

Generic Revisions of Mayfly Nymphs. I. *Traverella* in North and Central America (Leptophlebiidae)^{1,2}

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ABSTRACT

The 14 described species of *Traverella* are discussed, and synonymies and other pertinent data are presented for all North and Central American species. The 7 species of *Traverella* nymphs are included in an illustrated key and distribution map, and accounts of each include complete

synonymy, nymphal description and collection records. Nymphs designated as *Traverella* spp. A, B, C, are described, and the nymph of *T. lewisi* n. sp. is described and named.

There is great need for means of identification of nymphal mayflies for research in aquatic ecology, stream pollution, and fisheries biology, and this paper is the 1st in a series of planned generic revisions which will make available keys and descriptions by which the aquatic stage of the Ephemeroptera can be named and organized. The treatment of each species includes a name, or an informal epithet (e.g. A,B,C), a nymphal description or diagnosis, collection records, and illustrated keys and distribution maps. Described adults whose nymphs are unknown are included with complete synonymy, known distribution, and other pertinent data.

Institutions where specimens are deposited are indicated by the following abbreviations: British Museum (Natural History), BM; California Academy of Sciences, CAS; Canadian National Collection, CNC; Cornell University, CU; Lewis Berner Collection, LB; and the University of Utah, UU. Specimens without designation are deposited in the collection of California State University, Los Angeles, and collections by the author are indicated by the initials RKA.

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Genus *Traverella* Edmunds

Traverella Edmunds, 1948: 141; Edmunds, 1950: 551; Traver, 1960b: 24; Traver, 1960c: 73; Traver, 1963: 25; Packer, 1966: 9; Tsui & Peters 1972: 331.

Edmunds (1948) erected *Traverella* for *Thraulius albertana* McDunnough, 1931, based upon nymphs and reared adults collected in E Utah. In this same paper, he transferred *Thraulius presidianus* Traver,

1934, and described the nymph of *T. presidiana* as *Traverella* sp?, from specimens collected at Zapata, TX, and Tamaulipas, MEX. In 1950, Edmunds transferred *Thraulius ehrhardti* Ulmer, 1919, *T. maculipennis* Ulmer, 1919, *T. primanus* Eaton, 1892, and *T. versicolor* Eaton, 1892, to *Traverella*; and Traver (1960c) transferred *Thraulius bradleyi* Needham & Murphy, 1924, *T. montium* Ulmer, 1943, and *T. valdemari* Esben-Peterson, 1912, into this genus. *Traverella castanea* Kilgore & Allen was published in 1973, and *T. lewisi* n. sp. is described below. Three species of nymphs from Mexico and Central America are described herein, and the total number of described *Traverella* is 14. The Mexican and Central American nymphs are designated by letter, as the application of formal names is not desirable at this time. All have been collected within or near the known or expected distributional ranges of *T. primana* and *T. versicolor*, which are known only from described adults.

Traverella is confined to the New World and is considered to be of austral origin. The genus is a dominant element in the mayfly fauna of the SW United States, Mexico, and Central and South America. *Traverella bradleyi* is known from Brazil and Argentina, *T. ehrhardti* from Brazil and Uruguay, *T. maculipennis* from Brazil, *T. valdemari* from Argentina, and *T. montium* from Peru. *Traverella versicolor* is known from Costa Rica and Panama, *T. primana* from Costa Rica and Mexico, *Traverella* sp. A from Guatemala and Mexico, *Traverella* sp. B from Mexico, and *Traverella* sp. C from Honduras and Mexico. *Traverella presidiana* occurs from N central Mexico to N central Texas; *T. castanea* has a limited distributional range in New Mexico and Arizona; *T. lewisi* is recorded from Ohio and North Dakota; and *T. albertana* is widely distributed in W North America from Arizona to S Canada. The known latitudinal range of *Traverella* is from Arequita, Lavelleja Province, Uruguay (34°20'S latitude) to Saskatoon, Saskatchewan Province, Canada (52°10'N latitude).

The 5 South American species and *T. primana* and *T. versicolor* are known from only the adult stage; *T. albertana* and *T. presidiana* from both nymphal and adult stages; and *T. castanea*, *T. lewisi*, and *Traverella* spp. A, B, and C only from nymphs.

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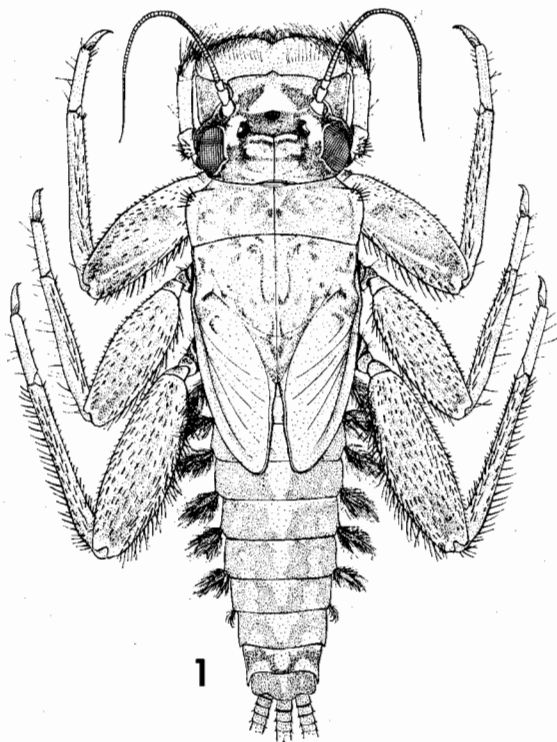


FIG. 1.—*Traverella* sp. A, mature female nymph, dorsal view.

NYMPHAL STAGE

Generic Characters.—Body moderately flattened. Head rectangular; clypeus with a median frontal projection, projection directed dorsally or anteriorly and poorly to well developed (Fig. 1–8); labrum as wide as head with a median emargination (Fig. 11); maxillary palpi exposed at lateral margins of head and palpi with dense setae on apical segments (Fig. 9); mandibles exposed dorsally and angulate on outer margins near canines (Fig. 12–13); labium as in Fig. 10. Pronotum wider than head; anterolateral margins of pronotum angled; pronotum with a group of spines at anterolateral corners (Fig. 1); femora moderately flattened with anterior and marginal spines (Fig. 14–16); tibiae and tarsi with marginal spines and setae; tarsal claws usually with 5–6 small basal and 5–6 large apical denticles (Fig. 18). Abdomen flattened ventrally, convex dorsally; abdominal gills present on Segments 1–6 or 1–7, gills largest on Segment 1, smallest on Segment 7; gills on Segment 7 variable and often reduced in size (Fig. 20–22); gills with double lamellae and with fimbriate margins (Fig. 19). Lateral cerci shorter than median terminal filament.

The characters most useful in distinguishing the species of *Traverella* nymphs are as follows: (1) the shape, direction, and degree of development of the frontoclypeal projection; (2) the color of the body and legs, and the markings on the abdominal terga

and legs; (3) the body size; (4) the number of spines on the anterior surface of the fore and hind femora; and (5) the known geographic distribution.

The following key will serve to distinguish the nymphs of the 7 North and Central American species.

Key to the Species

1. Frontoclypeal projection directed upward over clypeus (Fig. 2) **species C**
—Frontoclypeal projection directed forward over labrum, projection often small and barely discernible (Fig. 3–8) 2
- 2(1). Frontoclypeal projection more than $\frac{1}{2}$ as long as labrum (Fig. 3–4); femora pale with dark black markings as in Fig. 14 3
—Frontoclypeal projection less than $\frac{1}{2}$ as long as labrum (Fig. 5–8); femora pale to red, often suffused with black but without distinct black markings (Fig. 1) 4
- 3(2). Frontoclypeal projection spatulate (Fig. 3); known geographic distribution from N central Mexico to N central Texas (Fig. 23) .. **presidiana**
—Frontoclypeal projection triangular (Fig. 4); known geographic distribution from S Mexico only (Fig. 23) **species B**
- 4(2). Abdominal terga pale with a distinct black transverse band on each segment (Fig. 17); frontoclypeal projection small (Fig. 5–6) **albertana**
—Abdominal terga brown to reddish brown and red, without distinct black markings; frontoclypeal projection moderate (Fig. 7–8) 5
- 5(4). Abdominal terga light brown to brown with pale median markings, pale markings often barely discernible (Fig. 1); known distribution from Central America to S central Mexico (Fig. 23) **species A**
—Abdominal terga reddish brown to red and without pale markings; distribution in SW or central United States (Fig. 23) 6
- 6(5). Abdominal terga and legs red; gills on abdominal segment 7 reduced in size (Fig. 21); body less than 8 mm long; anterior surface of fore femora with fewer than 30 short spines (Fig. 15); known distribution only from N central United States (Fig. 23) **lewisi**
—Abdominal terga reddish brown and legs brown; gills on abdominal segment 7 normally developed (Fig. 20); body more than 10 mm long; anterior surface of fore femora with more than 50 short spines (Fig. 16); known distribution only from SW United States (Fig. 23) ... **castanea**

Traverella albertana (McDunnough)

Thraulius albertanus McDunnough, 1931: 82; Traver, 1935: 554.

Traverella albertana Edmunds, 1948: 142; Edmunds, 1959: 80; Edmunds & Musser, 1960: 121; Tsui & Peters, 1972: 331; Kilgore & Allen, 1973: 327.

McDunnough (1931) described this species from a series of adults collected from Alberta, and reported additional specimens from Saskatchewan. Edmunds (1948) reared nymphs from the Green River, in E Utah, and described the nymphal stage. Edmunds & Musser (1960) reported records from Wyoming,

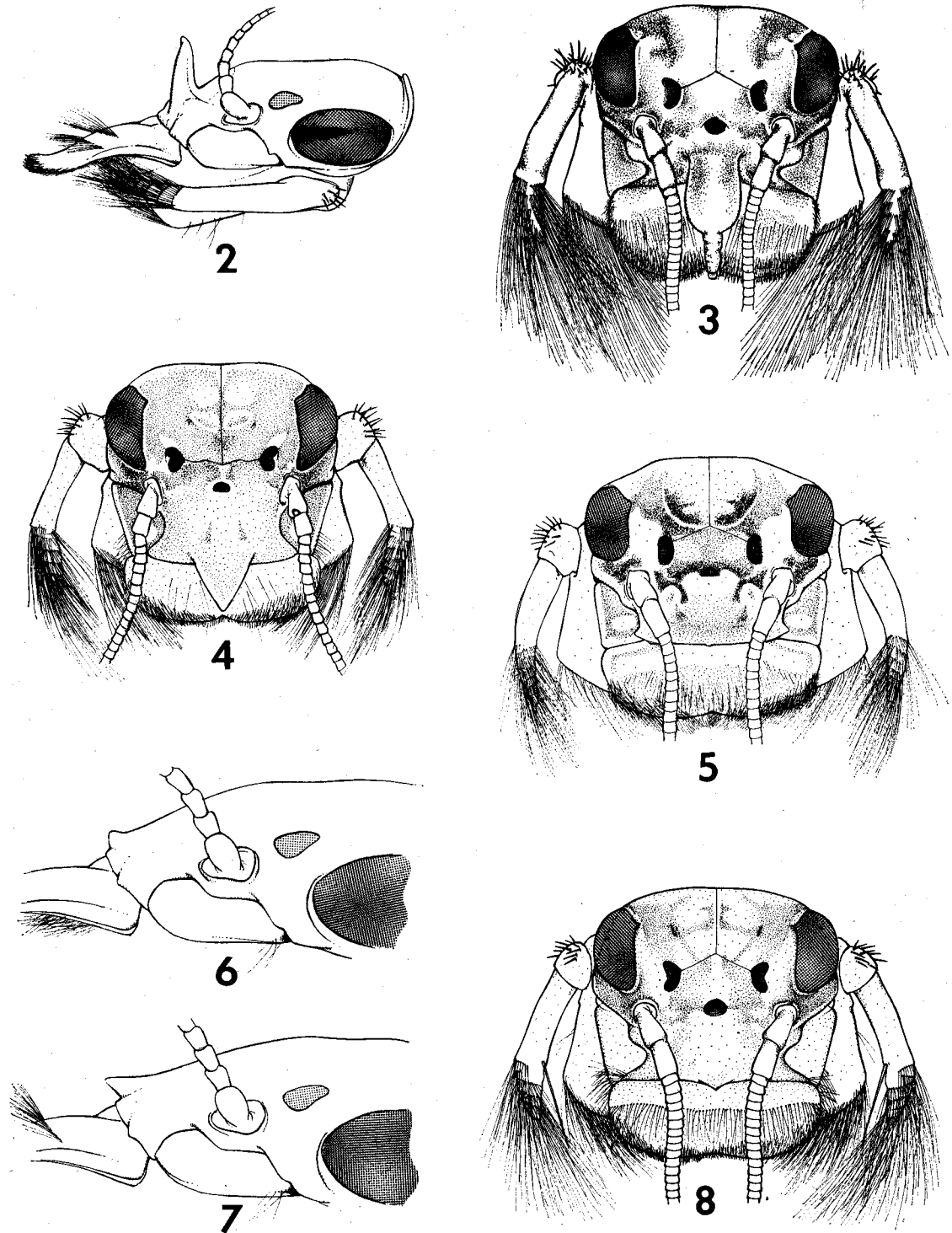


FIG. 2-8.—*Traverella* spp., nymphal heads. 2, species C, side view; 3, *presidiana*, dorsal view; 4, species B, dorsal view; 5, *albertana*, dorsal view; 6, *albertana*, side view; 7, *castanea*, side view; 8, *castanea*, dorsal view.

and Kilgore & Allen (1973) published a S-range extension into central Arizona.

Type Locality.—Medicine Hat, Alberta, Canada.

Type.—No. 3257, Canadian National Collection, Ottawa.

Nymph.—Length: body 9.0–10.0 mm; caudal filaments 9.0–10.0 mm. General color pale to light brown with black markings. Head pale to light brown with variable black markings; mouthparts as in Fig. 9–13; frontoclypeus with a poorly developed median projection above labrum, projection barely discernible (Fig. 5–6). Thoracic nota pale to light brown with variable black markings; legs pale, femora washed with black; fore femora with fewer than 30 short spines on anterior surface; hind femora with fewer than 75 short spines on anterior surface; tibiae and tarsi pale; tarsal claws with 6–7 large apical and 5–6 small basal denticles. Abdominal terga pale to light brown, and each tergum with a black transverse band (Fig. 17); abdominal gills well developed on Segments 1–7; abdominal sterna pale. Caudal filaments pale.

Habitat.—Edmunds (1948) described the nymphal habitat of *T. albertana* as a wide river at an elevation of ca. 5,000 feet, with a bottom of sand, mud, and rocks, and with summer temperature of 67°F avg. In Arizona, nymphs occur in moderately wide rivers (20–30 feet in width), with the same bottom type as described above, but at lower elevations and with a higher water temperature. Nymphs were collected in rivers between 2,700 and 3,500 feet elevation, with a water temperature between 78 and 82°F. Nymphs cling to the undersides of rocks in the area of maximum stream flow.

Distribution.—This species has the widest latitudinal distribution of any of the described species (Fig. 23). It is known from Clifton, AZ (33°04' N latitude) to Saskatoon, Saskatchewan (52°10' N latitude). Records are as follows:

ALBERTA: Medicine Hat, 22-VIII, J. H. Pepper (CNC). ARIZONA: *Gila County*, E Verde River on Rd. 406, 10 miles E Payson, 19-VII-70, RKA; Salt River on Hwy. 288, 20-VII-70, RKA; *Greenlee County*, Blue River at Clifton, 4-VII-64, RKA; *Yavapai County*, Verde River at Camp Verde, 18-VII-70, RKA. COLORADO: *Moffit County*, Yampa River, Deerlodge Park, 1-VIII-62, D. Q. Anderson (UU); Elkhead River, on Hwy. 40, 6 miles E Craig, 22-VIII-67, B. R. Oblad (UU); Green River, Gates of Ladore, 31-VII-62, D. Q. Anderson (UU). IDAHO: *Nez Perce County*, Snake River, Lewiston, 30-VII-51, J. N. Wilson (UU); *Idaho County*, Salmon River, 2 miles S Whitebird, 6-IX-58, G. F. Edmunds, Jr. & RKA (UU). MONTANA: *Park County*, Yellowstone River, Forsyth, 29-VIII-56, G. F. Edmunds, Jr. (UU). SASKATCHEWAN: Saskatoon, 9-IX, K. M. King (CNC). UTAH: *Daggett County*, Green River, 30-VII-59, C. Smith & G. G. Musser (UU); *Emery County*, Green River at Green River State Park, 8-IX-67, R. W. Koss & D. Argyle (UU); *Kane County*, Escalante River, 19-VII-58, G. R. Smith & G. G. Musser (UU); *San*

Juan County, Colorado River, 16-VII-58, G. R. Smith & G. G. Musser (UU); *Uintah County*, Green River, Rainbow Park, Dinosaur Natl. Monu., 5-VIII-63, D. Argyle (UU); Split Mountain Gorge Campground, Dinosaur Natl. Monu., 19-IX-61, G. F. Edmunds, Jr. & W. L. Peters (UU); Ashley Creek, 5 miles W Jensen, 31-VIII-49, G. F. Edmunds, Jr. (UU); *Washington County*, Virgin River, Zion Natl. Park, VII-51, G. F. Edmunds, Jr. (UU). WASHINGTON: *Benton County*, Columbia River, Finley, 27-VIII-51, J. J. Davis (UU); *Walla Walla County*, Walla Walla River, 6 miles above mouth, 14-VIII-54, J. J. Davis (UU). WYOMING: *Sweetwater County*, Green River, 17-VII-59, G. G. Musser (UU).

Traverella castanea Kilgore & Allen

Traverella nr. *albertana* Koss & Edmunds 1970: 55.

Traverella castanea Kilgore & Allen, 1973: 327.

This species was first reported in the literature by Koss & Edmunds (1970) from specimens collected in the Gila River, and was named and described from nymphs collected from this same locality. The adult stage is unknown.

Type Locality.—E Fork Gila River on Hwy. 527, Grant County, NM.

Type.—California Academy of Sciences, San Francisco.

Nymph.—Length: body 10.5–11.5 mm; caudal filaments 11.0–12.0 mm. General color brown to reddish brown with dark brown, black, and pale markings. Head brown with black and pale markings; head usually with a pale median occipital macula, and paired pale maculae mesad to compound eyes; frontoclypeus with a short median projection above labrum (Fig. 7–8). Thoracic nota light brown to reddish brown with pale and dark brown markings; legs light brown; femora dark brown, often with a pale median longitudinal stripe; fore femora with more than 50 short spines on anterior surface (Fig. 16); hind femora with more than 100 short spines on anterior surface; tibiae pale, usually suffused with red; tarsi pale; tarsal claws with 8–9 large apical and 5–6 small basal denticles. Abdominal terga light brown to reddish brown; abdominal gills well developed on Segments 1–7 (Fig. 19); abdominal sterna pale, often suffused with red. Caudal filaments pale.

Habitat.—*Traverella castanea* nymphs occur on the undersides of rocks in small rivers with a moderate stream flow. Specimens have been collected in water between 3,200 and 6,000 feet elevation with summer, daytime temperatures between 76 and 82°F.

Distribution.—This species has a narrow latitudinal distribution as it is known from only S New Mexico and central Arizona (Fig. 23). Records are as follows:

ARIZONA: *Gila County*, E Verde River on Rd. 406, 10 miles E Payson, 19-VII-70, RKA; *Navajo County*, N Fork White River at Whiteriver, 5-VII-64, RKA; *Yavapai County*, Verde River at Verde Valley, 18-VII-70, RKA; Oak Creek near Cornville, 17/18-VII-70, RKA. NEW MEXICO: *Grant County*, E Fork Gila River on Hwy. 527, 21-VII-70, RKA;

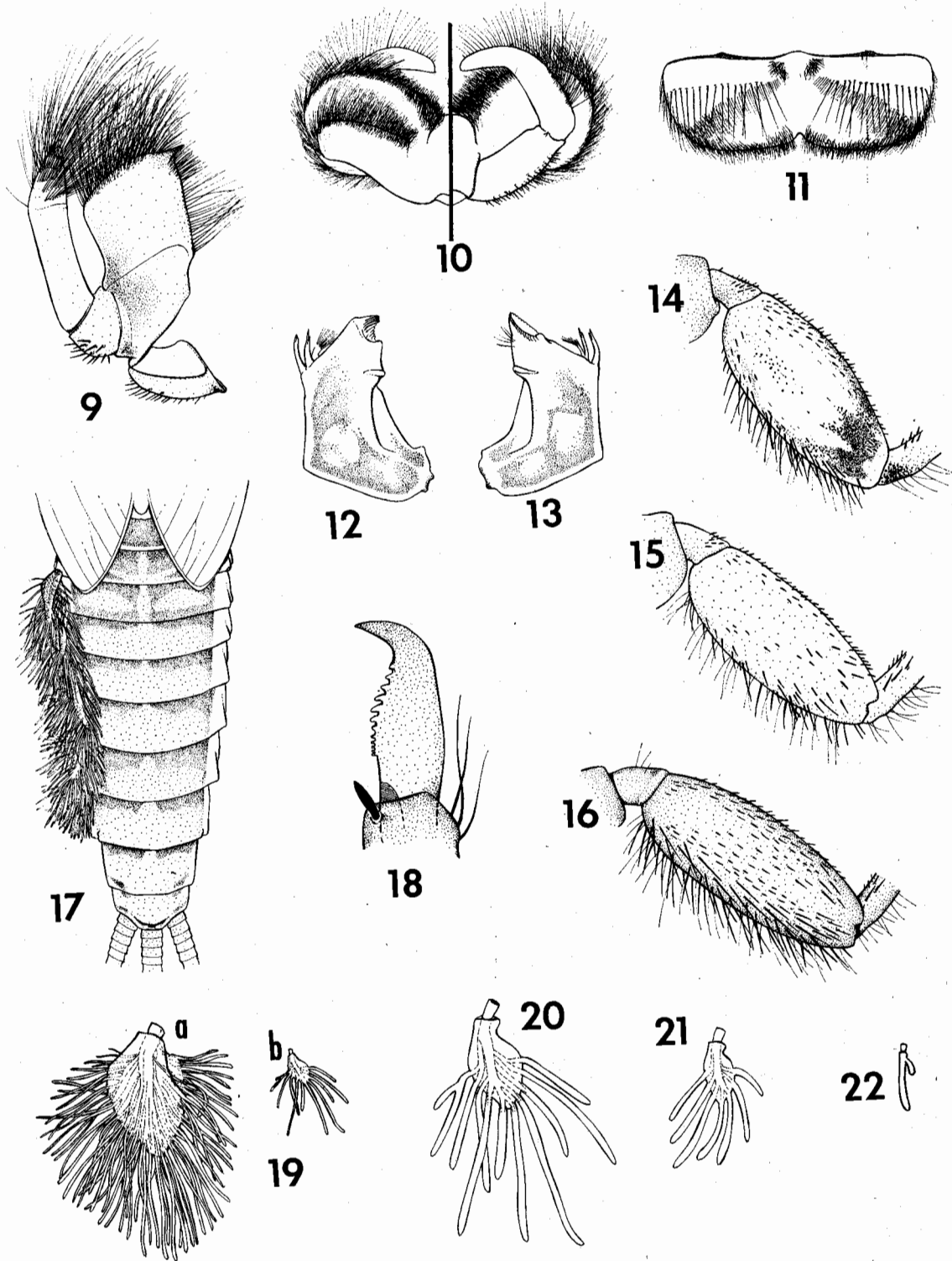


FIG. 9-13.—*Traverella albertana*, mouthparts. 9, maxilla; 10, labium; 11, labrum; 12, left mandible; 13, right mandible.

FIG. 14-22.—*Traverella* spp., nymphal parts. 14, *presidiana*, fore femur; 15, *lewisi*, fore femur; 16, *castanea*, fore femur; 17, *albertana*, abdomen, dorsal view; 18, *presidiana*, tarsal claw; 19, *castanea*, gills (a, Gill 3; b, Gill 7); 20, *castanea*, Gill 7 enlarged; 21, *lewisi*, Gill 7 enlarged; 22, species A, Gill 7 enlarged.

W Fork Gila River on Hwy. 527, 21-VII-70, RKA; Gila River near Cliff on Hwy. 180, 21-VII-70, RKA; *Catron County*, San Francisco River at Glenwood, 21-VII-70, RKA.

Traverella lewisi Allen n. sp.

Nymph.—Length: body 6.5–7.5 mm; caudal filaments 7.0–8.0 mm. General color red. Head pale red; head usually with a pale macula mesad to compound eyes and a black inverted U-shaped marking between lateral ocelli; frontoclypeus with a short forwardly-directed median projection above labrum as in Fig. 7–8. Thoracic nota pale red; legs red; fore femora with fewer than 30 short spines on anterior surface (Fig. 15); hind femora with fewer than 80 short spines on anterior surface; tarsal claws with 6–7 large median denticles and 5–6 small basal denticles. Abdominal terga red, often with indistinct dark markings; abdominal gills pale; gills well developed on Segments 1–6, poorly developed on Segment 7 (Fig. 21); abdominal sterna red. Caudal filaments reddish brown.

Types.—Holotype: mature nymph, Missouri River, Williston, Williams County, ND, 19-VIII-67, Ross Powers, in collection University of Utah, Salt Lake City. Paratopotype: 1 nymph, same data as holotype, in collection Environmental Protection Agency, Cincinnati, OH. Paratypes: 2 nymphs, Ohio River, Evansville, Vanderburgh County, IN, 5-IX-67, Max Anderson, 1 each in collections Environmental Protection Agency and California State University, Los Angeles.

REMARKS.—*Traverella lewisi* is similar to *T. castanea* in the degree of development of the frontoclypeal projection, but differs in body size, color, and known geographic distribution. It differs from *T. albertana* in the above characters and also in the degree of development of the frontoclypeal projection. This species is named in honor of Philip A. Lewis who sent the type material for examination and gave permission to publish the description.

Traverella presidiana (Traver)

Thraululus presidianus Traver, 1934: 199; Traver, 1935: 146.

Traverella presidiana Edmunds, 1948: 143; Traver, 1960a: 3; Traver, 1960c: 73.

This species was described from a single male imago, and Edmunds (1948) described the nymphal stage as *Traverella* sp?

Type Locality.—Presidio, TX.

Type.—No. 1261.1 in Cornell University collection, Ithaca, NY.

Nymph.—Length: body 7.0–8.0 mm; caudal filaments 7.0–8.0 mm. General color pale with black markings. Head pale with black markings; frontoclypeus with a large, spatulate median projection above labrum; projection extends to, or beyond, anterior margin of labrum (Fig. 3). Thoracic nota pale with black marginal and submedian longitudinal streaks; femora pale with black markings, usually with a median black macula and a transverse sub-

apical black band, as in Fig. 14; tibiae with a faint black basal macula; tarsi pale; tarsal claws with 6–7 large apical and 5–6 small basal denticles (Fig. 18). Abdominal terga pale to light brown, often suffused with black; gills well developed on Segments 1–6, poorly developed on Segment 7; abdominal sterna pale. Caudal filaments pale.

Habitat.—Nymphs are found in moderately large to large rivers on rocks and among debris. In the Rio Grande, individuals are common on rocks near the shore in slow moving water, and it is not known if they also occur in the deeper, faster moving parts of the river. Specimens have been collected from near sea level to 1,500-ft elevation in water between 70 and 75°F.

Distribution.—The latitudinal range of this species is narrow (Fig. 23). Specimens have been collected from Ciudad Victoria, Tamaulipas, Mexico (23°47' N latitude) to Clifton, TX (31°49' N latitude). Records are as follows:

MEXICO: *Nuevo Leon*, Rio Salinas at Cienega de Flores, 25-XI-68, RKA; Rio Sabinas at Sabinas Victoria, 4-VIII-70, RKA; Rio Ramos at Allende on Hwy. 85, 5-VIII-70, RKA; Rio Pilon at Montemorelos, 5-VIII-70, RKA; Rio Camacho at Linares, 5-VIII-70, RKA; *Tamaulipas*, Rio Guayalayo at Llera, 6-VIII-70, RKA; Rio Guayalayo near Magiscatzin, 22-XII-39, L. Berner (LB); Rio Corona near Ciudad Victoria, 25-XI-68, RKA; Rio Corona, 12 miles SW Padillo, 8-X-50, S Mulaik (UU). TEXAS: *Bosque County*, Bosque River at Clifton, 10-VIII-70, RKA; *Brewster County*, Rio Grande at Lajitas, 29-VII-70, RKA; *Caldwell County*, San Marcos River, 6 miles NE Luling off Hwy. 80, 9-VIII-70, RKA; *Gonzales County*, Guadalupe River, 12 miles S Luling on Hwy. 80, 9-VIII-70, RKA; *Hays County*, Blanco River, San Marcos, 24-VI-69, W Young (UU); *Kerr County*, S Fork Guadalupe River, 6 miles SW Hunt, 31-VII-70, RKA; *Kimball County*, S Fork Llano River, 12 miles S Jct. on Hwy 377, 31-VII-70, RKA; *Presidio County*, Rio Grande, 10 miles E Redford, 29-VII-70, RKA; *Uvalde County*, Frio River at Cancan on Hwy. 127, 1-VIII-70, RKA; *Val Verde County*, Rio Grande at Del Rio, 1-VIII-70, RKA; *Victoria County*, San Antonio River, 20 miles S Victoria on Hwy. 77, 8-VIII-70, RKA; *Williamson County*, San Gabriel River, 1 mile S Jonah on Farm Rd. 1660, 10-VIII-70, RKA; *Wilson County*, Cibole Creek, 4 miles W Stockdale on Hwy. 97, 9-VIII-70, RKA.

Traverella primana (Eaton)

Thraululus primanus Eaton, 1892: 7; Kimmins, 1934: 342; Traver, 1947: 149.

Traverella primana Edmunds, 1950: 551; Traver, 1960a: 3.

This species was described from 2 ♂ imagoes, and 1 ♀ to which Eaton (1892) referred as "either of this species or of near ally," and he figured only the hind wings of 1 ♂ and the 1 ♀. Kimmins (1934) selected 1 ♂ as the type, and reported that the genitalia were missing from both male imagoes in the

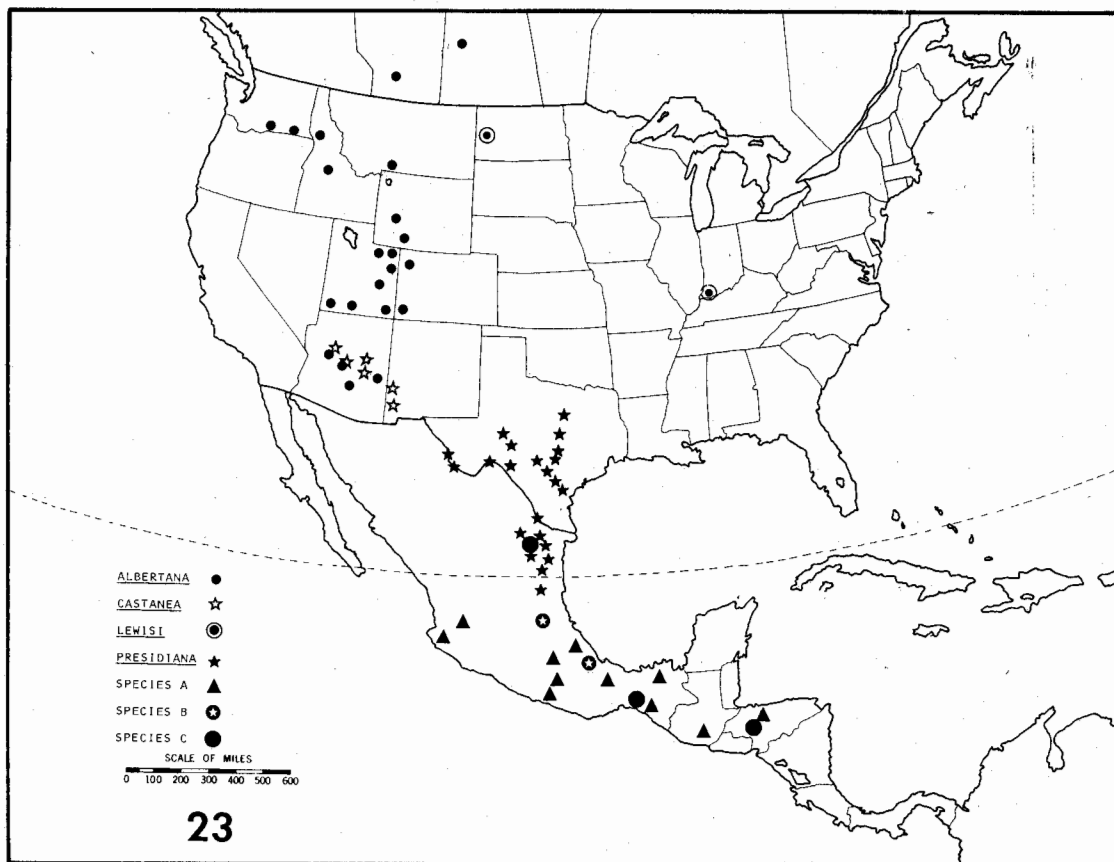


FIG. 23.—Distribution map of *Traverella* in North and Central America.

Godman and Salvin collection. Traver (1947) compared the characters of 4 ♂ imagoes from Costa Rica to Eaton's description of *T. primana*, figured the male genitalia, and assigned the specimens as representatives of *T. primana*. Edmunds (1950) transferred this species to *Traverella*, and Traver (1960a) reaffirmed her belief that the male imagoes from Costa Rica are *T. primana*.

Type Locality.—Atoyac, Vera Cruz, Mexico.

Type.—British Museum (Natural History), London.

Distribution.—Adults have been reported only from S Mexico and Costa Rica, and records are as follows:

COSTA RICA: Rio Pedrogoso, 11-39, D. L. Rounds (CU). MEXICO: *Tabasco*, Teapa, H. H. Smith, no other data (BM); *Vera Cruz*, Atoyac, Schumann, no other data (BM).

***Traverella versicolor* (Eaton)**

Thraulius versicolor Eaton, 1892: 7, Kimmins, 1934: 342.
Traverella versicolor, Edmunds, 1950: 551.

Eaton (1892) described this species from 3 ♀ imagoes and 3 ♀ subimagoes collected in Costa Rica, and 1 ♀ imago from Panama. Kimmins (1934) figured the subgenital plate of 1 of the ♀, designated a type specimen, and established the type locality for the species.

Type Locality.—Cache, Costa Rica.

Type.—British Museum (Natural History), London.

DISTRIBUTION.—This species is known from only Eaton's original material from the following localities: COSTA RICA: Cache, Rogers, no other data (BM). PANAMA: Volcan de Chirique, 3000 ft, Champion, no other data (BM).

REMARKS.—The female imagoes upon which this species is based are without distinctive color characters, and it is possible that nymphs and male imagoes can never be positively associated with the type material. This problem is complicated by the fact that there are 2 species described from adults and at least 3 species of nymphs in S Mexico and Central America.

***Traverella* sp. A**

Nymph.—Length: body 10.0–11.0 mm; caudal filaments 9.0–10.0 mm. General color brown with black and pale markings. Head brown with black and pale markings; head usually with a pale median occipital macula, and paired pale maculae mesad to compound eyes; frontoclypeus with a short, median projection above labrum (Fig. 1). Thoracic nota brown with black submarginal markings; thoracic sutures black; legs brown with diffuse dark shading on anterior sur-

face of femora and tibiae; tarsi pale; tarsal claws with 5-6 large apical and 5-6 small basal denticles. Abdominal terga brown, each with a pale median longitudinal stripe and pale submarginal markings (Fig. 1); pale markings barely discernible in some specimens; abdominal gills dark; gills well developed on Segments 1-6, poorly developed, rudimentary, and often absent on Segment 7 (Fig. 21-22); abdominal sterna pale, often suffused with yellow. Caudal filaments pale.

Habitat.—Specimens have been collected in a variety of streams and rivers from sea level to 5,100 ft elevation. Nymphs are found in clear, swift-flowing water with a bottom of gravel, debris, and rocks, and in slow-moving, silty rivers with only a few scattered rocks. Mature nymphs have been found in July and November in a wide range of water temperatures. Specimens collected in the summer were from streams with a temperature between 72 and 81°F, while those collected in the fall, often from the same rivers, had water temperatures between only 60-64°F.

DISTRIBUTION.—This species has a narrow latitudinal range (Fig. 23). Nymphs are known from Rio Cartaga, Guatemala (14°02' N latitude) N to Tizapan El Alto, Jalisco, Mexico (20°11' N latitude). Records are as follows:

GUATEMALA: Rio Cartaga, between Esquintla and Taxisco, 25-X-68, RKA. MEXICO: *Chiapas*, Rio Chiapa at Chiapa de Corzo, 9-VII-66, RKA; *Guerrero*, Rio Papagayo on Hwy. 95, 16-XI-68, RKA; Rio Balsis, between Iquala and Chilpancingo, 16-XI-68, RKA; *Jalisco*, Stream 6 miles W jct. Hwy. 80 near Mascota, Spring, 1969, C. D. Barbour & R. J. Douglass (UU); Rio La Pasion at Tizapan El Alto, 16-X-68, RKA; Hauhintlan on Hwy. 95, 29/30-VII-66, 14-XI-68, RKA; Rio Cuautla at Cuautla, 13-XI-68, RKA; *Tabasco*, Rio Grifalva at Teapa, 18-VII-66, RKA; *Vera Cruz*, Stream, 5 miles S Ciudad Mendoza, 7-XI-68, RKA; Rio Paso de Ovejas at Paso de Ovejas, 10-XI-68, RKA; *Zacatecas*, Rio Juchipila at Juchipila, 18-X-68, RKA.

Traverella sp. B

Nymph.—Length: body 7.5-8.5 mm; caudal filaments 7.0-8.0 mm. General color brown. Head brown, usually with a pale median macula and paired pale maculae mesad to compound eyes; frontoclypeus with a long triangular median projection (Fig. 4). Thoracic nota brown; legs brown with black markings; femora brown with a black apical band as in Fig. 14; tibiae brown with a basal black macula; tarsi brown; tarsal claws with 6-7 large apical and 5-6 small basal denticles. Abdomen brown; abdominal gills well developed on Segments 1-7; abdominal sterna light brown. Caudal filaments pale.

HABITAT.—Nymphs have been collected near sea-level (200-250 ft elevation) in clear moderately-flowing rivers. The Rio Axtla has an average width of ca. 120 feet, an average depth of 2-4 ft, and a bottom of rocks, sand and mud. The water temperatures of known habitats varies between 74 and 78°F.

DISTRIBUTION.—*Traverella* sp. B has a narrow latitudinal range in Mexico (Fig. 23). Specimens have been collected from near Nautla, Vera Cruz (20°15' N latitude) to near Tamazunchale, San Luis Potosi (21°23' N latitude). Records are as follows:

MEXICO: *San Luis Potosi*. Rio Axtla at Comoco, 20 miles N Tamazunchale, 9-VII-66, RKA; *Vera Cruz*. Rio Carranza, 20 miles S Nautla, 10-XI-68, RKA.

Traverella sp. C

Nymph.—Length: body 9.5-10.5 mm; caudal filaments 10.0-11.0 mm. General color brown with pale and black markings. Head brown with pale markings; head usually with a pale median occipital macula and pale maculae mesad to compound eyes; frontoclypeal projection moderately developed and directed upward (Fig. 2). Thoracic nota brown, often with pale maculae and black markings; legs brown and suffused with black; femora and tibiae brown and suffused with black; tarsi brown; tarsal claws with 6-7 large apical and 6-7 small basal denticles. Abdominal terga brown; abdominal gills well developed on Segments 1-7; abdominal sterna brown. Caudal filaments brown.

Habitat.—The Rio Ramos is a large river (ca. 100 feet in width) at 1,650 ft elevation and with a daytime summer temperature of 74°F.

Distribution.—The known geographic distribution of this species is from Taulabe, Honduras (14°15' N latitude) to Allende, Nuevo Leon (25°20' N latitude). Records are as follows:

HONDURAS: *Comayagua*. River, 3 miles N Taulabe on Hwy. #1, 20-X-64, J. S. Packer (UU). MEXICO: *Nuevo Leon*. Rio Ramos at Allende on Hwy. 85, 5-VIII-70, RKA; *Chiapas*. Finca El Real, Ocosingo Valley, 1-VII-50, C. and M. Goodknight & L. J. Stannard (UU).

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