. Contract number P8558022608. Zara Environmental LLC, Buda, Texas, 156 pp.

- Krejca, J.K. (2009) *Errata 1 and Errata 2: Inventory of Karst Fauna in Sequoia, Kings Canyon and Yosemite National Parks*. Zara Environmental, Buda, Texas, 4 pp. + 7 pp.
- Lock, K., Adriaens, T. & Stevens, M. (2010) Distribution and ecology of the Belgian *Campodea* species (Diplura: Campodeidae). *European Journal of Soil Biology*, 46, 62–65.
<http://dx.doi.org/10.1016/j.ejsobi.2009.09.003>
- Master, L.L. (1991) Assessing threats and setting priorities for conservation. *Conservation Biology*, 5, 559–563.
<http://dx.doi.org/10.1111/j.1523-1739.1991.tb00370.x>
- NatureServe, Inc. (2013) NatureServe Explorer: An online encyclopedia of life, Version 7.1. NatureServe, Arlington, Virginia. Available from: <http://www.natureserve.org/explorer>. (accessed 1 May 2013)
- Paclt, J. (1957) Diplura. In: *Genera Insectorum de P. Wytzman*. Fasc. 212E, 123 pp.
- Pagés, J. (1964) Remarques sur les Japygidae (Insecta, Diplura) signals dans le domaine souterrain, *International Journal of Speleology*, 1, 191–201, pl. 45–46.
<http://dx.doi.org/10.5038/1827-806x.1.1.15>
- Peck, S.B. (1973) A review of the invertebrate fauna of volcanic caves in western North America. *National Speleological Society Bulletin*, 35, 99–107.
- Podsiadlowski, L., Carapelli, A., Nardi, F., Dallai, R., Koch, M., Boore, J.L. & Frati, F. (2006) The mitochondrial genomes of *Campodea fragilis* and *Campodea lubbocki* (Hexapoda: Diplura): High genetic divergence in a morphologically uniform taxon. *Gene*, 381, 49–61.
<http://dx.doi.org/10.1016/j.gene.2006.06.009>
- Reddell, J.R. (1983) A checklist and bibliography of the Japygoidea (Insecta: Diplura) of North America, Central America, and the West Indies. *Texas Memorial Museum Pearce Sellards Series*, 37, 1–41.
- Rudolph, D.C., Elliott, W.R., Reddell, J.R. & Briggs, T.S. (1985) *The cave fauna of California*. Unpublished manuscript, 71 pp.
- Schott, H. (1897) North American Apterygogenea. *Proceedings of the California Academy of Sciences, 2nd series*, 6, 169–196.
- Schoville, S.D. & Graening, G.O. (2013) Updated checklist of the ice-crawlers (Insecta: Grylloblattodea: Grylloblattidae) of North America, with notes on their natural history, biogeography and conservation. *Zootaxa*, 3737 (4), 351–378.
<http://dx.doi.org/10.11646/zootaxa.3737.4.2>
- Silvestri, F. (1911) Materiali per lo studio dei Tisanuri XII. Un novo genere e undici specie nove di Japygidae dell'America settentrionale. *Bollettino del Laboratorio di Zoologia General e Agraria della R. Scuola Superiore d'Agricoltura in Portici*, 5, 72–87, 97–99.
- Silvestri, F. (1912) Nuovi generi e nuove specie di Campodeidae (Thysanura) dell'America settentrionale. *Bollettino del Laboratorio di Zoologia General e Agraria della R. Scuola Superiore d'Agricoltura in Portici*, 6, 5–25.
- Silvestri, F. (1928) Description of a new species of *Japyx* (Thysanura) from Potter Creek Cave, Shasta County, California. *University of Californai Publications in Entomology*, 4, 335–340.
- Silvestri, F. (1931) Campodeidae (Ins. Thysanura) di Cuba. *Bollettino del Laboratorio di Zoologia General e Agraria della R. Scuola Superiore d'Agricoltura in Portici*, 24, 299–318.
- Silvestri, F. (1933) Quarto contributo alla conoscenza dei Campodeidae (Thysanura) del Nord America. *Bollettino del Laboratorio di Zoologia General e Agraria della R. Scuola Superiore d'Agricoltura in Portici*, 27, 156–204.
- Silvestri, F. (1947) On some Japygidae in the Museum of Comparative Zoology (Dicellura). *Psyche*, 54, 209–229.
<http://dx.doi.org/10.1155/1947/93896>
- Silvestri, F. (1948) Descrizioni di alcuni Japyginae Insecta Diplura del Nord America. *Bollettino del Laboratorio di Zoologia General e Agraria della R. Scuola Superiore d'Agricoltura in Portici*, 8, 118–136.
- Smith, L.M. (1959a) The Japygidae of North America, 1. Provalljapyginae and *Nanojapyx*. *Pan-Pacific Entomologist*, 35, 99–107.
- Smith, L.M. (1959b) The Japygidae of North America, 2. The genus *Holjapyx* and descriptions of new species. *Pan-Pacific Entomologist*, 35, 177–186.
- Smith, L.M. (1959c) The Japygidae of North America, 3. *Occasjapyx* Silvestri and *Hecajapyx* n. gen. *Annals of the Entomological Society of America*, 52, 363–368.
- Smith, L.M. (1959d) Japygidae of North America, 4. New Species of *Evalljapyx* with twenty-four antennal segments (Diplura). *Proceedings of the Entomological Society of Washington*, 61, 267–274.
- Smith, L.M. (1960a) Japygidae of North America, 5. Species of *Evalljapyx* with 30+1 segments in the antenna (order Diplura). *Annals of the Entomological Society of America*, 53, 137–143.
- Smith, L.M. (1960b) Japygidae of North America, 6. New Species of *Evalljapyx* with 26 antennal segments. *Journal of the Kansas Entomological Society*, 33, 1–6.
- Smith, L.M. (1960c) The family Projapygidae and Anajapygidae (Diplura) in North America. *Annals of the Entomological Society of America*, 53, 575–583.
- Smith, L.M. (1961) Japygidae of North America, 8: Post embryonic development of Parajapyginae and Evalljapyginae (Insecta, Diplura). *Annals of the Entomological Society of America*, 54, 437–441.
- Smith, L.M. (1964) Japygidae of North America, 11: The genus *Hecajapyx*. *Pan-Pacific Entomologist*, 40, 37–39.
- Taylor, S.J. & Krejca, J.K. (2006) *Final report: a biological assessment of caves in Lava Beds National Monument*. Illinois Natural History Survey, Center for Biodiversity Technical Report 2006 (6), 107 pp.