

## Mayflies of the Southwest: New Species and Records of Heptageniidae

(Ephemeroptera)

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A recent study of mayfly collections from Arizona and New Mexico has revealed undescribed species, and new distributional records of heptageniids. Types of new species are deposited in the California Academy of Sciences, San Francisco (CAS). In the accounts dealing with the species, collections made by the senior author are indicated by the initials RKA, and all specimens, unless otherwise designated as deposited in the collection of California State University, Los Angeles.

### *Epeorus* (*Iron*) *albertae* (McDunnough)

New Record. NEW MEXICO: *Rio Arriba Co.* Rio Chama at Chama, 29-VI-64, RKA.

### *Epeorus* (*Iron*) *deceptivus* (McDunnough)

New Records. ARIZONA: *Gila Co.* Christopher Cr. at Christopher on Hwy 160, 19-VII-70, RKA. NEW MEXICO: *San Miguel Co.* Pecos Riv. at Tererro, Santa Fe Nat. For., 2-VII-64, RKA.

### *Epeorus* (*Iron*) *longimanus* (Eaton)

New Records. ARIZONA: *Apache Co.* E. Fk. White Riv., Rock Cr. Ranger Sta. on Hwy 73, Ft. Apache Indian Res., 5/6-VII-64, RKA; E. Fk. White Riv. at E. Fk. Cpgd., 26-VI-66, RKA; Hall Cr. on Hwy 373, Apache Nat. For., 3-VII-64, RKA; Little Colorado Riv. at E. Fk. Cpgd., Apache Nat. For., 3-VII-64, RKA; Nutrioso Cr. at Nutrioso, 26-VI-66, RKA; Stream at Greer, 27-VI-66, RKA. NEW MEXICO: *Rio Arriba Co.* Canjilon Cr. on Hwy 110, 27-VI-66, RKA. *San Miguel Co.* Pecos Riv., Cowles, Santa Fe Natl. For., 2-VII-64, RKA; Winsor Cr. at jct with Pecos Riv., Cowles, Santa Fe Nat. For., 2-VII-64, RKA. *Taos Co.* Red Riv. nr. Goose Cr. on Hwy 38, Carson Nat. For., 30-VI-64, RKA; Rio Pueblo, 1 mi S. Penasco jct. on Hwy 3, Carson Nat. For., 1-VII-64, RKA; Rio Chiquito, 3 mi S. Taos on Hwy 3, 1-VII-64, RKA.

### *Epeorus* (*Iron*) *margarita* Edmunds & Allen

New Records. ARIZONA: *Coconino Co.* Oak Cr. at Ensinoso Camp, Coconino Nat. For., 7/8-VII-64, RKA; Oak Cr. at Slide Rock Cpgd., 17-VII-70, RKA. *Gila Co.* E. Verde Riv. on Hwy 87, 18/19-VII-70, RKA; E. Verde Riv. on Rd 406, 16 km (10 mi) E. Payson, 19-VII-70, RKA; Haigler Cr. on For. Serv. Rd 200, 19-VII-70, RKA. *Navajo Co.* N. Fk. White Riv. at Whiteriver, Ft. Apache Indian Res., 5-VII-64, RKA. *Yavapai Co.* Verde Riv. at Verde Valley, 18-VII-70, RKA.

### *Heptagenia* *criddlei* McDunnough

New Records. ARIZONA: *Apache Co.* Hall Cr. on Hwy 373, 3-VII-64, RKA; Gooseberry Cr. on Hwy 73, Ft. Apache Indian Res. 6-VII-64, RKA; N. Fk. White Riv. nr. Hawley Lake, 27-VI-66, RKA; Nutrioso Cr. at Nutrioso, 27-VI-66, RKA; Stream, 1.6 km (1 mi) N. Greer, on Hwy 373, 22-VII-70, RKA. *Coconino Co.* Oak Cr. at Pine Flat Camp, 7-VII-64, RKA; Oak Cr. at Slide Rock Cpgd., 17-VII-70, RKA. *Gila Co.* Tonto Cr. at Kohl's Ranch, 19-VII-70, RKA. *Graham Co.* Wet Cr. at Wet Cr. Canyon Camp, Pinaleno Mtns., 20-VII-70, RKA. *Navajo Co.* N. Fk. White Riv., Whiteriver, Ft. Apache Indian Res., 5-VII-64, RKA; E. Fk. White Riv., on Hwy 73, 27-VI-66, RKA. *Yavapai Co.*

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Verde Riv. at Verde Valley, 18-VII-70, RKA. NEW MEXICO: *Catron Co.* San Francisco Riv. on Hwy 180, Apache Nat. For., 4-VII-64, RKA; White Riv. at Whitewater Cpgd., 22-VII-70, RKA; San Francisco Riv. at Reserve, 22-VII-70, RKA; San Francisco Riv. nr. Luna on Hwy 180, 22-VII-70, RKA. *Coffax Co.* Moreno Cr., 8 km (5 mi) N. Eagle Nest, 1-VII-64, RKA; Cimarron Riv. at Cimarron, 23-VIII-70, RKA. *Grant Co.* Sapillo Cr. nr. Lake Roberts on Hwy 25, 21-VII-70, RKA. *Lincoln Co.* Creek at Pine Lodge, Lincoln Nat. For., 24-VII-70, RKA; Bonito Cr. at Bonito, 27-VII-70, RKA; N. Fk. Bonito Cr., 1.6 km (1 mi) above Bonito Lake, 24-VII-70, RKA; S. Fk. Bonito Cr. at S. Fk. Cpgd., Lincoln Nat. For., 24-VII-70, RKA. *Mora Co.* Mora Riv. at Mora, 1-VII-64, RKA. *Rio Arriba Co.* Wolf Cr. at Kelly Cpgd., 6-VIII-72, D.C. Lowrie. *Taos Co.* Rio Hondo at jct with Rio Grande on Hwy 111, 30-VI-64, RKA; Rio Hondo on Hwy 3, 30-VI-64, RKA. *Valencia Co.* Blue Water Cr. on Rt 178, Cibola Nat. For., 23-VII-70, RKA.

**Heptagenia elegantula Eaton**

New Records. NEW MEXICO: *Coffax Co.* Ponil Cr., 1.6 km (1 mi) E. Cimarron, 23-VIII-70, RKA; Cimarron Riv. at Cimarron, 23-VIII-70, RKA.

**Heptagenia simplicioides McDunnough**

New Records. ARIZONA: *Apache Co.* Little Colorado Riv. on Hwy 73, Apache Nat. For., 3-VII-64, RKA; E. Fk. White Riv., 4.8 km (3 mi) N. Rock Cr. Ranger Sta. on Hwy 73, Ft. Apache Indian Res., 6-VII-64, RKA; Little Colorado Riv., 6.4 km (4 mi) E. Eagar on Hwy 73, 22-VII-70, RKA.

**Heptagenia solitaria McDunnough**

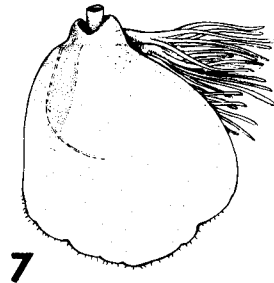
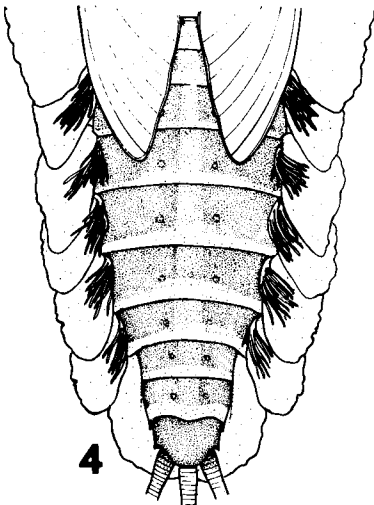
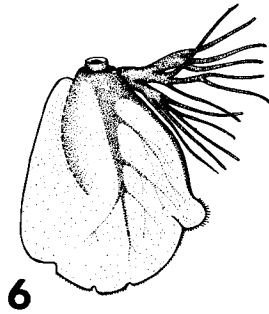
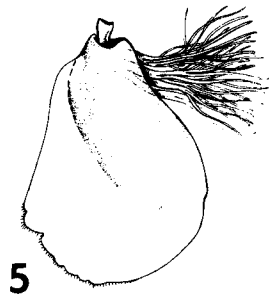
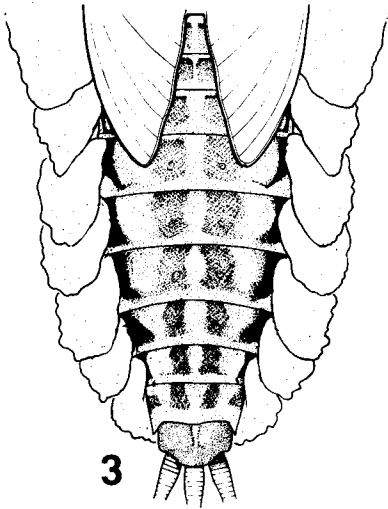
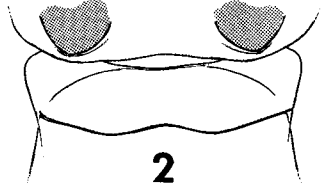
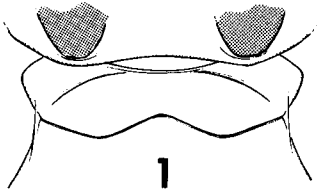
New Records. ARIZONA: *Apache Co.* N. Fk. White Riv., Hawley Lake Rd, 26-VI-66, RKA; Little Colorado Riv., 6.4 km (4 mi) E. Eagar on Hwy 73, 22-VII-70, RKA.

**Key to the *Rhithrogena* Nymphs of the Southwest**

- 1. Gill lamellae with sclerotized setose line (Fig. 5); body length usually greater than 13.0 mm ..... *robusta*  
 Gill lamellae without sclerotized setose line (Figs. 6-7); body length usually less than 11.0 mm ..... 2
- 2 (1). Gill lamellae with small dorsal lobe; as in Fig. 6; gills tinged pink or smoky-black ..... 3  
 Gill lamellae without lobe as in Fig. 7; gills tinged brown, never pink or smoky-black ..... 4
- 3 (2). Anterolateral margin mesothorax distinctly concave (Fig. 1); abdominal terga dark brown often with paired submedian pale or dark spots ..... *morrisoni*  
 Anterolateral margin mesothorax straight, or only slightly concave (Fig. 2); abdominal terga brown with black web-like tracheations ..... 5
- 4 (2). Abdominal terga with submedian longitudinal dark brown stripes, and black lateral margins (Fig. 3); abdominal sterna brown with dark brown markings; body length 9.0-10.0 mm ..... *vitta*  
 Abdominal terga brown with pale median longitudinal stripe, and pale lateral margins (Fig. 4); abdominal sterna pale to brown; body length 7.0-8.0 mm ..... *plana*

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Figs. 1-2. Thoracic terga. Fig. 1, *Rhithrogena morrisoni*; Fig. 2, *R. hageni*. Figs. 3-4. Abdominal terga. Fig. 3, *R. vitta*; Fig. 4, *R. plana*. Figs. 5-7. Abdominal gills. Fig. 5, *R. robusta*; Fig. 6, *R. morrisoni*; Fig. 7, *R. vitta*.



- 5 (3). Abdominal gills tinged pink; body length 10.0-11.0 mm . . . . . *hageni*  
 Abdominal gills tinged smoky-black; body length 6.5-7.5 mm . . . . .  
 . . . . . *undulata*

### Rhithrogena hageni Eaton

New Records. ARIZONA: *Apache Co.* N. Fk. White Riv. nr. Hawley Lake Rd., 27-VI-66, RKA; E. Fk. White Riv. at Rock Cr. Ranger Sta. on Hwy 73, Ft. Apache Indian Res., 5/6-VII-64, RKA. NEW MEXICO: *Taos Co.* Red Riv. nr. Goose Cr. on Hwy 38, Carson Nat. For., 30-VI-64, RKA.

### Rhithrogena morrisoni (Banks)

New Records. ARIZONA: *Apache Co.* White Riv. at Rock Cr. Ranger Sta. on Hwy 73, Ft. Apache Indian Res., 5/6-VII-64, RKA; N. Fk. White Riv. nr. Hawley Lake Rd., 27-VI-66, RKA. NEW MEXICO: *Colfax Co.* Cimarron Riv. at Cimarron, 23-VIII-70, RKA. *San Miguel Co.* Pecos Riv. at Tererro, 2-VII-64, RKA. *Taos Co.* Red Riv. nr. Goose Cr. on Hwy 38, 30-VI-64, RKA; Rio Chiquito, 4.8 km (3 mi) S. Taos on Hwy 3, 1-VII-64, RKA.

### Rhithrogena plana, new species

Nymph. Length: body 7.0-8.0 mm.; caudal filaments broken. General color brown. Head brown, pale around ocelli; frontal and coronal sutures pale. Thoracic nota brown with pale and dark brown markings; pronotum brown with pale midline; mesonotum brown with pale midline and sublateral markings; mesonotum with dark brown line along anterior margin; anterolateral margin mesothorax distinctly concave as in Fig. 1; metanotum brown; sterna pale, dark brown at sutures; legs brown, femora brown with dark brown to black submedian macula, area surrounding macula pale, smaller dark freckling within pale and brown areas; tibiae brown with row short ventral spines; tarsal claws brown with 1 large basal and 3-4 small apical denticles. Abdominal terga brown with paired dark brown submedian spots; abdominal terga with pale median longitudinal stripe, and pale posterior margins on terga 1-9 (Fig. 4); abdominal gills without lobe as in Fig. 7; gills with brownish tinge, gill lamellae with "ruffled" margins, and fibrilliform portion often brownish; abdominal sterna brown, dark brown at lateral margins, and with paired sublateral dark brown stripes. Caudal filaments pale, dark brown basally.

Types. Holotype: mature female nymph, Fort Apache Indian Reservation, North Fork White River at Whiteriver, Navajo County, Arizona, 5-VII-64, RKA (CAS). Paratotypes: 14 male and 51 female nymphs, same data as holotype (CSULA). Paratypes: 3 male and 3 female nymphs, E. Fk. White Riv., Ft. Apache on Hwy 73, Navajo Co., Arizona, 27-VI-66, RKA (CSULA).

Remarks. The nymphal abdominal gills of *R. plana* are without a lobe, similar to *R. robusta*, but its body length is only 7.0-8.0 mm., at least 5.0 mm. shorter than the latter. The nymph of *R. plana* is further distinguished from *R. robusta* and all other described species from western North America by the following combination of characters: (1) absence of sclerotized setose line on ventral surface of abdominal gills; (2) anterolateral margin of mesothorax distinctly concave as in Fig. 1; (3) paired dark submedian spots on abdominal terga (Fig. 4); and (4) abdominal gills tinged with brown.

### Rhithrogena undulata (Banks)

New Records. ARIZONA: *Apache Co.* N. Fk. White Riv. nr. Hawley Lake Rd., 27-VI-66, RKA; E. Fk. White Riv. at E. Fk. Cpgd., 26-VI-66, RKA; E. Fk. White Riv. at Rock Cr. Ranger Sta. on Hwy 73, 5/6-VII-64, RKA; E. Fk. White Riv., 4.8 km (3 mi) N. Rock Cr. Ranger Sta. on Hwy 73, 6-VII-64, RKA; Paradise Cr. on Hwy 73, Ft. Apache Indian Res., 6-VII-64, RKA. *Navajo Co.* N. Fk. White Riv. at Whiteriver, 5-VII-64, RKA. NEW MEXICO: *Colfax Co.* Cimarron Riv. at Cimarron, 23-

VIII-70, RKA. *San Miguel Co.* Pecos Riv. at Tererro, Santa Fe. Nat. For., 2-VII-64, RKA; Pecos Riv. at Pecos, 2-VII-64, RKA. *Taos Co.* Red Riv. nr. Goose Cr. on Hwy 38, 30-VI-64, RKA.

### ***Rhithrogena vitta*, new species**

Nymph. Length: body 9.0-10.0 mm.; caudal filaments broken. General color brown to dark brown. Head brown, pale around ocelli; frontal and coronal sutures pale. Thoracic nota brown with pale markings; pronotum brown with pale midline; anterior portion pronotum darker than posterior; mesonotum brown with pale midline and sublateral markings; mesonotum with dark brown line along anterior margin; anterolateral margin mesothorax distinctly concave as in Fig. 1; metanotum brown; sterna pale, dark brown at sutures; legs brown; femora brown with dark brown to black submedian macula, area surrounding macula pale, smaller dark freckling within pale and brown areas; tibiae brown with row short ventral spines; tarsal claws brown with 1 large basal and 2-3 small apical denticles. Abdominal terga brown with submedian longitudinal dark brown stripes, and dark brown to black lateral margins (Fig. 3); abdominal terga with light brown median stripe; abdominal gills 2-6 without lobe (Fig. 7); gills with brownish tinge; lamellar portion gills with "ruffled" margins; fibrilliform portion gills often brownish; abdominal sterna brown, dark brown at lateral margins and sublateral dark brown stripes. Caudal filaments pale, dark brown basally.

Type. Holotype: mature female nymph, Fort Apache Indian Reservation, North Fork White River at Whiteriver, Navajo County, Arizona, 5-VII-64, RKA (CAS). Paratopotypes: 9 male and 10 female nymphs, same data as holotype (CSULA). Paratypes: 1 male and 3 female nymphs, Ft. Apache Indian Res., E. Fk. White Riv. at Rock Cr. Ranger Sta. on Hwy 73, Apache Co., Arizona, 5/6-VII-64, RKA (CSULA).

Remarks. The nymph of *R. vitta* is distinguished from all other western North American *Rhithrogena* by the following combination of characters: (1) absence of a sclerotized setose line on ventral surface abdominal gills; (2) anterolateral margin of mesothorax distinctly concave; (3) presence of two submedian longitudinal dark stripes, and black lateral margins; and (4) brownish tinge on abdominal gills.

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