

**A SYNOPSIS OF THE ARGIA FISSA GROUP,
WITH DESCRIPTIONS OF TWO NEW SPECIES,
A. ANCEPS SP.N. AND A. WESTFALLI SP.N.
(ZYGOPTERA: COENAGRIONIDAE)**

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The *Argia fissa* group, of the northern neotropical region, is analyzed. *A. anceps* sp.n. (holotype ♂, allotype ♀: Costa Rica, San Jose prov., San Pedro, 9-VIII-1979; in USNM) and *A. westfalli* sp.n. (holotype ♂, allotype ♀: Mexico, Nuevo León, Municipio de Santiago, 2.5 km NW of Rancho Los Atascos, 2-VII-1987; in FSCA) are described, keyed, illustrated, and compared with the northern South American *A. fissa*. The types are deposited in FSCA, Gainesville, FL, USA.

INTRODUCTION

Argia fissa was originally described by SELYS (1865) from an unspecified number of males and females from "Bogota, Nouvelle Grenada [= Colombia]". CALVERT (1902) featured the species in the *Biologia centrali americana*, extending the species northward to 25°38'N in Nuevo Leon (nr. El Diente, ca 6 km SW Monterey), Mexico. RIS (1918) extended its range southward to 12°05'S in Peru (Lima Prov., Callao). Males of this species are unique in possessing slightly amber wings, largely pale blue abdominal coloration lacking postbasal streaks, and long cerci with a single decumbent tooth. Leonora K. Gloyd, who was working on the genus up to her death in June, 1993, realized many years ago that three species were included under the name *A. fissa*. One of the undescribed species is perhaps the most commonly encountered zygopteran in Mexico and south through Costa Rica. Gloyd examined thousands of specimens and applied a manuscript name to this species. This and the other undescribed species are the northern components of the *A. fissa*

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complex along the northernmost border states of Mexico. I describe them so that their names will be available for an upcoming manual on the damselflies of North America by M. May and M.J. Westfall, Jr.

Terminology follows that of GARRISON (1994). The illustrations of the structures in this paper were made using a Wild M-8 microscope equipped with a camera lucida. Under species accounts, app = appendages, mp = mesostigmal lobe(s), thx = thorax, synthx = synthorax, FW = fore wing, HW = hind wing, and abd = abdomen. Venational counts are from 20 specimens of each sex, where available, from as many different localities as possible. Specimens listed as RWG are in my collection; other acronyms can be found in the acknowledgements.

A critical examination of the cerci (Fig. 2c) in males and mesostigmal lobes (Fig. 11a', c') in females is necessary to assure accurate identification of the three species. They may be differentiated by the following key.

KEY TO SPECIMENS OF THE *ARGIA FISSA* GROUP

MALES

- 1 Cercus in dorsal view with medial margin convexly curved, followed by a small concave margin near tip (Fig. 3c), same structure in mediodorsal view (Fig. 3a) with medial margin nonlinear, this area curving ventrally to meet decumbent tooth, then curving dorsally after tooth; cercus in mediodorsal view with decumbent tooth located at distal 0.70 so that medial margin of cercus appears slightly angulate at region of tooth; humeral stripe unbranched (Fig. 24) in more northerly Mexican states, or forked (Fig. 25) in populations from Chiapas *westfalli*
- 1' Cercus in dorsal view with medial margin linear or slightly concave (Figs 1c, 2c), same structure in mediodorsal view (Figs 1a, 2a) with medial margin linear (except at region of tooth); cercus in mediodorsal view with decumbent tooth located at ca. 0.30-0.60 of appendage, cercus not appearing angulate at region of tooth (Figs 1a, 2a); humeral stripe of varying condition (Figs 17, 18, 20, 21), but never forked; northern border states of Mexico south through Colombia, Ecuador, and Peru 2
- 2(1') Medial margins of cerci in dorsal view contiguous or nearly so, transverse torus strongly overlapping epiproct, tori almost contiguous, each torus about 10x wider than gap separating them (Fig. 2c); decumbent tooth on medial margin of cercus in posterior view at basal 0.30-0.40 (Figs 2d, 5a-c); extreme eastern Costa Rica south through cordilleran region of Colombia and northern Peru *fissa*
- 2' Medial margins of cerci in dorsal view separated by a gap about as wide as basal width of each cercus, tori only slightly overlapping epiproct, each torus about 3-4x wider than gap separating them (Fig. 1c); decumbent tooth on medial margin of cercus in posterior view at basal 0.50-0.60 (Figs 1d, 4a-d); northern border states of Mexico south to eastern Costa Rica... *anceps*

FEMALES

- 1 Mesostigmal lobes strongly elevated, with lobe distinctly erect (Figs 11b', c'), anterior margin of mesepisternum directly underneath mesostigmal lobe with no tubercle, this area forming a concave junction with base of mesostigmal lobe (Fig. 16) [Note: Strong light is necessary to see this structure], humeral stripe unbranched to forked (Fig. 26) *westfalli*
- 1' Mesostigmal lobes not as strongly elevated (Figs 9b', c', 10b, c) compared with *A. westfalli*; anterior margin of mesepisternum directly underneath mesepisternal lobe with a transverse

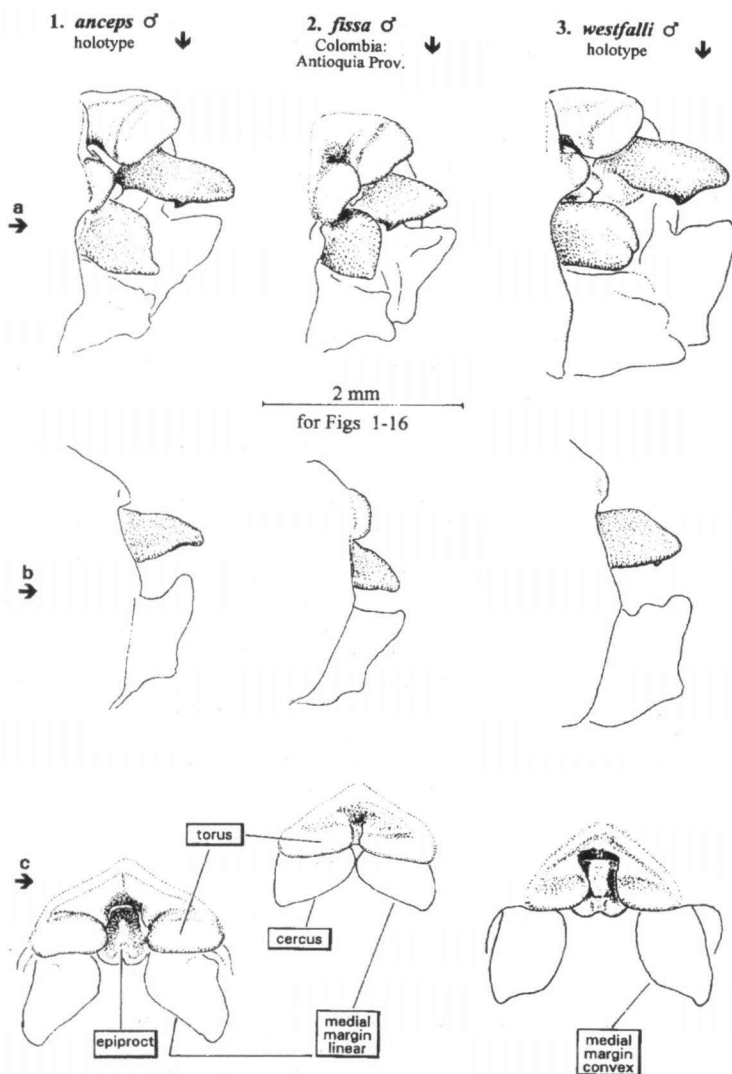
- tubercle of varying length (Figs 14-15), this structure sometimes visible in lateral view (Fig. 9c'); humeral stripe never forked (Figs 22, 23) 2
- 2(1') Distance between mesostigmal lobes almost as wide (70-93%, N=8) as each lobe; usually with a small gap between medial edge of mesostigmal lobe and anterior fork of middorsal thoracic carina (Figs 9a, a', 12a-f) *anceps*
- 2' Distance between mesostigmal lobes approximately half (50-63%, N=8) as wide as each lobe; medial margin of mesostigmal lobe adjacent to anterior fork of middorsal thoracic carina (Figs 10a, 13a-f) *fissa*

ARGIA ANCEPS SP. NOV.

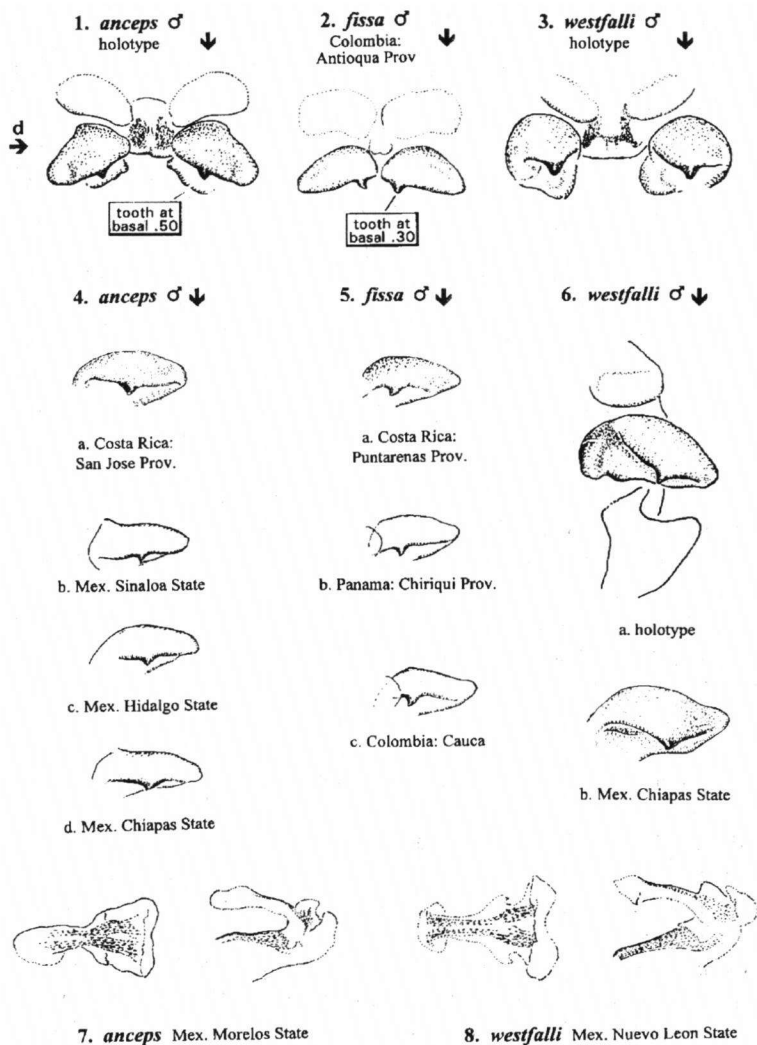
Figures 1, 4-app, 7-penis, 9, 12-mp, 17-body of holotype, 18-thx, abd segments 7-10 of paratype, 19-abd segments 7-10 of paratype, 20-21-humeral stripe of males, 22-body of allotype

Argia fissa CALVERT 1899: 381 (descr. ♂ from Tepic, Mex.); CALVERT, 1902: 89 (all specimens from Middle America misidentified as *A. fissa*)

Material. – **Holotype** ♂, **allotype** ♀: COSTA RICA, San Jose prov., San Pedro, dump beside Holland House (Hotel), 9-VIII-1979, R.W. & J.A. Garrison leg. Both in USNM. – **Paratypes** (123 ♂, 34 ♀): MEXICO: Sinaloa: stream 15.7 mi NE of Concordia, 1900 ft, 26-VIII-1965, D.R. Paulson leg., 1 ♂ (FSCA); – Hidalgo, Calnali, 9-IV-1994, R. Novelo, leg. 1 ♂, 1 ♀ (IE); – Molango, Laguna de Atezca, 1450 m, 20-XI-1983, J. Peña, leg., 3 ♂ (IE); – Laguna Azteca [sic, should be Atezca], 2 km N Molango, 24-VII-1992, G. Harp, leg., 1 ♂ (RWG); – Naopa, 1000 m, 25-IV-1984, R. Novelo, V. Garcia & J. Peña, leg. 1 ♂ (IE); – Tecozautla, Río Tecozautla, 14-IX-1992, R. Novelo leg., 2 ♂ (IE); – Guerrero, MX-55 between Taxco Jct and Huajintlan, 22-VII-1993, W.F. Maufray, leg., 1 ♂ (IORI); – Jalisco, Sierra de Autlan, 16-IX-1991, no collector, 1 ♂ (RWG); – Morelos, Rt 115 E of Cuernavaca near Tlalpa, 23-VI-1963, R.E. Woodruff, leg., 1 ♂ (FSCA); – Las Fuentes, Municipio of Jiutepec, 10 km W of Cuernavaca, 1300 m, 17-IX-1983, R.W. Garrison, leg., 3 ♂ (RWG); – same data but 1-X-1983, 6 ♂, 2 ♀ (RWG); – Itzamatitlan, 5 km SW of Yauatepec, 2-X-1983, R.W. Garrison leg., 2 ♂, 1 ♀ (RWG); – Cañon de Lobos, 5 km SW of Yauatepec, 1-X-1983, R.W. Garrison, leg., 1 ♂ (RWG); – Cañon de Lobos, 19 km E of Cuernavaca, 15-X-1986, E. Fisher, leg., 1 ♂ (RWG); – Xochitepec, MX-95 libre at Balneario Campestre Rio Sabinos, 21-VII-1992, W.F. Maufray, leg., 17 ♂ (1 ♂ in copula with ♀ of *A. extranea* [Hag.]), 9 ♀ (IORI, FSCA); – Cocoyotla, approx. 5 km N of MX rt 421, 23-VII-1992, W.F. Maufray, leg., 2 ♂ (IORI, FSCA); – Balneario on river S of Temixco on Libre 95, 21-VII-1992, S.W. Dunkle, leg., 1 ♂, 1 ♀ (SWD); – Ixcatepec, Campamento Cammohmila, 16-X-1993, R. Novelo, leg., 2 ♂ (IE); – Rio Sabinos, km 18.3 carr. 95, 5 km S Acatlipa, 14-X-1994, R. Novelo, leg., 2 ♂ (IE); – Michoacan, stream 3.9 mi N of Tuxpan, ca 6000 ft, 18-VIII-1965, D.R. Paulson, leg., 1 ♂, (FSCA); – Veracruz, stream at highway, "Finca las Animas", 1 mi E of Jalapa, 4680 ft, 11-VIII-1957, G.H. Beatty III, leg., 1 ♂, 1 ♀ (RWG); – stream 6.9 km S of Cordoba by Mex Hwy 150, 700 m, 1-VIII-1976, R.W. & J.A. Garrison, leg., 1 ♂ (RWG); – same data but 12-VIII-1976, 17 ♂ (RWG); – same data but 13-VIII-1976, 1 ♂ (RWG); – km 17 carr. Cordoba-Veracruz, 22-IX-1983, R. Novelo, leg., 1 ♂, 1 ♀ (IE); – Fortin de las Flores, 27-VI-1963, R.E. Woodruff, leg., 1 ♂, 1 ♀ (FSCA); – stream 4.2 mi N Fortin, 4100 ft, 11-VIII-1965, D.R. & M.L. Paulson, leg., 2 ♂ (FSCA); – Rio Metlac about 3.5 km WNW Fortin de las Flores, 900 m, 10-VIII-1976, R.W. & J.A. Garrison, leg., 4 ♂, 2 ♀ (RWG); – 5 mi N of Huatusco, 4000-4500 ft, 13-VIII-1963, H.V. Weems, Jr., leg., 1 ♀ (FSCA); – pond 28 km NE Huatusco by Mex Hwy 66, 900 m, 11-VIII-1976, R.W. & J.A. Garrison, leg., 2 ♂, 3 ♀ (RWG); – Parque Javier Clavijero, Jalapa, 1300 m, 17-VIII-1982, R.W. & J.A. Garrison, leg., 2 ♂, 1 ♀ (RWG); – same locality, 8-V-1991, R. Novelo, leg., 1 ♂ (IE); – La Fraternidad, 17 km E of Cordoba, 22-IX-1983, R.W. Garrison, leg., 1 ♂ (RWG); – Puebla, Nuevo Necaxa (Presa), 18-VII-1990, R. Novelo, leg., 1 ♂ (IE); – Puente Necaxa, Hwy 130, 5 mi NE Huauchinango, B.C.



Figs 1-3. *Argia anceps* sp.n. (holotype: Figs 1a-c), *A. fissa* (Figs 2a-c), and *A. westfalli* sp.n. (holotype: Figs 3a-c): (a) caudal appendages, mediodorsal view; - (b) same, lateral view; - (c) same, dorsal view.



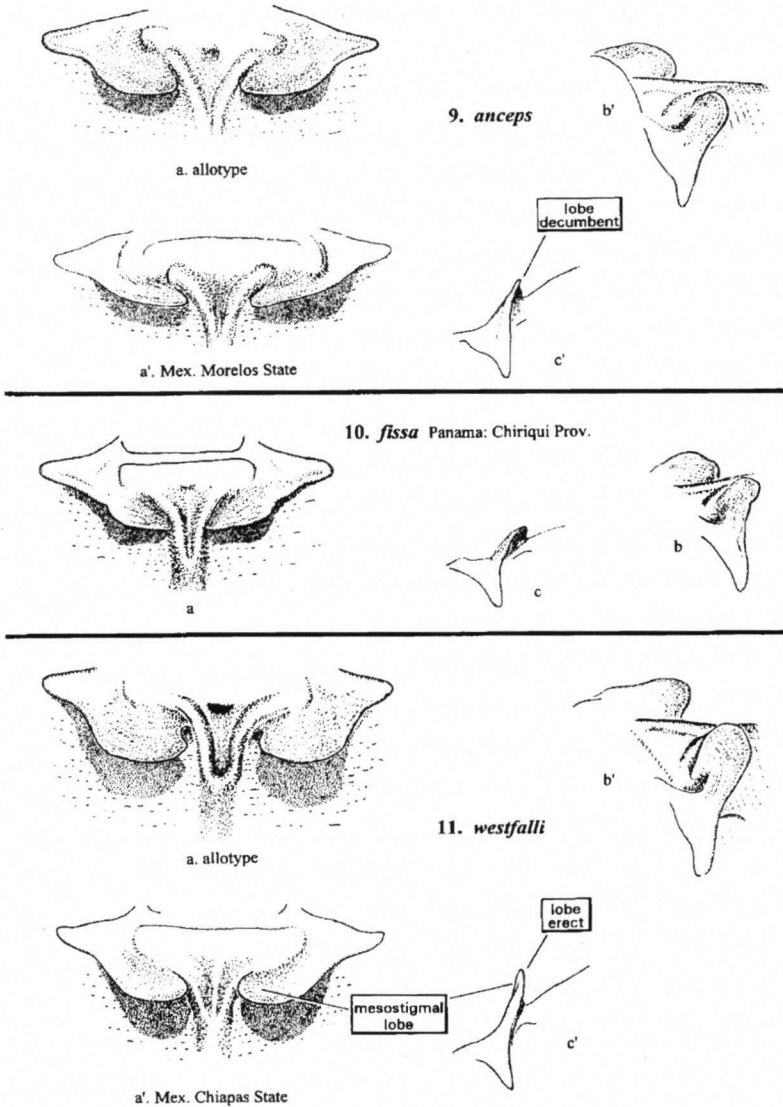
Figs 1-3 (continued), 4-8. *A. anceps* sp.n. (Figs 1d, 4, 7), *A. fissa* (Figs 2d, 5), and *A. westfalli* sp.n. (Figs 3d, 6, 8): (1d-3d) caudal appendages, posterior view; – (4-6) right cercus, medioposterior view; – (7-8) penis, ventral (ectal) view, left, lateral view, right.

Villegas, leg., 1 ♀ (RWG); – Piedras Negras arroyo, 25-X-1987, A. Gomez, leg., 3 ♂ (IE); – Xicotepec de Juárez, 20-V-1987, R. Novelo & A. Gomez, leg., 1 ♂, 1 ♀ (IE); – Oaxaca, 43 mi W of Tehuantepec, 2500-3000 ft, 22-VIII-1963, H.V. Weems, Jr., leg., 1 ♂ (FSCA); – Chiapas, Finca San José La Victoria, km 20 carretera Tapachula-Cacahoatán, 9-III-1982, R. Novelo, leg., 1 ♂ (IE); – Finca La Flor, 3 km NE de Ocuilapan, Mun. de Berriozábal, 13-III-1982, R. Novelo, leg., 1 ♂ (IE); – La Boquilla, 25 km N de Tapachula, 21-XI-1982, R. Novelo, leg., 1 ♂ (IE); – 13 mi SW of Cintalapa, 1500-2000 ft, 19-VIII-1963, H.V. Weems, Jr., leg., 1 ♂ (FSCA); – El chorreadero at km 25 on Tuxtla-Gutierrez-San Cristobal Rd, 24 km S of Tuxtla Gutierrez, R.W. Garrison, leg., 1 ♂, 1 ♀ (RWG); – El Chorreadero, carretera Tuxtla-Gutierrez-San Cristobal de las Casas, 27-XI-1983, R. Novelo, leg., 1 ♂ (IE); – BELIZE, Privassion Creek, 10-XII-1992, T. Boomsma, leg., 1 ♂ (RWG); – GUATEMALA, Dept Guatemala, caldera, lake nr San Francisco de Sales, 1800 m, 22-VIII-1964, T.W. Donnelly, leg., 4 ♂ (FSCA, RWG); – HONDURAS, Danli, 10-V-1966, J. Matta, leg., 1 ♂, 1 ♀ (FSCA); – Francisco Morazan Dept, El Rancho, between Zamorano and Tegucigalpa, 11-XII-1987, S.W. Dunkle, leg., 2 ♂ (RWG); – El Hatillo, 10 km N of Tegucigalpa, 1300 m, T.W. & A. Donnelly, leg., 28-VI-1974, 1 ♂ (FSCA); – COSTA RICA, Cartago Prov, Rio Reventazon, SE of Turrialba by Hwy 10, 10-VIII-1979, R.W. & J.A. Garrison, 6 ♂, 2 ♀ (RWG); – vicinity Juan Vinas, Rio Reventazon, 800 m, 11-VI-1962, T.W. Donnelly, leg., 1 ♂ (RWG); – Guanacaste Prov, small stream on Rt 145 just E of Tilaron, 27-II-1987, S.W. Dunkle, leg., 1 ♂ (SWD); – Puntarenas Prov, Macacona de Esparta, I/II-1905, P. Biolley, Jr., leg., 1 ♂ (FSCA); – San Jose Prov, no locality, 7-V-1960, R.B. Cumming, leg., 2 ♂ (FSCA); – same data as holotype, 4 ♂, 2 ♀ (RWG); – Res. Biol. El Rodeo, 7 km W of Villa Colón, 9°54'N, 84°16'W, 800 m, 10/13-VII-1990, T.W. Donnelly, leg., 2 ♂, 1 ♀ (FSCA, RWG); – San Pedro de Montes de Oca, Quebrada los Negritos, 1200 m, 5-VIII-1983, E.A. Rojas, M., leg., 1 ♂, 1 ♀ (RWG).

E t y m o l o g y. – Latin for double, in reference to its sibling relative *A. fissa*.

MALE (holotype). – Head (Fig. 17). Labium pale blue, remainder of head blue with small black medial spot at base of labrum; black on epicranium reduced with narrow longitudinal line separating large postocular spot from cross bar of blue on occiput; pale spot anterolateral to lateral ocellus confluent with remainder of blue; anterior margin of black with anterolateral margin not reaching base of antennae; antennae black rear of head chiefly pale, with small area around occipital foramen black.

T h o r a x. – Prothorax blue, black above with following areas pale: transverse band on frontal lobe, finely divided narrow dorsal spot and large dorsolateral spot on middle lobe, narrow medial spot and lateral of 0.30 of posterior lobe. Pale areas of synthorax (Fig. 17) blue, with broad black middorsal stripe 0.30 as wide as pale antehumeral stripe; black humeral stripe not forked, extending from base of mesinfraepisternum and forming a broad lobe at base of mesepimeron, then upper half of this constricting to 0.25 width of pale humeral stripe; black humeral stripe abruptly narrowed to 0.10 width of pale humeral stripe and with slight enlargement at dorsal 0.10 of thorax, third lateral suture with narrow black stripe. Wings slightly amber with venation black; pterostigma dark brown, surmounting 1.5 cells in all wings (one cell in left hind wing); postnodals: 16/13; postquadrangular cells: FW 5/5; HW 5/4, M_2 originating at FW 7/7; HW 6/7. Coxae and trochanters pale except for black on dorsum; femora black dorsally, pale ventrally; tibiae black on inner surface, black on exterior surface of pro- and mesothoracic tibiae, remainder pale; tarsi and armature black.



Figs 9-11. *A. anceps* sp.n. (Fig. 9), *A. fissa* (Fig. 10), and *A. westfalli* sp.n. (Fig. 11): (a,a') mesostigmal plates, dorsal view (note: dark areas behind each lobe are shadows for each lobe); – (b,b') same, oblique dorsolateral view; – (c,c') same, lateral view.

Abdomen (Fig. 17) blue, segment 1 pale with dorsal brown spot at basal 0.50; segment 2 with black dorsolateral stripe extending to 0.80 of segment, its end forming an inverted triangle extending to but not connecting above, a small isolated spot below, annulus black; segment 3 with an incomplete band of black at posterior 0.80 of segment, isolated spot of blue at lateral 0.90 of segment, annulus black; segments 3-5 with apical 0.20 of each segment, including annulus, black; this black not meeting dorsally on segment 4, separated by a narrow middorsal line on segment 5, and connecting dorsally on segment 6; segment 7 similar to segment 6 but with lateral prolongation of black extending to basal 0.15 of segment; segments 8-10 pale with a touch of black at lower posterior margin of segment 8.

Torifer (Fig. 1a, c) triangular, torus prominent, transversely twice as wide as long, occupying lower 0.50 of torifer, each torus transversely about 1.5 times as wide as the distance between them; epiproct not prominent, extending to level of torus, largely black except for pale apical margin, bilobed with a recessed small median lobe. **Cercus** (Fig. 1a) pale, about twice as long as wide, distally slightly falcate, in dorsal view with medial margin slightly concave, cercus with a single small black decumbent tooth visible at middle along ventral margin in dorsomedial view; medial margin nearly linear in dorsomedial view; in lateral view, cercus narrowly triangular, with inner tooth not visible; paraproct a little shorter than cercus, barely divided, with dorsal lobe forming a broadly based triangle; ventral branch a small bluntly pointed tubercle (Fig. 1b).

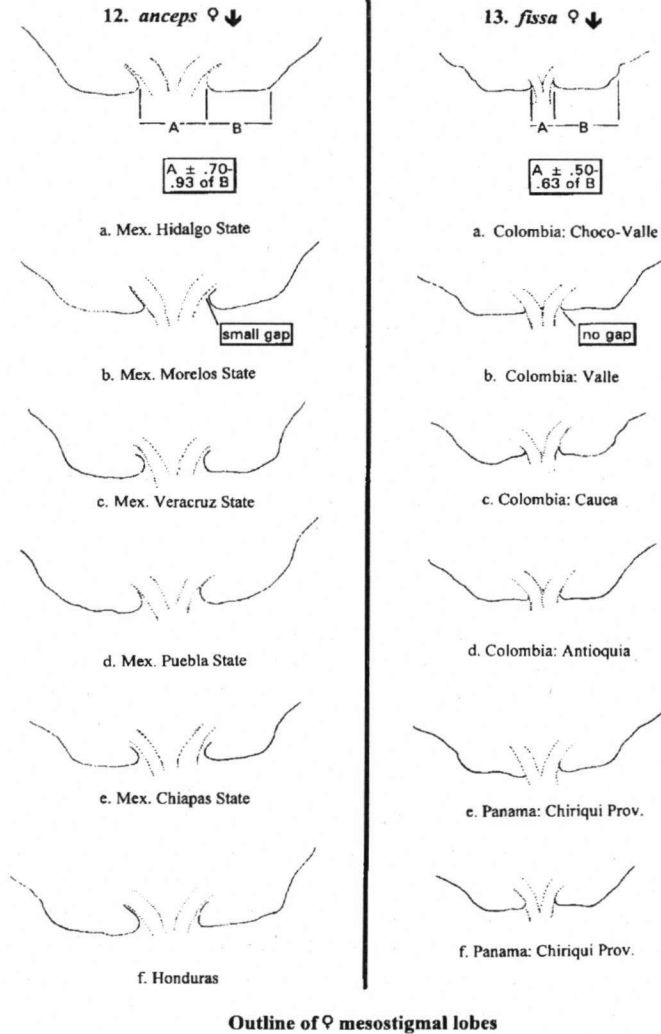
Penis (paratype, Fig. 7) with fourth segment forming a narrow, bluntly rounded lobe.

Measurements (in mm). – HW 24.5, abdomen 31.0.

FEMALE (allotype). – Tan with head and thoracic patterns similar to male but with black areas on epicranium less extensive (Fig. 22) and with diffuse black spot extending from below base of antenna to eye margin, black middorsal stripe a mere hairline along middorsal thoracic carina, black humeral stripe similar to male but narrower. Wings slightly amber with venation black, pterostigma brown, surmounting one cell or slightly less in all wings, postnodal crossveins: FW 15/15, HW 13/12; postquadrangular cells: FW 5/5, HW 4/4; M_2 originating near FW 8/8, at HW 6/6.

Abdomen (Fig. 22) tan with diffuse brown markings on dorsum and with darker markings at distal 0.80 of segments 3-7, these dark markings composed of a larger dorsolateral spot and a narrow lateral streak; annuli dark brown on segments 2-6, paler on 7; segment 8 pale with a wash of brown at distal margin, segments 9-10 and cerci pale.

Mesostigmal lobe (Fig. 9a) well developed, moderately erect, and forming a broad semicircle; its distal margin well differentiated from remainder of mesostigmal plate, its medial margin separated from lateral arm of middorsal thoracic carina by a small gap; medial half of lobe black dorsally, entirely black ventrally; a distinct transverse tubercle at junction of mesostigmal lobe and anterior margin of mese-



Figs 12-13. *A. anceps* sp.n. (Fig. 12) and *A. fissa* (Fig. 13): (a-f) mesostigmal lobes, outline, dorsal view.

pisternum (Fig. 14, paratype); no mesepisternal tubercles.

Measurements (in mm). – HW 26.0, abdomen 31.0.

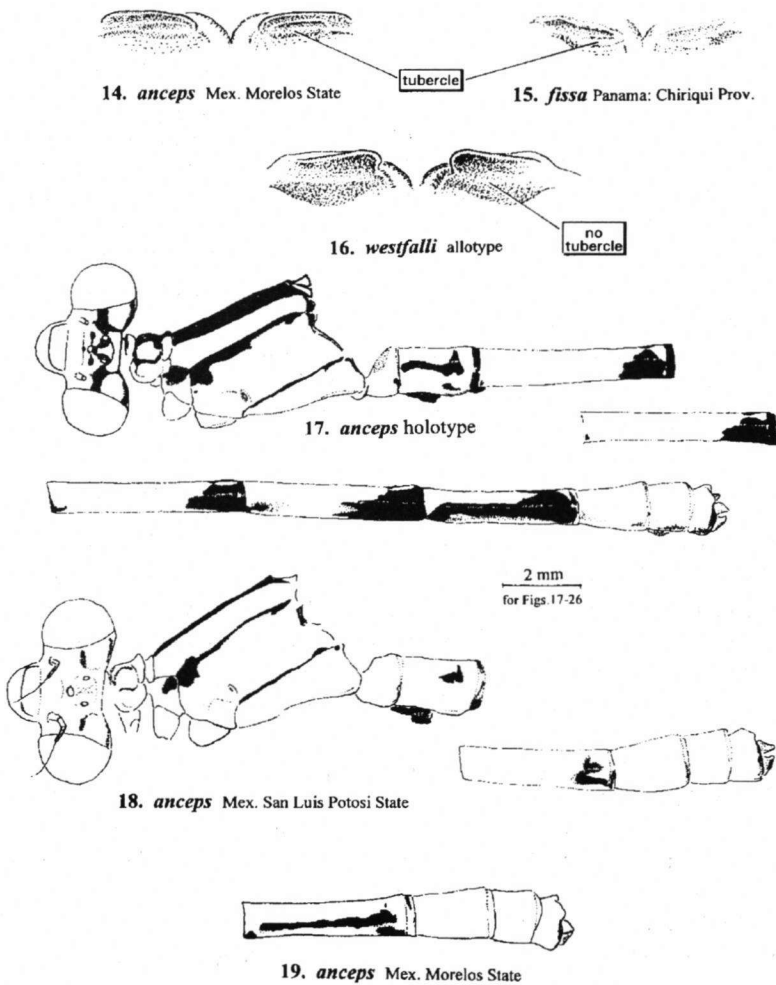
REMARKS. – Much inter- and intrapopulational variability in body markings is expressed in this widely distributed species. Overall black markings may be reduced (Fig. 18), and some specimens of both sexes lack any black markings on the epicranium (Figs 18, 23). A corresponding reduction in the width of the middorsal and humeral stripes exists within populations. Some males have the middorsal thoracic stripe as wide as the pale antehumeral area on the mesepisternum (similar to that illustrated for the holotype, Fig. 17), while others (Fig. 18) have the stripe reduced almost to a hairline, as for females (Figs 22, 23), although the stripe is usually wider in males than in females in the same population. The black humeral stripe can be greatly reduced (Figs 20a, b) or may form an almost continuous, nearly parallel stripe which is slightly narrowed dorsally (Fig. 21). The lateral black streak on abdominal segment 7 may be isolated (Fig. 19) or reduced to the distal 0.20 (Fig. 18). I have noticed no correlation of thoracic markings with geography: intraspecific variability seems as great as interpopulation variability among the specimens I examined.

Paratype measurements: *Males* (N = 20): HW 22–26.5 mm, abdomen 29–33 mm. Postnodal crossveins (FW/HW) 14–18/11–15; origin of M_2 6–8.5/6–8; postquad-rangular cells 4–6/3–5. – *Females* (N = 20): HW 22.5–27 mm, abdomen 27.5–32 mm; postnodal crossveins 14–18/12–15; origin of M_2 6–8/6–7.5; postquad-rangular cells 4–5/3–4.

CALVERT (1899) first misidentified this species as *A. fissa* after he compared two males from Tepic, Mexico, with “specimens from Guatemala in Baron de Selys’ collection...”. Because no bona fide specimens of *A. fissa* are known north of south-eastern Costa Rica, Calvert almost certainly had compared his material with Guatemalan specimens of *A. anceps*. I doubt whether Calvert had ever seen specimens of the true *A. fissa*. All previous records of *A. fissa* from Middle America probably refer to *A. anceps*.

BIOLOGY. – *A. anceps* is an abundant stream-dwelling species. It is likely to be encountered at any small stream or trail bordering larger streams almost anywhere in Middle America. It apparently flies year round as collection dates range from January–February to 11 December.

DISTRIBUTION. – According to Gloyd’s unpublished distribution records and GONZÁLEZ & NOVELO (1996), this species has been recorded from every state in Mexico except the far northwesterly states (Baja California, Sonora, Chihuahua, Coahuila, Durango), or poorly collected states (Zacatecas, Aguas-Calientes, Guanajuato, Querétaro, Tlaxcala, Distrito Federal, and Mexico). I have seen no records from the Yucatán peninsula (Tabasco, Campeche, Yucatán, and Quintana Roo), though it will probably be found in western Tabasco. Its distribution extends to approximately 9°5’ N in San José, Cartago and the northern part of Puntarenas provinces, Costa Rica. It is apparently parapatric to *A. fissa*, the most northerly



Figs 14-19. *A. anceps* sp.n. (Figs 14, 17-19), *A. fissa* (Fig. 15), and *A. westfalli* sp.n. (Fig. 16): (14-16) mesostigmal lobe and mesepisternum, posterodorsal view; - (17) body, lateral view; - (18) head, thorax, abdominal segments 1-2, 7-10; - (19) abdominal segments 7-10.

record for which is San Isidro del General (9°2' N, 83°42' W). *A. fissa* apparently displaces *A. anceps* from eastern Costa Rica (Puntarenas Prov.) south through Peru.

ARGIA WESTFALLI SP. NOV.

Figures 3, 6-app, 8-penis, 11, 16-mp, 24, 25-thx, abd seg 1-2 of paratype ♂, 26-part of synthx of paratype ♀

Material. – **Holotype** ♂, **allotype** ♀: MEXICO, Nuevo León, Municipio de Santiago, 2.5 km NW of Rancho Los Atascos, 2-VII-1987, (M.J. Westfall, Jr, H. Quiróz & A. Contreras leg. Both in FSCA). – **Paratypes** (44 ♂, 6 ♀): MEXICO, San Luis Potosí, Axtla R. nr. Xilitla, 29-XII-1953, M.S. Gordon leg., 1 ♂ (TWD); – Veracruz, Orizaba, Ojo de Agua, 3800 ft, 10-VII-1965, D.R. & M.L. Paulson leg., 2 ♂ (FSCA); – spring at Matzinga, 3.6 mi S of Orizaba, 3800 ft, 13-VII-1965, D.R. Paulson leg., 4 ♂, 1 ♀ (FSCA, DRP, RWG); – Tlilapan, E of Orizaba, 2-V-1980, E. González leg., 1 ♂ (RWG); – Nuevo León: same data as holotype, 17 ♂ (FSCA, IBUNAM, RWG); – Municipio de Monterrey, Rancho Los Pinos, 3-VII-1987, M.J. Westfall, G. Luna & A. Contreras leg., 1 ♂ (FSCA); – Municipio de Monterrey, Cerro El Mirador, 5-VII-1987, M.J. Westfall & A. Contreras, leg., 1 ♂ (FSCA); – Horsetail Falls (Cola de Caballo), 35 km SW of Monterrey, 6-IX-1962, T.W. Donnelly, leg., 3 ♂ (FSCA); – same data, 2-IX-1963, 4 ♂ (FSCA); – stream at entrance to Horsetail Falls, 1800 ft, 25-VI-1965, D.R. & M.L. Paulson leg., 7 ♂ (FSCA, DRP, RWG); – Chiapas: 40 mi E Comitán, Lagos de Montebello, 8-II-1963, G. Beatty leg., 1 ♂, 1 ♀ (RWG); – Ruinas Chinultic, nr Comitán, 23-X-1986, E. Fisher leg., 1 ♀ (RWG); – Lagunas de Montebello, approx. 16°6'N, 91°43'W, 23-X-1986, E. Fisher leg., 2 ♂, 3 ♀ (RWG).

Etymology. – Named in honour of my friend, Dr Minter J. Westfall, Jr, whose work on Odonata of the Americas over the past 50 years has been an inspiration for all students of the order.

MALE (holotype). – Body coloration as in holotype of *A. anceps* (Fig. 17) with following exceptions: epicranium with black more reduced, similar to pattern in paratype male of *A. anceps* (Fig. 18); thorax as in Figure 17 for *A. anceps*, but with middorsal thoracic stripe narrower; wings amber with venation black; pterostigma brown, surmounting 1.5 cells in all wings; postnodal crossveins: FW 17/17, HW 14/13; postquadrangular cells: FW 5/5, HW 4/4, M_2 originating at FW 8/8, HW 7/7.

Torifer (Fig. 3a, c) triangular, torus prominent, transversely twice as wide as long, occupying lower 0.5 of torifer, each torus transversely about 2x as wide as the distance separating them; epiproct not prominent, extending to level of torus, black except for pale apical lobes, and longitudinal recessed median lobe. Cercus (Fig. 3a) pale, about twice as long as wide, in dorsal view (Fig. 1c) with medial margin gently convex followed by a concave margin at distal 0.1, cercus with a well developed black decumbent tooth at distal 0.7 of margin in dorsomedial view (Fig. 1a), medial margin gently angulate at region of tooth in dorsomedial view, in lateral view (Fig. 3b) basal half of cercus with upper and lower surfaces parallel, distal half decumbent toward tip, inner tooth barely visible; paraproct as long as cercus, barely divided with dorsal lobe forming a blunt triangle; ventral branch a small, bluntly pointed tubercle (Fig. 3b).

Penis (paratype, Fig. 8) as for *A. anceps*.

Measurements (in mm). – HW 26.0, abdomen 33.0.

FEMALE (allotype). – Tan with head and thoracic patterns similar to allotype of *A. anceps* (Fig. 22) but with following differences: epicranium with lateral and anterior black markings surrounding large pale posterior spots vestigial; posterior transverse black well defined but separated from eye; wings amber with venation black, pterostigma brown, surmounting 1.2 cells in left FW (right FW lost), 1.5 cells in both HW; postnodal crossveins FW 16/?, HW 14/14, postquadrangular cells FW 4/? HW 4/4, M_2 originating at FW 9/?, HW 7/7.

Abdomen as in Figure 22 for *A. anceps*, but with well defined posterolateral black on abdominal segment 2 and with vestigial anterior branch extending to anterior 0.2 of segment; remainder of abdominal segments similar to those of *A. anceps* (Fig. 22) but with vestigial isolated anterolateral black streaks at anterior 0.9 of each segment; dorsal diffuse brown areas as shown for allotype of *A. anceps* but darker.

Mesostigmal lobe (Fig. 11a) well developed, strongly erect (Fig. 11c', paratype), and forming a broad semicircle, its distal margin well differentiated from remainder of mesostigmal plate, its medial margin distinctly separated from lateral arm of middorsal thoracic carina by a small, semicircular gap, mesostigmal lobe mostly black, becoming pale along distal 0.25; ventral margin of mesostigmal lobe meeting anterior margin of mesepisternum as a gentle concavity (Fig. 16); no mesepisternal tubercle.

Measurements (in mm). – HW 26.0, abdomen 32.0.

REMARKS. – Intrapopulational variability of black markings on the body is similar to that discussed under *A. anceps* and is as shown in Figures 18–21. The two males from San Luis Potosí and Veracruz encompass the variation expressed among the 27 males collected in Nuevo León. The three males from Chiapas differ in having a well developed forked humeral stripe and darker, more extensive markings on abdominal segment 2 (Fig. 25). One of the males from Lagunas de Montebello has extensive black markings on abdominal segment 7 like those shown in Figure 17. The other two males are similar to that shown in Figure 18.

The five paratype females, all from Chiapas, have a forked humeral stripe (Fig. 26). The mesostigmal lobes of these individuals differ from those of the allotype in not having a conspicuous gap between the medial margin of the lobe and the anterior fork of the middorsal thoracic carina.

Paratype measurements: **Males** ($N = 20$): HW 24–26 mm, abdomen 31–34.5 mm. Postnodal crossveins (FW/HW) 15–19/13–16; origin of M_2 7–9.5/6–8.5; postquadrangular cells 4–5/3–5. – **Females** ($N = 6$): HW 25–26 mm, abdomen 28–32 mm; postnodal crossveins 15–17/12–15; origin of M_2 7–<9/6–<8; postquadrangular cells 4–5/4.

DIAGNOSIS. – Positive identification of *A. westfalli* is assured only by critical examination of the secondary genital characters in the key. The medial margin of

the cercus of *A. westfalli* is convex (Fig. 3c), and I suspect it abuts against the concavity between the base of the mesostigmal lobe and mesepisternum in females (Fig. 16). In *A. anceps* and *A. fissa* (Figs 1c, 2c), the medial margin of the cercus is linear or slightly concave and probably accommodates the transverse tubercle found in the females of those two species (Figs 14-15). Both sexes of *A. westfalli* from Chiapas are provisionally distinguished from populations of *A. anceps* in the same region by the forked humeral stripe (Figs 25-26).

BIOLOGY. – Nothing is known of the biology of this species. The pair collected on 8 Feb. 1963 in Chiapas was taken, according to distributional notes by the late L.K. Gloyd, with specimens of *A. anceps*. The two species are thus sympatric in Chiapas, and I suspect that the more northerly populations coexist with *A. anceps* as well. Unknown is whether the two closely related species are allotopic at the same locality. Collection dates range from 8 Feb. to 29 Dec.

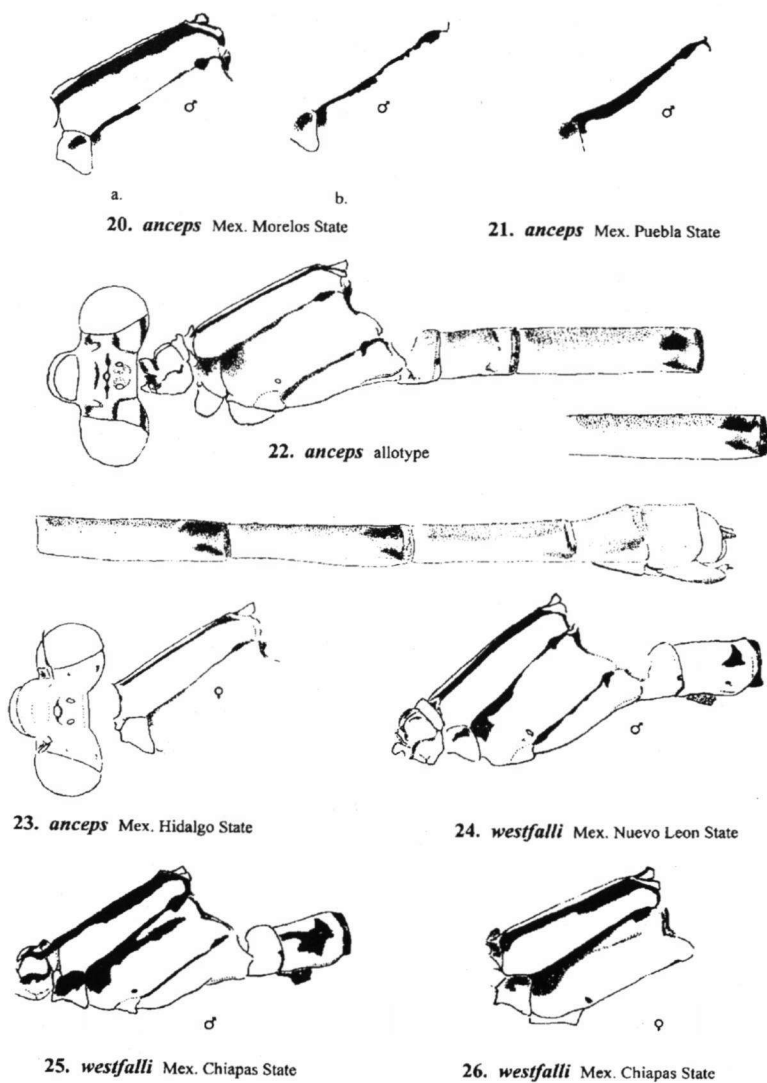
DISTRIBUTION. – A geographic distance of approximately 600 km separates the most southerly known capture (Veracruz: spring at Matzinga, 3.6 mi S of Orizaba at about 18°51' N, 97°08' W) from the more northerly Mexican states (Nuevo León, San Luis Potosí, and Veracruz), from those from Chiapas. More thorough collecting in the intervening areas will probably reveal populations intermediate in the condition of the forked humeral stripe. Since all known specimens from Chiapas were collected near the Guatemalan border, I suspect that *A. westfalli* will eventually be found in Guatemala.

ARGIA FISSA SELYS, 1865

Figures 2, 5-app, 10, 13, 15-mp

Argia fissa SELYS, 1865: 461 (29 separate) (descr. ♂, ♀ from Bogota, Colombia).

Material (53 ♂, 21 ♀). – COSTA RICA: Puntanares Prov., 13 km S of S. Isidro General, 1800 ft, 21-V-1946, H.H. & F.M. Brown leg., 1 ♀ (UMMZ); – Campo Dos y Medio, stream along Villa Neily-San Vito road, 8°43'N 82°56'W, 1000 m, 19-VII-1990, T.W. Donnelly leg., 1 ♂ (RWG); – PANAMA: Chiriqui Prov.: Boquete, Chiriqui Mts, 4000 ft, 8-III-1923, F.M. Gaige leg., 1 ♂, 1 ♀ (UMMZ); – same data but 20-III-1923, 1 ♂ (UMMZ); – same data but 24-III-1923, 1 ♂, 1 ♀ (RWG); – Potrerillos, 8-II-1935, J.W. MacSwain leg., 1 ♀ (UMMZ); – same data but 9-II-1935, 1 ♂ (UMMZ); – same data but 18-II-1935, 1 ♀ (UMMZ); – same data but no date, 1 ♂ (UMMZ); – same data, 3600 ft, 27-VI-1965, H. Real leg., 1 ♀ (RWG); – Cocle Prov.: El Valle d'Anton, 2500-3000 ft, 50 mi NW Panama City, 27-I-1946, D.W. Jenkins leg., 1 ♀ (UMMZ); – same data but VIII-1946, 1 ♀ (UMMZ); – same data but I-1947, 1 ♂, 1 ♀ (UMMZ); – El Valle, 2500 ft, 7-II-1937, A. Bliss leg., 1 ♀ (FSCA); – Panama Prov. Cerro Campana, 15-IV-1970, E.S. Morton leg., 1 ♂ (RWG); – COLOMBIA: Antioquia Prov.: Rio Porce, nr. Porcecito E Medellin, 3200 ft, N.A. Weber leg., 18-VII-1938, 1 ♀ (UMMZ); – nr. Porcecito, E. Medellin, 3200-3300 ft, 20-VII-1938, N.A. Weber leg., 1 ♂ (UMMZ); – mountainside nr. Medellin, 5800 ft, 23-VII-1938, N.A. Weber leg., 1 ♂ (UMMZ); – La Estrella, 1800 m, 30-V-1959, H. Gloger leg., 4 ♂, 4 ♀ (UMMZ, RWG); – Quebrada Minatas, NW San Felix, 13-II-1983, O.S. Flint, Jr, leg., 1 ♂ (RWG); – Cundinamarca Prov.: Bogota, no other data, 1 ♂ (UMMZ); – Bogota, Thomas? Bihl? (illegible, Förster collection), 1 ♂ (UMMZ); – Cauca Prov.: no other data, 16 ♂ (UMMZ, RWG); – Tumbo, 1000 m, no collector (Förster collection), I-1909, 1 ♂ (UMMZ); – Valle del Cauca



Figs 20-26. *A. anceps* sp.n. (Figs 20-23) and *A. westfalli* sp.n. (Figs 24-26): (20-21) humeral stripe; - (22) body; - (23) head, mesothorax; - (24-25) thorax, abdominal segments 1-2; - (26) mesothorax, metepisternum.

Prov.: Cali, no other data, 1 ♂, 1 ♀ (RWG); – Cali, 24/29-IX-1970, E.S. Morton leg., 1 ♂ (RWG); – Buga, 2-IX-1969, coll. for G. Wolffhugel, 1 ♂ (FSCA); – same data but 11-IX-1969, 1 ♂ (FSCA); – Cali, 5-III-1978, Aurelia leg., 1 ♂ (FSCA); – Cali, 2000 m, 25-IX-1970, E. Morton leg., 1 ♂ (RWG); – 40 mi S Cali, 1140 m, 6-III-1935 [sic: should be 1953], E.I. Schlinger & E.S. Ross leg., 1 ♀ (FSCA); – Cumbre, 7-IX-1969, coll. for G. Wolffhugel, 1 ♂, 1 ♀ (FSCA); – Laguna El Darien, 15-III/15-IV-1969, coll. for G. Wolffhugel, 4 ♂ (FSCA); – Rio Anchicaya, Carretera al Mar, 19-V/2-VI-1969, coll. for G. Wolffhugel, 2 ♂, 1 ♀ (FSCA); – Choco-Valle del Cauca Dept. (border?): Rio San Juan, 2-VIII-1969, G. Wolffhugel, 2 ♂ (FSCA); – same data but 3-VIII-1969, coll. for G. Wolffhugel, 1 ♂ (FSCA); – same data but 7-VIII-1969, 1 ♀ (FSCA); – same data but 9-VIII-1969, 2 ♂, 1 ♀ (FSCA); – same data but 14-VIII-1969, 1 ♂ (FSCA).

REMARKS. – Male body coloration and variation as described for *A. anceps*. Caudal appendages (Fig. 2) as for *A. anceps*, but with large transverse tori almost contiguous (Fig. 2c); epiproct largely hidden in dorsal view. Medial margin of cercus with decumbent tooth at basal 0.3-0.4 of appendage (Fig. 5).

Measurements: males (N = 20): HW 20.5-24 mm, abdomen 26-31 mm. Postnodal crossveins (FW/HW) 14-16/12-14; origin of M_2 < 7/8-6-7; postquadrangular cells 4-5/3-4.

Female body coloration and variation as for *A. anceps*. Mesostigmal lobe (Fig. 10) transversely foliate, its distal end slightly linear, not strongly erect; its distal margin well differentiated from remainder of plate, the medial margin adjacent to lateral arm of middorsal thoracic carina (Fig. 13).

Measurements females (N = 20): HW 20.5-24.5 mm, abdomen 25-29 mm. Postnodal crossveins (FW/HW) 13-16/12-14, origin of M_2 6.5-8/6-7, postquadrangular cells 4-5/3-4.

DIAGNOSIS. – See under *A. anceps*.

BIOLOGY. – Nothing has been written of the biology of this species.

DISTRIBUTION. – San José Province, Costa Rica (9°28' N, 83°42' W), south through Panama, Colombia, and northern Peru. No specimens have been recorded from Ecuador. All known records of *A. fissa* indicate it to be a mountainous species.

COMPARISON OF THE *A. FISSA* GROUP WITH OTHER SPECIES OF *ARGIA*

Both sexes of all three species described here will key to *A. fissa* in CALVERT (1901). Males of all three species will key to *A. extranea* (Hagen) in GARRISON (1994) but are easily separated from that species by the shape of the paraproct in lateral view. The ventral branch of the paraproct in *A. extranea* is longer than the upper branch (GARRISON, 1994, fig. 31b); the same structure in the three species discussed here forms a poorly developed obtusely angular ventral branch (Figs 1b, 2b, 3b).

Females will key to F-2 (smoky or amber colored wings) in GARRISON (1994). But the mesostigmal lobes of *A. anceps*, *A. fissa* and *A. westfalli* are large, foliate structures which will separate them from *A. fumipennis* (Burmeister) (GARRISON, 1994, fig. 43). Females of all three species also lack the well developed

mesepisternal tubercles present in *A. tezpi* Calvert (GARRISON, 1994, fig. 58), nor do they have the slight to deep non-costate circular mesepisternal depression found in *A. rhoadsi* Calvert (GARRISON, 1994, fig. 41). The mesostigmal lobe in *A. sedula* (Hagen) (GARRISON, 1994, figs 42, 91) is narrow when viewed dorsally, and is nearly perpendicular when viewed laterally; the same structure in the three species discussed here is broadly foliate when viewed dorsally, and is inclined in a 45°-60° angle. Finally, the mesostigmal lobe in *A. tarascana* Calvert is directed posterodistally (GARRISON, 1994, figs 44, 45), not posteriorly, as in these three species.

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