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New species and records of Andean *Anacroneuria*

(Insecta, Plecoptera, Perlidae)

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Descriptions are given for 13 previously unrecognized species including *Anacroneuria amaru, A. ambora, A. bipunctata, A. carole, A. cochabamba, A. cusi, A. huayna, A. pucallpa, A. rossi, A. spectori, A. taylori, A. tiwanaku,* and *A. wari.* Females of *A. cosnipata* Stark & Sivec, *A. inca* Stark & Sivec, *A. kitchensi* Stark, and *A. mochica* Stark & Sivec are described and new records for *A. chavin* Stark & Sivec, *A. cuzco* Stark & Sivec, *A. flavicoronata* Jewett, *A. montera* Stark & Sivec, and *A. woytkowskii* Stark & Sivec are given. A checklist of 53 *Anacroneuria* species known for Peru and Bolivia is included.

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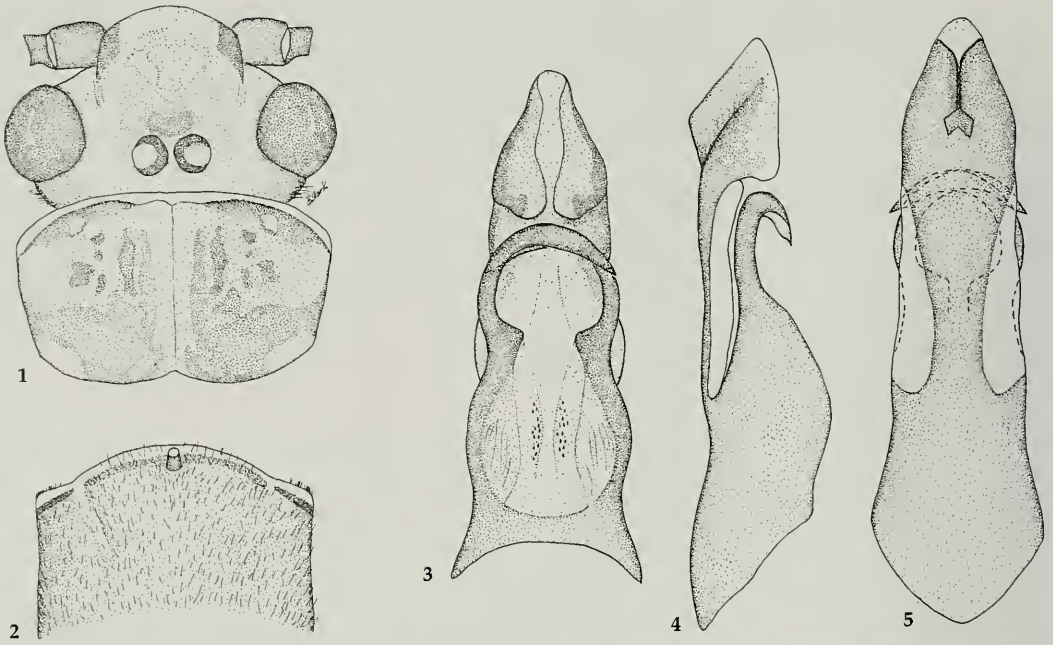
Introduction

Stark & Sivec (1998) recorded 39 *Anacroneuria* species from Peru and Bolivia but only eight of these are known from both male and female specimens. Subsequently, Stark et al. (2001) described *Anacroneuria loreto* Stark & Zúñiga from a Peruvian female and also associated the female of *A. montera* Stark & Sivec bringing to nine the number of regional *Anacroneuria* known from both sexes. A similar pattern exists for Ecuador (Stark 2001) and Colombia (Stark et al. 1999, Zúñiga & Stark 2002) where most recent descriptions have been based on male specimens. In the present study an effort has been made to recognize distinctive females among unstudied material and to match these, when possible, with previously described males. The results support recognition of 13 previously undescribed species and putative associations of previously undescribed females are made for *A. cosnipata* Stark & Sivec, *A. inca* Stark & Sivec, *A. kitchensi* Stark, and *A. mochica* Stark & Sivec (Stark 2001, Stark & Sivec 1998); new records are also given for *A. chavin* Stark & Sivec, *A. cuzco* Stark & Sivec, *A. flavicoronata* Jewett, *A. montera* Stark & Sivec and *A. woytkowskii* Stark & Sivec. Specimens are deposited at the United States National Museum of Natural History, Washington (USNM), the American Museum of Natural History, New York (AMNH), the California Academy of Sciences, San Francisco (CAS), the Field Museum of Natural History, Chicago (FMNH), the Los Angeles County Museum of Natural History, Los Angeles (LACM), and Michigan State University, East Lansing (MSU).

Anacroneuria amaru, spec. nov.
Figs 1-5

Types. Holotype: ♂, Bolivia, Santa Cruz Dept., Caballero Prov., Park Nacional Amboró, 2030 m, 17°50'14"S 64°23' 38"W, 15 October 2001, S. Spector, J. Ledezma, AMB21-LITE001 (Holotype retained by AMNH until a permanent Bolivian repository is selected). – Paratypes (all from Bolivia): 5♂♂, same data (AMNH); 6♂♂, same locality as holotype, 20 October 2001, S. Spector, J. Ledezma, AMB21LITE005 (AMNH); 95♂♂, Santa Cruz Dept., Caballero Prov., Park Nacional Amboró, 2060 m, 17°50'2"S 64°23'5"W, 18 October 2001, S. Spector, J. Ledezma, AMB21LITE003 (AMNH); 18♂♂, same locality, 19 October 2001, S. Spector, J. Ledezma, AMB21LITE004 (AMNH).



Figs 1-5. *Anacroneuria amaru*, spec. nov. **1.** Head and pronotum. **2.** Male sternum 9. **3.** Aedeagus ventral. **4.** Aedeagus lateral. **5.** Aedeagus dorsal.

Description

Adult habitus. Dark pigment on head extends from ocellar area to M-line and forward of M-line as a tongue shaped patch; M-line usually complete; interocellar area paler, lappets dark brown (Fig. 1). Pronotum with irregular dark and interspersed pale areas over most of disc; narrow median band pale. Femora pale brown except for narrow dark apical band and pale linear spot near apex; tibiae pale brown but darker on outer margins. Wing membrane pale amber, veins brown, Sc, R and M veins darker.

Male. Forewing length 15.0-16.5 mm. Hammer thimble shaped (Fig. 2). Aedeagal apex scoop shaped, wide at shoulders and narrowed to tip; apex strongly sclerotized along ventrolateral margins (Fig. 3); dorsal keel a narrow sharp ridge with strongly elevated base (Figs 4-5); apex somewhat triangular in lateral aspect (Fig. 4). Hooks scythe shaped and strongly sclerotized.

Female. Unknown.

Nymph. Unknown.

Etymology. The species name, used as a noun in apposition, honors Tupa Amaru, final ruler of the Inca people.

Diagnosis. The aedeagus of this species is similar to that of *A. chavin* but the prominent keel and strong lateral sclerotization will distinguish these (Stark & Sivec 1998). In many respects, including the strongly elevated dorsal keel base, this species is similar to *A. spectori*, described below, but in that species the entire aedeagal apex is turned strongly ventrad and the aedeagal base is shorter.

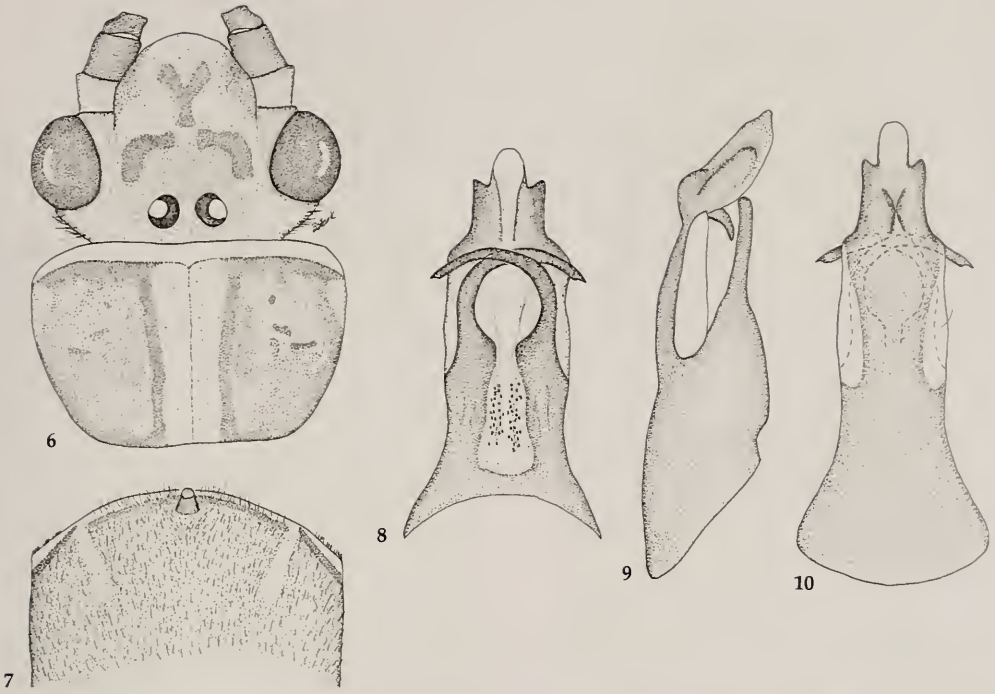
Anacroneuria amboro, spec. nov.

Figs 6-10

Types. Holotype: ♂, Bolivia, Santa Cruz Dept., Caballero Prov., Park Nacional Amboró, 2030 m, 17°50'15"S 64° 23'29"W, 17-20 October 2001, S. Spector, J. Ledezma, AMB21FIT002 (Holotype retained by AMNH until a permanent Bolivian repository is selected). – Paratypes (all from Bolivia): 1♂, Santa Cruz Dept., Caballero Prov., Park Nacional Amboró, 2060 m, 17°50'2"S 64°23'5"W, 19 October 2001, S. Spector, J. Ledezma, AMB21LITE004 (AMNH); 3♂♂, same locality, 18 October 2001, AMB21-LITE003 (AMNH).

Description

Adult habitus. Pale brown pigment over ocellar region bounded anterolaterally by darker border and interrupted by pale mesal spot on M-line; anterior to pale spot a Y-shaped brown patch is located; lappets brown (Fig. 6). Pronotum with irregular dark and interspersed pale areas over most of disc;



Figs 6-10. *Anacroneuria amboro*, spec. nov. **6.** Head and pronogum. **7.** Male sternum 9. **8.** Aedeagus ventral. **9.** Aedeagus lateral. **10.** Aedeagus dorsal.

narrow median band pale (Fig. 6). Femora and tibiae pale brown except for narrow dark apical band on femora. Wing membrane transparent, veins pale to amber, but cord crossvein darker.

Male. Forewing length 13-14 mm. Hammer thimble shaped (Fig. 7). Aedeagal apex trilobed in ventral aspect and foot shaped in lateral aspect (Figs 8-9); lateral lobes sclerotized and acute, longer median lobe rounded or truncate; dorsal keel of two curved ridges which meet, or almost meet, at midlength forming an X-shaped pattern (Fig. 10); hooks slender.

Female. Unknown.

Nymph. Unknown.

Etymology. The species name, used as a noun in apposition, is based on the type locality.

Diagnosis. The aedeagus of this species is distinct from that of all known *Anacroneuria* but bears some similarity to that of *A. callanga* Stark & Sivec in the trilobed aedeagal apex (Stark & Sivec 1998). That species, however, has more prominent lateral lobes, a different dorsal keel and the lateral aspect of the aedeagal apex is also quite distinct.

Anacroneuria bipunctata, spec. nov.
Figs 11-12

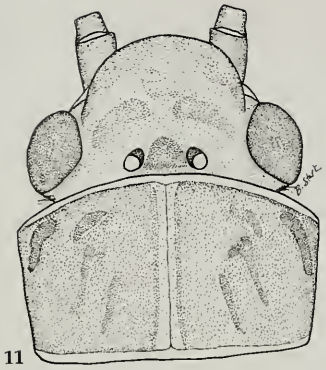
Types. Holotype: ♀ (pinned), Peru, Madre de Dios, Manu Biosphere Reserve, Aguajal, 250 m, 12 September 1988, M. G. Pogue (USNM). – Paratype: ♀ (pinned), same data (USNM).

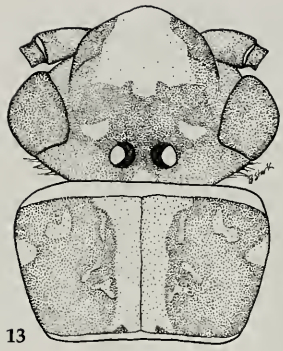
Description

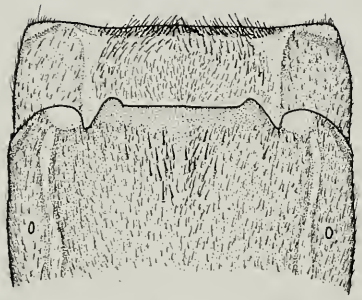
Adult habitus. Head with a pair of elongate, dark pigment spots located in the central frons; a small dark spot is located between the ocelli and a larger transverse dark band connects dark areas on the lappets (Fig. 11). Pronotum dark brown over most of disk but with a narrow, pale median band, and with scattered darker areas (Fig. 11). Wing membrane transparent, veins brown except for pale costal area. Femora brown along dorsal surface and pale ventrally; tibiae pale brown.

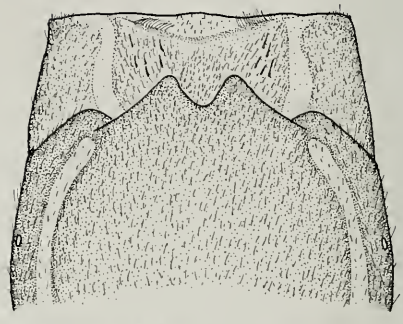
Male. Unknown.

Female. Forewing length 14 mm. Subgenital plate with broad, truncate mesal lobe offset from narrow lateral lobes by V-shaped notches (Fig. 12); lateral margins of mesal lobe slightly produced. Apical margin of subgenital plate hairless; hairless zone extends along midline of sternum 8 to about midlength of segment. Transverse sclerite of ster-









Figs 11-14. *Anacroneuria* head and pronotal color patterns and female sterna 8 and 9. **11-12.** *A. bipunctata*, spec. nov. **13-14.** *A. carole*, spec. nov.

num 9 densely hairy; median sclerite weakly hirsute but with longer setae located in lateral patches (Fig. 12).

Nymph. Unknown.

Etymology. The species name refers to the pair of oblong pigment spots forward of the ocelli.

Diagnosis. The broad, truncate, mesal subgenital plate lobe distinguishes this species from any known *Anacroneuria* female, and the head pattern is unlike that of known males.

Anacroneuria carole, spec. nov.
Figs 13-14

Types. Holotype: ♀ (pinned), Peru, Madre de Dios, Manu, Pakitza, 250 m, 9-23 September 1988, O. S. Flint, N. Adams (USNM). – Paratypes (all from Peru): 2♀♀, same location, 9 September 1988, O. S. Flint, N. Adams (USNM); 1♀, same location, 8-22 September 1989, Trail 1, Marker 4, N. Adams et al. (USNM).

Description

Adult habitus. Posterior half of head brown to dark brown except for a pair of pale oval spots anterolateral to ocelli; lappets dark brown (Fig. 13). Dark lateral pronotal bands with a few scattered pale spots included on disk; lateral bands separated by narrow, pale mesal band. Wing membrane transparent, veins dark brown except for pale apical third of costa. Fore femora pale in basal third but dark apically; mid and hind femora pale over basal half. Fore tibiae, tarsi and cerci dark brown.

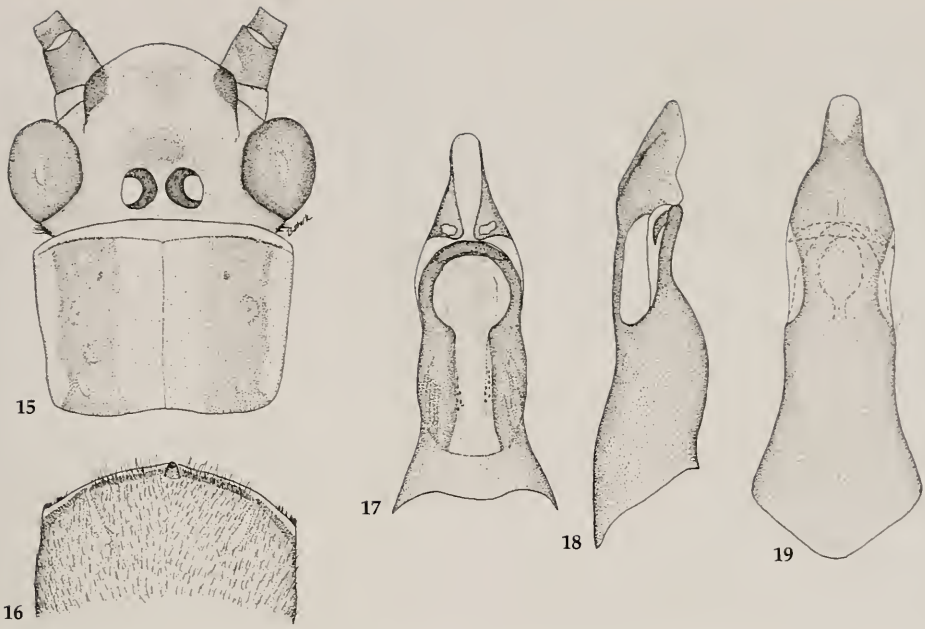
Male. Unknown.

Female. Forewing length 11 mm. Subgenital plate with a broad, bilobed mesal lobe separated from narrow, low lateral lobes by obscure notches (Fig. 14). Transverse sclerite of sternum 9 slender and bearing a lateral fringe of bristles; median sclerite bearing a patch of fine, short mesal setae and longer setae in lateral patches (Fig. 14).

Nymph. Unknown.

Etymology. The species name, used as a noun in apposition, honors singer, songwriter, environmental advocate, Carole King in recognition of her music career, a pearl by any standard.

Diagnosis. Several Andean *Anacroneuria* have similar head patterns including *A. montera* (Stark & Sivec 1998), *A. loreto* Stark & Zúñiga (Stark et al. 2001), and three species described below (*A. rossi*,



Figs 15-19. *Anacroneuria cochabamba*, spec. nov. **15.** Head and pronotum. **16.** Male sternum 9. **17.** Aedeagus ventral. **18.** Aedeagus lateral. **19.** Aedeagus dorsal.

A. tiwanaku, and *A. wari)*. These six species are also similar in size, and identifications based on these features could result in confusion. However, among these species with similar habitus, the subgenital plates are quite distinct (Stark & Sivec 1998, Stark et al. 1999, Stark et al. 2001), and *A. carole* is the only one with long mesal subgenital plate lobes separated by a large U-shaped notch (Fig. 14).

Anacroneuria cochabamba, spec. nov.
Figs 15-19

Types. Holotype: ♂, Bolivia, Santa Cruz Dept., Caballero Prov., Park Nacional Amboró, 2060 m, 17°50'2"S 64°23' 5"W, 18 October 2001, S. Spector, J. Ledezma, AMB21LITE003 (Holotype retained by AMNH until a permanent Bolivian repository is selected).

Description

Adult habitus. Head mostly yellow but with a small pale brown spot forward of ocelli and a diffuse area forward of pale spot at M-line; lappets brown (Fig. 15). Pronotum with brown mid lateral bands and pale median and marginal bands (Fig. 15). Anterior surface of fore femora yellow except for darker ventral margin, dorsum and narrow apical band; fore tibiae pale brown but darker basally. Wing membrane pale amber, veins brown; basal half of R and Sc and cord crossvein darker.

Male. Forewing length 13.5 mm. Hammer thimble shaped (Fig. 16). Aedeagal apex scoop shaped, wide at shoulders and narrowed to tip (Fig. 17); apex darker along ventrolateral margins and with an obscure pair of membranous lobes (Fig. 17); dorsal keel obsolete, consisting of a faint low ridge with indistinct lines (Fig. 19); apex in lateral aspect relatively straight (Fig. 18); hooks slender.

Female. Unknown.

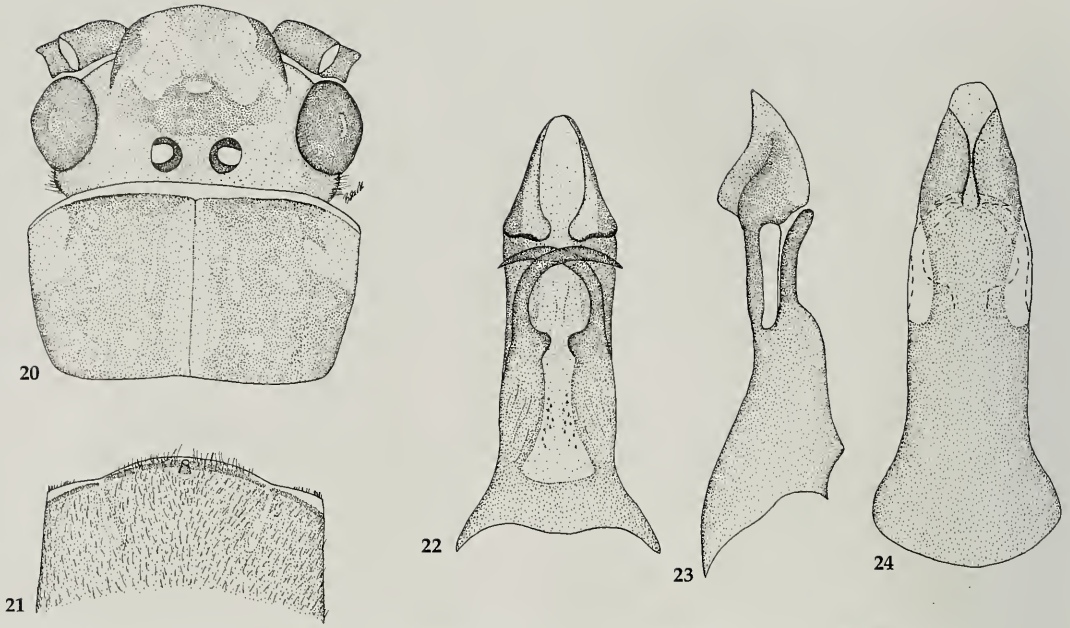
Nymph. Unknown.

Etymology. The species name, used as a noun in apposition, honors the Cochabamba people of Bolivia.

Diagnosis. The aedeagus of this species is generally similar to that of *A. jewetti* Stark and *A. chavin*, but is distinguished from both by the indistinct dorsal aedeagal keel and the small ventral membranous lobes present on the aedeagus of *A. cochabamba*.

Anacroneuria cusi, spec. nov.
Figs 20-24

Types. Holotype: ♂, Bolivia, Santa Cruz Dept., Caballero Prov., Park Nacional Amboró, 2060 m, 17°50'2"S 64°23'5"W, 18 October 2001, S. Spector, J. Ledezma, AMB21LITE003 (Holotype retained by AMNH until a permanent Bolivian repository is selected). – Paratypes (all from Bolivia): 2♂♂, same locality as holotype, 19



Figs 20-24. *Anacroneuria cusi*, spec. nov. **20.** Head and pronotum. **21.** Male sternum 9. **22.** Aedeagus ventral. **23.** Aedeagus lateral. **24.** Aedeagus dorsal.

October 2001, S. Spector, J. Ledezma, AMB21LITE004 (AMNH); 1♂, Santa Cruz Dept., Caballero Prov., Park Nacional Amboró, 2030 m, 17°50'14"S 64°23'38"W, 15 October 2001, S. Spector, J. Ledezma, AMB21LITE001 (AMNH).

Description

Adult habitus. Dark pigment extends from ocellar area to M-line; median area forward of M-line and interocellar area with diffuse pigment; lappets brown (Fig. 20). Pronotum brown to diffuse brown over most of disc but with scattered pale areas and a narrow median pale band. Wing membrane and veins brown except pale costal area. Femora brown but paler in basal half; tibiae brown.

Male. Forewing length 13.0-13.5 mm. Hammer thimble shaped (Fig. 21). Aedeagal apex scoop shaped, wide at shoulders and narrowed to rounded tip (Fig. 22); apex more strongly sclerotized along ventrolateral margins and along posterior margins of shoulders (Fig. 22); apex somewhat foot shaped in lateral aspect with sole distinctly arched (Fig. 23); dorsal keel of two close set ridges which diverge and reach margins near tip; base of keel open but appearing U-shaped (Fig. 24); hooks slender.

Female. Unknown.

Nymph. Unknown.

Etymology. The species name, used as a noun in apposition, honors Inca ruler Titu Cusi.

Diagnosis. The aedeagus of this species is similar to that of *A. wincha* Stark & Sivec but the ventrolateral margins of the aedeagal shoulders are more swollen in that species, the aedeagal apex is not arched in lateral aspect, the anterior keel arms do not reach the margins and the keel is more distinctly U-shaped (Stark & Sivec 1998). In addition, *A. wincha* is a smaller and darker species than *A. cusi*.

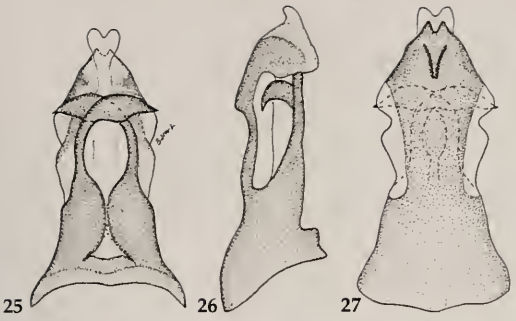
Anacroneuria huayna, spec. nov.

Figs 25-27

Types. Holotype: ♂ (pinned), Peru, Pasco, Chontilla, 22 km S Iscozazin, 1-15 August 1961, R. Etheridge (LACM).

Description

Adult habitus. Head with dark ocellar spot and a dark tongue shaped mesal band forward of M-line which is fused with dark brown lappets. Pronotum with narrow, pale mesal band and wide dark brown lateral bands which reach margins. Wing membrane transparent, veins brown with R vein darker. Femora diffuse brown or pale grading to dark brown at tibial joint; tibiae banded with diffuse brown pigment basally and apically and a paler mesal band.



Figs 25-27. *Anacroneuria huayna*, spec. nov. **25.** Aedeagus ventral. **26.** Aedeagus lateral. **27.** Aedeagus dorsal.

Male. Forewing length 7.5 mm. Hammer almost conical but with elongate oval apex. Aedeagal apex wide at shoulders but gradually narrowed to a notched sclerotized tip (Fig. 25); extruded from tip is a membranous, emarginate lobe, recurved in lateral aspect (Fig. 26). Aedeagal hooks unusually large in apical third, appearing strongly chelate (Fig. 25). Dorsal aedeagal keel V-shaped but with base of keel slightly open (Fig. 27).

Female. Unknown.

Nymph. Unknown.

Etymology. The name, based on Incan emperor Huayna Capac, is used as a noun in apposition.

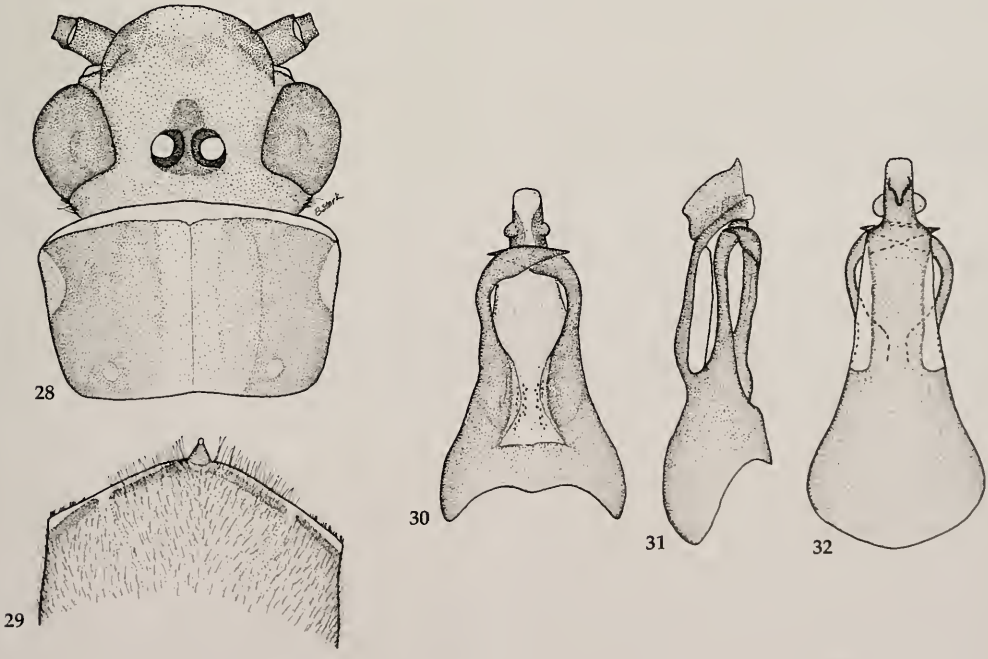
Diagnosis. The aedeagus of this species is similar to that of *A. kitchensi* (Stark 2001) but the V-shaped notch in the anterior margin of the dorsal sclerite and the membranous apical extrusion with notched margin of *A. huayna* distinguishes the two species. Both species have subchelate or chelate aedeagal hooks although these are more developed in *A. huayna*.

Anacroneuria pucallpa, spec. nov.
Figs 28-32

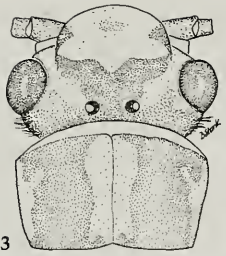
Types. Holotype: ♂, Peru, Loreto, Pucallpa, 10-12 April 1969, P. Spangler, P. Spangler (USNM). – Paratype: 1♂, Peru, Dept. Pasco, Chontilla, 22 km S Iscozazin, 1-15 August 1961, R. Etheridge (LACM).

Description

Adult habitus. Head with a dark pigment spot over ocelli and on anterior of frons connecting lappets (Fig. 28). Pronotum dark over most of disk but with a pale median band. Fore femora pale brown dorsally and yellow brown along venter; fore tibiae pale brown, mid and hind tibiae banded. Wing membrane transparent, veins amber except for pale costal margin.



Figs 28-32. *Anacroneuria pucallpa*, spec. nov. **28.** Head and pronotum. **29.** Male sternum 9. **30.** Aedeagus ventral. **31.** Aedeagus lateral. **32.** Aedeagus dorsal.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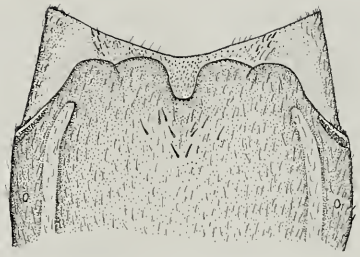
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Figs 33-34. *Anacroneuria rossi*, spec. nov. **33.** Head and pronotum. **34.** Female sterna 8 and 9.

Male. Forewing length 10 mm. Hammer thimble shaped; height greater than basal diameter (Fig. 29). Aedeagal apex truncate, scoop shaped with a pair of small, bulging subterminal processes (Figs. 30, 32). Posterolateral aspect of apex with a small marginal notch (Fig. 31). Dorsal aedeagal keel somewhat Y-shaped with broad stem directed basally (Fig. 32); aedeagal hooks subchelate (Fig. 30).

Female. Unknown.

Nymph. Unknown.

Etymology. The species name, based on the type locality, is used as a noun in apposition.

Diagnosis. This species is a member of the *Anacroneuria atrinota* Jewett complex defined by Stark (2001). It is most similar in aedeagal structure to the Colombian species, *A. rosita* Stark & Rojas (Stark et al. 1999), but the aedeagal hooks and dorsal keel shape readily distinguish these species. The hooks of *A. rosita* are bent abruptly inward below the thickened apex of the hooks rather than being smoothly curved, and the dorsal keel of that species is V-shaped with margins of the keel straight.

Anacroneuria rossi, spec. nov.
Figs 33-34

Anacroneuria PE-1 Stark & Sivec, 1998: 63.

Types. Holotype: ♀, Peru, Huanuco, 43 mi E Tingo Maria, 18 November 1954, E. I. Schlinger, E. S. Ross (CAS).

Description

Adult habitus. Head with dark brown pigment over occiput and extending forward between ocelli to mid frons; dark area reduced between eyes and ocelli by pale callosities. Lappets and a small transverse median bar near anterior margin of frons brown (Fig. 33). Median pronotal band and lateral margins pale. Wing membrane transparent and veins brown except along costal margin; veins pale in apical window at cord.

Male. Unknown.

Female. Forewing length 10 mm. Subgenital plate with four subequal lobes; outer lobes poorly separated from inner lobes by narrow slits, median notch larger and U-shaped (Fig. 34). Transverse sclerite of sternum 9 narrow, median sclerite covered with fine short setae in mesal field and with more prominent bristles in the lateral field.

Nymph. Unknown.

Etymology. The patronym honors E. S. Ross of the California Academy of Sciences for his important contributions to Neotropical entomology.

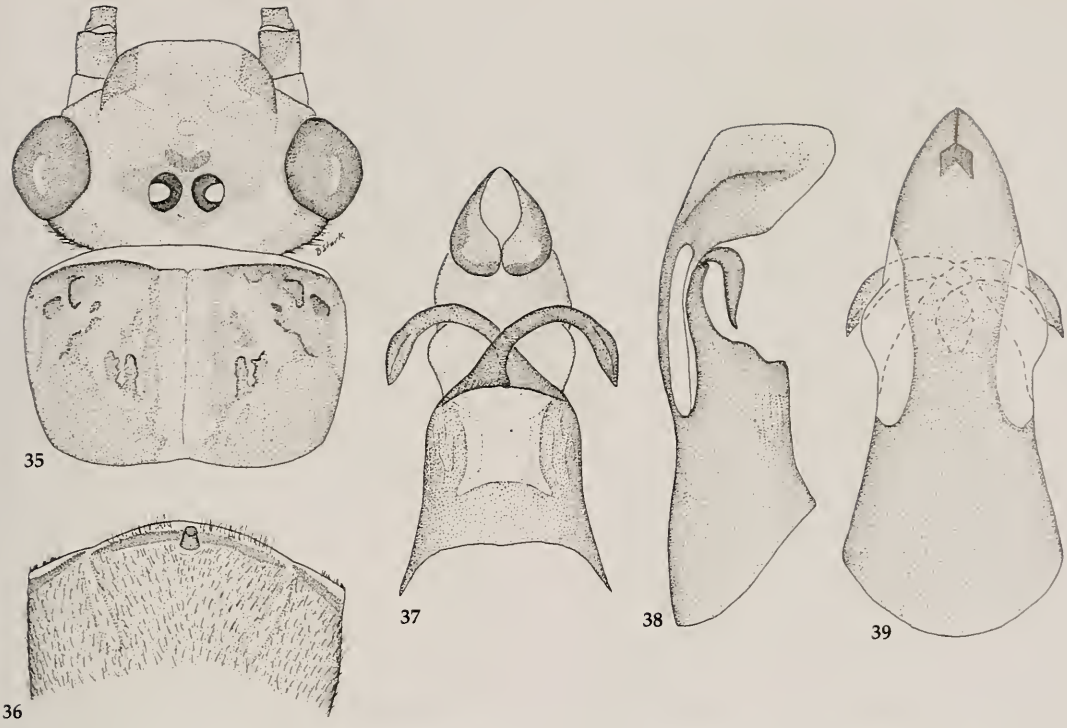
Diagnosis. The color pattern of this species is similar to *A. montera* as discussed above for *A. carole*. Among the cluster of species sharing this general habitus, *A. rossi* is unique in the four lobed subgenital plate with lateral notches reduced to narrow slits (Fig. 34). In addition, the species is also distinct from most others by virtue of the apical transparent window in the wing pigment. This species was previously described under the informal designation of *Anacroneuria* PE-1 in Stark & Sivec 1998).

Anacroneuria spectori, spec. nov.
Figs 35-39

Types. Holotype: ♂, Bolivia, Santa Cruz Dept., Caballero Prov., Park Nacional Amboró, 2030 m, 17°50'14"S 64°23'38"W, 20 October 2001, S. Spector, J. Ledezma, AMB21LITE 005 (Holotype retained by AMNH until a permanent Bolivian repository is selected). – Paratypes (all from Bolivia): 2♂♂, same data (AMNH); 1♂, same locality as holotype, 15 October 2001, S. Spector, J. Ledezma, AMB21LITE001 (AMNH); 1♂, Santa Cruz Dept., Caballero Prov., Park Nacional Amboró, 2060 m, 17°50'2"S 64°23'5"W, 19 October 2001, S. Spector, J. Ledezma, AMB21LITE004 (AMNH).

Description

Adult habitus. Dark pigment on head covers ocelli and extends forward and laterally in a more diffuse patch to M-line and lappets; area forward of



Figs 35-39. *Anacroneuria spectori*, spec. nov. **35.** Head and pronotum. **36.** Male sternum 9. **37.** Aedeagus ventral. **38.** Aedeagus lateral. **39.** Aedeagus dorsal.

M-line diffuse brown; lappets brown (Fig. 35). Pronotum brown or diffuse brown over most of disc but paler along midline. Wing membrane transparent, most of veins amber, but base of R and cord crossvein darker; costa and R beyond cord pale. Femora mostly pale brown but darker on dorsum, pale basally and with a median pale spot and dark band at apex; tibiae brown, becoming darker apically.

Male. Forewing length 14.5-16.0 mm. Hammer thimble shaped (Fig. 36). Aedeagus robust with apical third bent strongly ventrad and hooks with strong ventral keel and basal knob (Figs 37-38); dorsal keel strongly elevated at base, extending as a sharp ridge along midline of dorsoapical margin (Fig. 39).

Female. Unknown.

Nymph. Unknown.

Etymology. The patronym honors Sacha Spector of the American Museum of Natural History, collector of the type series of this and several other Bolivian *Anacroneuria*.

Diagnosis. The aedeagus of this species is similar to that of *A. major* Stark from Ecuador, but that species is larger, paler and the aedeagal keel base is not elevated as in *A. spectori*.

Anacroneuria taylori, spec. nov.

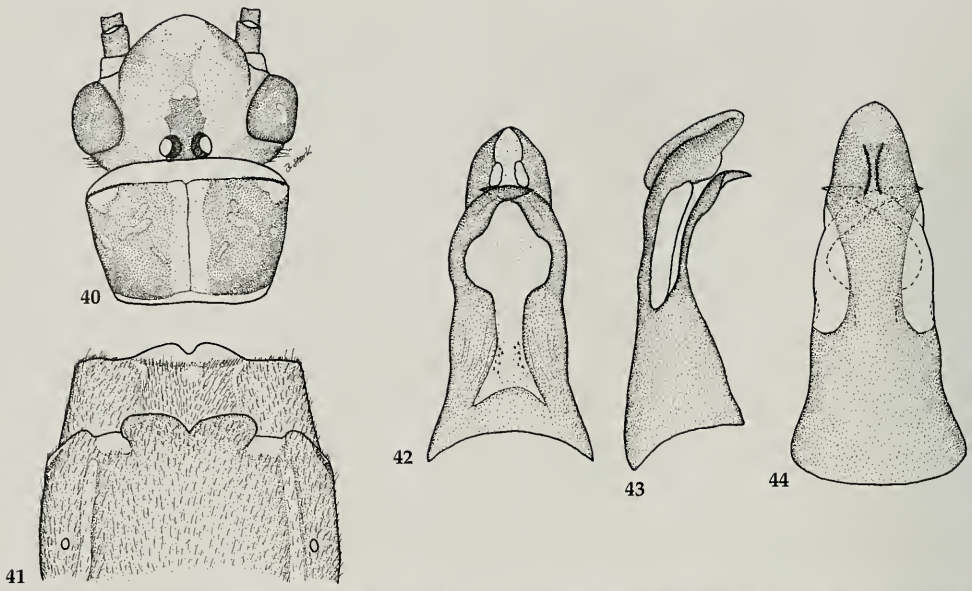
Figs 40-44

Types. Holotype: ♂, Peru, Madre de Dios, Manu, Pakitza, 250 m, 9 September 1988, O. S. Flint, N. Adams (USNM). – Paratypes: 1♀, same data (USNM); 2♂♂, Bolivia, Santa Cruz, Buena Vista, 400 m, 1958 (MSU).

Description

Adult habitus. Head with a longitudinal dark pigment band extending forward between ocelli to pale spot on mid frons; beyond pale spot on frons, a pale brown X-shaped spot occurs. Lappets dark brown, occiput pale brown (Fig. 40). Pronotum brown laterally, narrow mesal band pale. Fore tibiae dark, hind tibiae banded with dark basal and apical areas interrupted by a mesal yellow band. Wing membrane pale brown; veins brown, R-vein dark brown.

Male. Forewing length 9.0-10.5 mm. Hammer compressed laterally forming a hatchet shaped structure with height greater than basal diameter. Aedeagal apex simple, scoop shaped, rounded, and bearing a small pair of ventral membranous lobes (Figs 42-43). Aedeagal hooks subchelate (Fig. 42). Dorsal keel composed of a moderately long pair of narrowly separated ridges (Fig. 44).



Figs 40-44. *Anacroneuria taylori*, spec. nov. **40.** Head and pronotum. **41.** Female sterna 8 and 9. **42.** Aedeagus ventral. **43.** Aedeagus lateral. **44.** Aedeagus dorsal.

Female. Forewing length 14 mm. Subgenital plate bilobed and offset from segment by oval membranous, hairless zones located basolateral to plate; lobes of plate separated by a shallow V-shaped notch (Fig.41). Transverse sclerite of sternum 9 narrow and located forward of a weakly sclerotized, mesally notched process. Median sclerite of sternum 9 densely hirsute (Fig. 41).

Nymph. Unknown.

Etymology. The patronym honors singer, songwriter James Taylor in appreciation of his attention to environmental causes, particularly those in the rain forests of South America where *Anacroneuria* occurs.

Diagnosis. Males of *A. taylori* key to couplet 36 in Stark & Sivec (1998) but am impasse occurs at this point and the species cannot be resolved with the choices of *A. montera* and *A. aymara* Stark & Sivec. In Stark (2001) males key to couplet 19 where the species cannot be resolved with *A. aymara* and *A. pastaza* Stark & Sivec, but the species is perhaps more closely related to *A. auca* Stark, an Ecuadoran species which lacks ventral membranous aedeagal lobes (Stark 2001). Although the aedeagus of *A. taylori* is similar in one or more aspects to each of these five species, it is distinguished by the combination of subchelate hooks, small ventral membranous lobes and dorsal keel with arms apically divergent. The female is also distinct from known species by virtue of the subgenital plate structure shown in Fig. 41.

Anacroneuria tiwanaku, spec. nov.

Figs 45-46

Types. Holotype: ♀, Bolivia, Yungas Las Paz, Rio Murarrata to Suapi, 1400-1600 m, 26-28 November 1984, L. E. Pena G. (USNM).

Description

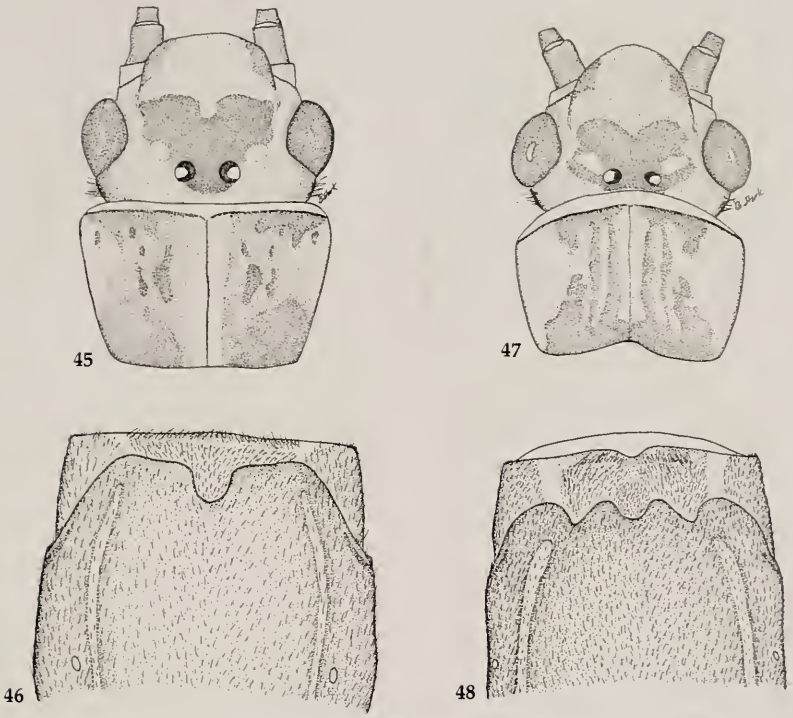
Adult habitus. Head with large dark area covering ocelli and extending forward and laterally to center of frons; anterior margin of dark patch with a mesal U-shaped notch. Lappets dark brown (Fig. 45). Pronotum brown laterally and with a pale mesal band; dark lateral areas of disk with scattered dark brown rugosities. Femora yellow in basal half, tibiae brown. Wing membrane pale brown but with a transparent window beyond cord; veins brown except for mid costal margin.

Male. Unknown.

Female. Forewing length 11.5 mm. Subgenital plate bilobed; margins of lobes truncate, notch V-shaped (Fig. 46). Transverse sclerite of sternum 9 pale and clothed with numerous short bristles; median sclerite rather densely clothed with short bristles.

Nymph. Unknown.

Etymology. The species name, used as a noun in apposition, honors the Tiwanaku people and culture.



Figs 45-48. *Anacroneuria* head and pronotal color patterns and female sterna 8 and 9. **45-46.** *A. tiwanaku*, spec. nov. **47-48.** *A. wari*, spec. nov.

Diagnosis. This species is another of those similar in habitus to *A. montera* as discussed for *A. carole* above. The bilobed subgenital plate with broad, truncate lobes and the apical window in the wing membrane will distinguish *A. tiwanaku* from similar species.

Anacroneuria wari, spec. nov.
Figs 47-48

Types. Holotype: ♀, Peru, Cusco, Hacienda Maria near Cosnipata River, 900 m, 24 February 1952, F. Woytkowski (USNM).

Description

Adult habitus. Head with dark brown pigment covering ocelli and extending laterally almost to compound eyes and forward to mid frons; anterior margin of dark patch with a mesal V-shaped notch and with a pair of oval pale areas lateral to ocelli (Fig. 47). Pronotum brown with irregular dark longitudinal rugosities near midline; lateral margins pale brown. Fore femora pale over basal third, dark over remaining surface; fore tibiae brown. Wing membrane brown except for transparent window beyond cord; veins brown except mid and basal costal area.

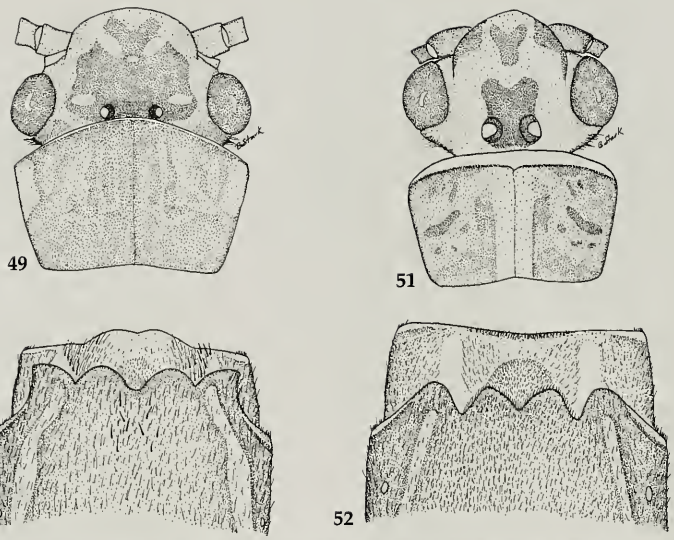
Male. Unknown.

Female. Forewing length 10.5 mm. Subgenital plate four lobed with outer lobes slightly wider and longer than inner lobes. Lateral and mesal notches subequal in size (Fig. 48). Transverse sclerite of sternum 9 wide and relatively hirsute except for small bare median area. Median sclerite with fine short setae in mesal field and with longer bristles laterally.

Nymph. Unknown.

Etymology. The species name, used as a noun in apposition, honors the Wari people and culture.

Diagnosis. This species is similar in general habitus to others in the *A. montera* cluster but differs from most others in having a four lobed subgenital plate with subequal lobes and notches. The species that is most similar to *A. wari* is *Anacroneuria* CO-6, described informally by Zúñiga & Stark (2002) from a Colombian specimen. These species differ in the shape of the dark head patches and more subtly in the relative size and shape of the outer subgenital plate lobes. In *A. wari* these lobes are broadly rounded whereas in the Colombian species they are more acute.



Figs 49-52. *Anacroneuria* head and pronotal color patterns and female sterna 8 and 9. **49-50.** *A. cosnipata* Stark & Sivec. **51-52.** *A. inca* Stark & Sivec.

Anacroneuria chavin Stark & Sivec

Anacroneuria chavin Stark & Sivec, 1998. Holotype ♂, Peru, Yurac, 67 mi E Tingo Maria (CAS).

Examined material. 38♂♂, Peru, Pasco, Chontilla, 22 km SE Iscozazin, 1-15 August 1961, R. Etheridge (LACM).

Comments. This species was previously known from the holotype (Stark & Sisvec 1998). The aedeagus of specimens in the present series has the apex gradually narrowed from the shoulders to the tip and the dorsal keel is about twice as long as shown for the holotype (Stark & Sivec 1998). Unfortunately no female specimens could be matched with this unusually large male series.

Anacroneuria cosnipata Stark & Sivec
Figs 49-50

Anacroneuria cosnipata Stark & Sivec, 1998. Holotype ♂, Peru, Cuzco. Llayehuyo near Cosnipata River (USNM).

Examined material. 1♀, Peru, Cuzco, Paucartambo, Quinta Calzon, ca. 30 km NW Pilcopata, km 164, 1030 m, 3 September 1989, N. Adams et al. (USNM); 1♀, same location, 2 September 1989, R. A. Faitoute (USNM).

Description of the putative female

Forewing length 10.5 mm. Subgenital plate four lobed; outer lobes acute and curved outward at tips; inner lobes shorter and more rounded than outer lobes; mesal notch slightly wider and deeper than lateral notches (Fig. 50). Transverse sclerite poorly developed; median sclerite with fine short setae in mesal patch; lateral bristles longer.

Diagnosis. These females agree well in color pattern with the distinctive males of *A. cosnipata* (Fig. 49) but have the same forewing length as the holotype male (Stark & Sivec 1998) and therefore might represent another species. Presently, the dark head pattern with five enclosed pale oval areas seems distinctive for *A. cosnipata*.

Anacroneuria cuzco Stark & Sivec

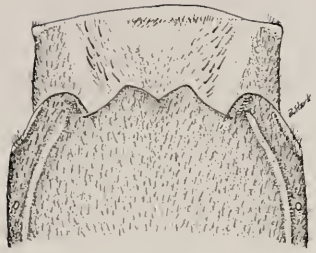
Anacroneuria cuzco Stark & Sivec, 1998. Holotype ♂, Peru, Cuzco, Paucartambo, pte. San Pedro (USNM).

Examined material. 1♂, Bolivia, Santa Cruz Dept., Caballero Prov., Park Nacional Amboró, 2060 m, 17°50'2"S 64°23'5"W, 19 October 2001, S. Spector, J. Ledezma, AMB21LITE004 (AMNH).

Comments. This species was previously known from seven male specimens collected primarily from southern Peru but is also known from one Bolivian site (Stark & Sivec 1998). This is the first record from Santa Cruz Department.

Anacroneuria flavicoronata Jewett

Anacroneuria flavicoronata Jewett, 1959. Holotype ♀, Yurac, 67 miles east of Tingo Maria, Peru.
Anacroneuria flavicoronata: Stark & Sivec, 1998.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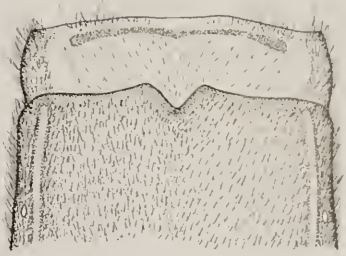
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Figs 53-54. *Anacroneuria* female sterna 8 and 9. **53.** *A. kitchensi* Stark. **54.** *A. mochica* Stark & Sivec.

Examined material. 11♂♂, Peru, Pasco, Chontilla, 22 km S Iscozazin, 1-15 August 1961, R. Etheridge (LACM).

Comments. This species was previously reported from the Departments of Huanuco and Loreto in Peru (Jewett 1959, Stark & Sivec 1998).

Anacroneuria inca Stark & Sivec
Figs 51-52

Anacroneuria inca Stark & Sivec, 1998. Holotype ♂, Peru, Madre de Dios, Manu, Erika (USNM).

Examined material (all from Peru). 3♀♀, Madre de Dios, Manu, Erika, 550 m, 4-6 September 1988, O. S. Flint, N. Adams (USNM); 1♀, Madre de Dios, Manu, Pakitza, 250 m, 8-22 September 1989, N. Adams et al. (USNM); 2♀♀, Madre de Dios, Manu, Rio Manu, Limonal, 200 m, 7 September 1988, O. S. Flint, N. Adams (USNM).

Description of the putative female

Forewing length 12 mm. Subgenital plate four lobed; outer lobes slightly wider than inner lobes; lateral notches deeper than mesal notch (Fig. 52). Transverse sclerite of sternum 9 narrow and sparsely covered with short bristles; median sclerite with a broad mesal field of fine short setae; lateral setae more prominent.

Diagnosis. The color pattern and size of these females are in close agreement with the holotype male specimen (Fig. 51) consequently this association seems secure. The subgenital plate is similar to that of *A. atrinota* Jewett and *A. flavifrons* Jewett in having deep lateral notches and a shallow mesal notch. The species is closely related to the former species and separation of isolated females of *A. atrinota* and *A. inca* will be quite difficult, however the mesal notch for *A. inca* is slightly deeper and the dark pigment patch in the ocellar area extends laterally beyond the ocelli in that species.

Anacroneuria kitchensi Stark
Fig. 53

Anacroneuria kitchensi Stark, 2001. Holotype ♂, Ecuador, Pastaza, Puyo (USNM).

Examined material. 26♂♂, 24♀♀, Ecuador, Pastaza, Puyo, 900m, 13 May 1971, B. Malkin (FMNH).

Description of female

Forewing length 12-13 mm. Subgenital plate 4-lobed; lateral lobes separated by deep V-shaped notches, median lobes by a wide V-shaped notch; median lobes slightly longer than lateral lobes (Fig. 53). Sternum 9 without transverse sclerite; median sclerite lightly sclerotized and distinctly elevated into a narrow mesal ridge projecting from beneath subgenital plate median notch and extending to near posterior margin of sternum 9; lateral setal patches prominent, mesal setae finer and less prominent (Fig. 53).

Comments. The subgenital plate and 9th sternum of this species are similar to those of *A. inca*, described above, and *A. spangleri* Stark but those species have a transverse sclerite on sternum 9 and lack the peculiar elevated mesal ridge present in *A. kitchensi* (Stark 2001). This species was previously known from three male specimens also collected at Puyo or at a nearby site (Stark 2001).

Anacroneuria mochica Stark & Sivec
Fig. 54

Anacroneuria mochica Stark & Sivec, 1998. Holotype ♂, Peru, Madre de Dios, Manu, Pakitza (USNM).

Examined material. 2♀♀, Peru, Madre de Dios, Manu, Pakitza, 250 m, 14-23 September 1988, O. S. Flint, N. Adams (USNM); 1♀, Peru, Madre de Dios, Manu, Aquajal, 250 m, 12 September 1988, M. G. Pogue (USNM).

Description of the putative female

Forewing length 13 mm. Subgenital plate bilobed with lobes separated by V-shaped notch; inner angles of lobes project beyond outer angles (Fig. 54). Transverse sclerite of sternum 9 darkly sclerotized and without bristles; median sclerite with slightly larger bristles in lateral patches.

Diagnosis. These females agree closely with the holotype male in color pattern but are slightly larger than expected for a species whose males have a forewing length of only 9 mm. The subgenital plate structure is distinct from any known species and the unusual wing pigment pattern of dark amber across the cord and wing tip, on R beyond the cord to near the wing tip, on Cu along the entire pre-cord length and across the bases of the A veins is also distictive.

Anacroneuria montera Stark & Sivec

Anacroneuria montera Stark & Sivec, 1998. Holotype ♂, Peru, Loreto, Iquitos (USNM).
Anacroneuria montera: Stark et al. 2001.

Examined material. 1♀, Peru, Loreto, Oran, 100 mi E Iquitos, 10 December 1986, L. Stevens (USNM).

Comments. This species is known from a few specimens collected in the Iquitos area of Peru and the neighboring region in Amazonas, Colombia.

Anacroneuria woytkowskii Stark & Sivec

Anacroneuria woytkowskii Stark & Sivec, 1998. Holotype ♂, Peru, Cuzco, Hacienda Maria near Cosnipata River (USNM).

Examined material. 1♂, Peru, Madre de Dios, Rio Tambopata Res., 30 air km SW Pto. Maldonado, 290 m, 16-20 November 1979, J.B. Heppner (USNM).

Comments. This species was previously known from the holotype (Stark & Sivec 1998).

Peruvian and Bolivian *Anacroneuria* species list

53 *Anacroneuria* species currently recognized for Peru and Bolivia are listed below. 43 of these occur in Peru and 18 are known for Bolivia, only 11 species are known from both male and female specimens and none have been associated in the nymphal stage.

A. adamsae Stark & Sivec, 1998	Peru
A. amaru, spec. nov.	Bolivia
A. amboro, spec. nov.	Bolivia
A. atrinota Jewett, 1959	Peru
A. aymara Stark & Sivec, 1998	Peru
A. bipunctata, spec. nov.	Peru
A. boliviensis (Enderlein, 1909)	Bolivia
A. brunneilata Jewett, 1959	Peru
A. bulbosa Stark & Sivec, 1998	Peru
A. callanga Stark & Sivec, 1998	Peru
A. cana Stark & Sivec, 1998	Peru
A. canchi Stark & Sivec, 1998	Peru
A. carole, spec. nov.	Peru
A. chavin Stark & Sivec, 1998	Peru
A. chipaya Stark & Sivec, 1998	Bolivia
A. cochabamba, spec. nov.	Bolivia
A. cosnipata Stark & Sivec, 1998	Peru
A. cusi, spec. nov.	Bolivia
A. cuzco Stark & Sivec, 1998	Bolivia, Peru
A. flavicoronata Jewett, 1959	Peru
A. flavifrons Jewett, 1959	Peru
A. flinti Stark & Sivec, 1998	Peru
A. handlirschi Klapálek, 1922	Bolivia, Peru
A. heppneri Stark & Sivec, 1998	Peru
A. huayna, spec. nov.	Peru
A. inca Stark & Sivec, 1998	Peru
A. iridescens Klapálek, 1922	Bolivia
A. loreto Stark & Zúñiga, 2001	Peru
A. lupaca Stark & Sivec, 1998	Peru
A. moche Stark & Sivec, 1998	Peru
A. mochica Stark & Sivec, 1998	Peru
A. montera Stark & Sivec, 1998	Peru
A. nazca Stark & Sivec, 1998	Peru
A. pacaje Stark & Sivec, 1998	Bolivia
A. pachacuti Stark & Sivec, 1998	Bolivia, Peru
A. pakitza Stark & Sivec, 1998	Peru
A. pellucida Klapálek, 1922	Bolivia, Peru
A. perpusilla Klapálek, 1921	Peru
A. pucallpa, spec. nov.	Peru
A. quecha Stark & Sivec, 1998	Peru
A. rossi, spec. nov.	Peru
A. spectori, spec. nov.	Bolivia
A. taylori, spec. nov.	Bolivia, Peru
A. tiwanaku, spec. nov.	Bolivia
A. uru Stark & Sivec, 1998	Bolivia, Peru
A. vilcabamba Stark & Sivec, 1998	Peru
A. vitripennis Klapálek, 1922	Peru
A. wari, spec. nov.	Peru
A. wincha Stark & Sivec, 1998	Peru
A. woytkowskii Stark & Sivec, 1998	Peru
A. x-nigrum Klapálek, 1921	Peru
A. yameo Stark & Sivec, 1998	Bolivia, Peru
A. zwicki Stark & Sivec, 1998	Bolivia, Peru

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