

**NEW AND LITTLE-KNOWN SPECIES OF
CYANALLAGMA KENNEDY, 1920
FROM THE ANDES AND FROM PANTEPUI
(ZYGOPTERA: COENAGRIONIDAE)**

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Received November 10, 1996 / Reviewed and Accepted December 2, 1996

The generic characters of *Cyanallagma* are reviewed and 3 new Andean spp. are described, viz. *C. gaianii* sp. n. (Venezuela: Trujillo, Laguna Negra, 1650 m, 9 km E of Mosquey; MIZA), *C. thelakterion* sp. n. (Venezuela: Mérida, Monte Zerpa, Sta. Rosa Experimental Station, 2000 m; MIZA), and *C. risi* sp. n. (Colombia: Cundinamarca, Pacho, 2000 m; SENCK). The latter is the "*Enallagma ovigerum*" of RIS, 1918 [*Arch. Naturg.* (A) 9: 1-197]. – *C. demarmelsi* Cruz is redescribed from topotypes. Figures and notes on *C. laterale* (Sel.), *C. ovigerum* (Calv.) and *C. tamaense* De Marmels are presented. The genus is recorded from Pantepui for the first time, and a new sp. is described and illustrated, viz. *C. tepuiantum* sp. n. (Venezuela: Amazonas, Mt. Duída, Caño Sina, 2100 m, 3°22'N, 65°42'W; MIZA). A key to the adults of all spp. treated is presented, and their known distribution is mapped. The larva of *C. gaianii* is the first one described of an Andean *Cyanallagma*.

INTRODUCTION

A few years ago (DE MARMELS, 1989), when revising two species of *Cyanallagma* Kennedy, 1920, and the perhaps congeneric *Mesamphiagrion occultum* (Ris, 1918), I suggested that more unknown species of the former genus might be discovered in the central and northern Andes. Indeed, two new species from the Venezuelan Andes are described in the present paper. A third one was found on Mt Duída, which is the first record of *Cyanallagma* from Pantepui (Guayana Highlands).

In my 1989 article I expressed some doubts about *Enallagma ovigerum* of RIS (1918) being conspecific with *E. ovigerum* Calvert, 1909 (now placed in *Cyanallag-*

ma). Based on figures of Calvert's type at MCZ drawn by Dr R. W. Garrison (Azusa, California, USA), and reproduced here with his kind permission, I am now able to show that Ris' specimens represent yet another new species.

Three other Andean species, not treated in DE MARMELS (1989, 1990a), are *C. laterale* (Selys, 1876), *C. demarmelsi* Cruz, 1986, and *C. tamaense* De Marmels, 1988. All are discussed and illustrated in the present paper. In order to provide a tool for identification, all Andean and the single Pantepuyan *Cyanallagma* species, are keyed.

The remaining species currently placed in this genus are, *bonariense* (Ris, 1918), *interruptum* (Sel., 1876), *nigrinuchale* (Sel., 1876) and *trimaculatum* (Sel., 1876), all from southeastern South America. *C. interruptum* is the type species of *Cyanallagma*. In an earlier paper (DE MARMELS, 1989: 250), I stated that the removal of the Andean species from *Cyanallagma* and their placement in a separate genus (*Archaeallagma* Kennedy, 1920; type species: *Enallagma ovigerum* Calv.), "would be most unwise". The Andean *C. ovigerum* rather resembles the southeastern species group in lacking a well-defined dorsal branch of cercus (Fig. 4), which is often conspicuous and usually hooked apically in the Andean species (Figs 1, 5). On the other hand, the larvae of *C. interruptum* and *C. bonariense*, both well illustrated by BULLA (1973), differ in details of the labial palp and caudal lamellae from the sole larva so far known of an Andean species (described below). *C. nigrinuchale* seems to fit neatly in the southeastern group of *Cyanallagma*. This species is very small. Finally, *C. trimaculatum* has been illustrated by SANTOS (1965). His figures are not very informative, however, and the question whether *trimaculatum* should be included in *Cyanallagma* remains unsolved until a careful examination of a specimen is possible.

In DE MARMELS (1989), I have discussed a set of characters which, combined, seem to describe the genus *Cyanallagma*. This peculiar character set is reviewed, considering also the additional species found since. Even if there seems to be no synapomorphy of the species forming the genus *Cyanallagma*, "... in a new taxon there are not necessarily any new character states, only new combinations of ancestral character states" (HEADS, 1985: 212; see also NELSON & PLATNICK, 1981: 12). Thus, if a combination of characters or character states can be established for *Cyanallagma*, which is not shared by any other genus, then *Cyanallagma* should be recognized as a valid taxon.

CHARACTERS OF *CYANALLAGMA* KENNEDY, 1920

(1) Frons rounded, but not inflated; – (2) postocular spots present; – (3) pale ocellar marks (between ocelli and corresponding antenna) absent; – (4) pale occipital line absent (at least in male); – (5) pronotal hind lobe usually with median process; – (6) tendency towards interruption of pale antehumeral stripes; – (7) dark stripe between metastigma and dorsal end of second lateral suture; – (8) no defined

metasternal tubercle; – (9) tibial spines shorter than, or about as long as the distance between them; – (10) tarsal claws with subapical tooth; – (11) penis with proximal and distal lateral lobes, and with internal process (Figs 26, 29); – (12) internal fold of penis (sensu KENNEDY, 1916) absent; – (13) no spines or setae present on second segment of penis (except for one undescribed species from Mato Grosso in the A.B.M. Machado collection); – (14) no bladed prominence distally on inner side of second segment of penis shaft; – (15) male abdominal segment X usually with dorso-apical bilobed process; – (16) male cerci not slanting, and without dorsobasal mesiad directed spine (as in *Acanthagrion* Sel.), and, correspondingly, female without mesepisternal fossae; – (17) vulvar spine present on sternum VIII; – (18) juvenile and adult colourations differ (in all species?).

KENNEDY (1920a: 28) divided the “Coenagrioninae” into several “series”. *Cyanallagma* would fall into his “*Enallagma-Acanthagrion* series”. He further splits this group into “(a) the *Enallagma* series, with forked appendages” and “(b) the *Acanthagrion* series, with the dorsal appendages slanting downwards”. I found this cercus-based criterion rather cumbersome. Instead, I agree with LEONARD (1977: 11), who separates *Acanthagrion* from *Enallagma* Charp. adducing that “the internal fold [of the penis] is absent in all known species” of the former genus, while in *Enallagma* “the internal fold always occurs”. With this criterion in mind the genera *Enallagma*, *Enacantha* Donnelly & Alayo, and *Protallagma* Kennedy can be assigned to the *Enallagma*-series, while *Acanthagrion*, *Acanthallagma* Williamson & Williamson, *Amphiagrion* Sel., *Andinagrion* Bulla, *Argentagrion* Fraser, *Cyanallagma*, *Homeoura* Kennedy (including *cheliferum* Sel.), *Oxyagrion* Sel., *Oxyallagma* Kennedy, and *Tigriagrion* Calv. would join the *Acanthagrion* series. The genus *Skiallagma* Förster will probably fit here, too.

Cyanallagma differs from *Acanthagrion*, *Acanthallagma*, *Amphiagrion*, *Oxyagrion* and *Tigriagrion* in cercal morphology and in the absence of a median process on the pronotal hind lobe in these genera. *Acanthallagma* also lacks an internal process on the penis and has a strongly autapomorphic wing venation.

Cyanallagma differs from *Andinagrion* in that the latter has a dorsobasal, mesiad directed, blunt spine or tubercle on the cercus and lacks postocular spots; the red colour probably reflecting a neotenic condition in view of similarly coloured juvenile *Cyanallagma* (at least some Andean species).

Cyanallagma differs from *Oxyallagma* also by body colour and by the absence of postocular spots in the latter. The penis of *Oxyallagma* lacks basal lateral lobes. – Male *Cyanallagma* have no occipital pale line as has *Argentagrion*. The latter is a much smaller insect, with the pronotal hind lobe somewhat expanded rearwards, but with a median emargination. – *Homeoura* differs from *Cyanallagma* in having an occipital pale line. The pronotal hind lobe in male *Homeoura* has no median process, bearing instead a knob distally on each side, at some distance from the middle. The penis has a bladed prominence on the inner side of the second segment; the basal lateral lobe is replaced by a membranous expansion of bulbous

appearance. The species *cheliferum* comes closest to *Homeoura* in morphology of pronotum and penis, and small size. – *Skiallagma* lacks postocular spots, but has similar, although shorter, median process of pronotal hind lobe, when compared with *Cyanallagma*. Noteworthy is the presence in *Skiallagma* of a dorsobasal mesiad directed spine on the male cerci, as in *Acanthagrion* (all observations referring to *Skiallagma* are based on figures drawn after the type of *S. baueri* in UMMZ, by Dr R.W. Garrison).

The venational nomenclature used in this study follows RIEK & KUKALOVA-PECK (1984). FW and HW means fore wing and hind wing, respectively; px refers to postnodal cross-vein(s); CuP is the anal crossing. Total length and length of abdomen always include cerci. All measurements are given in millimeters. The figures were drawn with the help of a Wild M-8 stereoscope equipped with a camera lucida.

Material from the following institutions has been examined:

ICN	Museo del Inst. de Ciencias Naturales, Universidad Nacional, Bogotá.
MALUZ	Museo de Artrópodos, Universidad del Zulia, Maracaibo.
MCZ	Museum of Comparative Zoology, Cambridge.
MIZA	Museo del Inst. de Zoología Agrícola, Universidad Central de Venezuela, Maracay.
NHM	The Natural History Museum, London.
SENCK	Naturmuseum Senckenberg, Frankfurt a. M.
UMMZ	Museum of Zoology, University of Michigan, Ann Arbor.

KEY TO ADULTS OF THE ANDEAN AND PANTEPUYAN CYANALLAGMA

- 1 Males (penis of *ovigerum* not known) 2
- Females (*acutum*, *ovigerum* and *tepuianum* unknown) 10
- 2 Ventral branch of cercus finger-like, much longer than rudimentary, apically hooked dorsal branch, and directed straight backwards (Figs 6, 12); first segment of penis with lateral patch of soft hairs on membrane near articulation with second segment; tergum VI largely blue *tepuianum*
- Ventral branch of cercus variably shaped, but never as above; first segment of penis at most with some short setae on the shaft; tergum VI black 3
- 3 Cercus along dorsal branch much longer than segment X at level of cercus; dorsal branch with apical hooklet; distal lateral lobe of penis strongly back-curved, narrow, with tip reaching to level of proximal lateral lobe *acutum*
- Cercus along dorsal branch little longer, or shorter than segment X at level of cercus; dorsal branch with or without apical hooklet; distal lateral lobe of penis variably shaped, but if strongly back-curved (Fig. 31), not reaching to level of proximal lateral lobe 4
- 4 Dorsal branch of cercus reduced to a small knob; internal branch with sharp, downwards directed subapical spine (Fig. 4); tergum VII dorsally with large blue area, broadly framed with black along proximal, lateral and distal edges (Fig. 59) *ovigerum*
- Dorsal branch of cercus well-developed, usually with apical hooklet; internal branch variably shaped; blue area on tergum VII, if present, not broadly framed with black along distal edge 5
- 5 Dorsal branch of cercus in lateral view slender, straight, sharply pointed, without apical hooklet (Fig. 7); ventral branch vestigial; internal branch as a large, narrow, mesiad, ventrad and proximad curved claw (Fig. 13); tergum VII black above; total length more than 44 mm *thelkterion*
- Dorsal branch of cercus in lateral view robust, with apical hooklet; internal branch not as above; tergum VII usually with some dorsal blue; total length less than 39 mm 6

- 6 Median process of pronotal hind lobe narrow, gutter-like, with lateral edges sharply raised (Fig. 32); proximal lateral lobe of penis long, pointed, directed straight caudad (lateral view); tergum VII with some dorsal blue *demarmelsi*
- Median process of pronotal hind lobe variably shaped, with lateral edges not, or only moderately, raised; proximal lateral lobe of penis variable, but never directed straight caudad (lateral view); tergum VII usually black 7
- 7 Internal branch of cercus in lateral view protruding caudad as an obtuse process, between dorsal and ventral branch (Fig. 5); proximal lateral lobe of penis smaller than distal lateral lobe 8
- Internal branch of cercus in lateral view not protruding caudad as an obtuse process between dorsal and ventral branch (Figs 2, 3); proximal lateral lobe of penis as large as distal lateral lobe 9
8. Internal branch of cercus (internal view) ventrally triangular, pointed; tergum VII dorsally blue in distal two thirds *risi*
- Internal branch of cercus (internal view) ventrally ax-shaped (Fig. 24); tergum VII dorsally black, or with blue limited to distal third *tamaense*
- 9 Median process of pronotal hind lobe squared, slightly constricted at base (Fig. 34); proximal and distal lateral lobes of penis contiguous, and of similar shape; tergum VII blue with only narrow black basal band (Fig. 58) *laterale*
- Median process of pronotal hind lobe semicircular, not constricted at base (Fig. 33); proximal and distal lobes of penis widely separated and of different shape; tergum VII blue only in distal two thirds (Fig. 57) *gaianii*
- 10 Median process of pronotal hind lobe narrow, gutter-like, with lateral edges sharply raised (Fig. 39) *demarmelsi*
- Median process of pronotal hind lobe broadly semicircular, or slightly rectangular, with lateral edges little raised, or hind border of pronotum more or less undulated, lacking median process 11
- 11 Median process of pronotal hind lobe transversely rectangular, with hind margin shallowly emarginated in middle (Fig. 43) 12
- Median process of pronotal hind lobe more or less semicircular, or hind margin of pronotum broadly emarginated in middle, without process 13
- 12 Three to four poststigmatal cells in costal field; total length over 40.0 mm *thelkterion*
- Five to six poststigmatal cells in costal field; total length less than 40.0 mm *risi*
- 13 Median process of pronotal hind lobe regularly semicircular (Fig. 41); pterostigma broader than high; tergum VII often with some blue *laterale*
- Median process of pronotal hind lobe little projecting caudad, or absent; pterostigma usually as high as, or higher than broad; tergum VII black 14
- 14 Median process of pronotal hind lobe little projecting caudad, with irregularly undulated hind margin (Fig. 42) *tamaense*
- Median process of pronotal hind lobe almost absent; hind margin of pronotum undulate, with shallow emargination in middle (Fig. 40) *gaianii*

CYANALLAGMA DEMARMELSI CRUZ, 1986

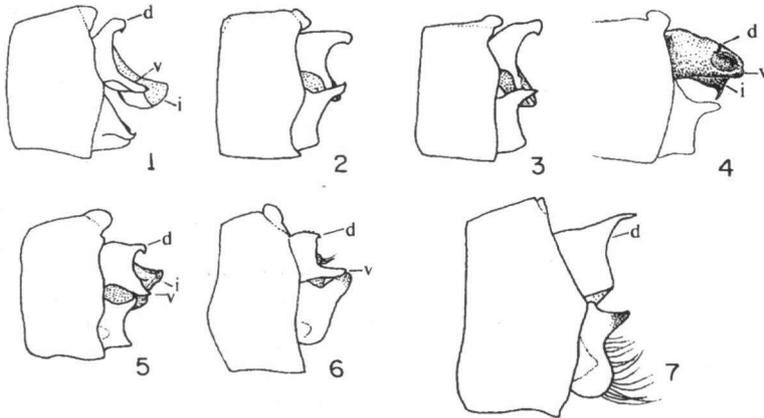
Figures 1, 8, 14, 20, 26, 32, 39, 44, 50, 56, 65, 82

Cyanallagma [sic!] *demarmelsi* CRUZ, 1986: 743 (Colombia: Bogotá)*Cyanallagma demarmelsi*: DE MARMELS, 1989: 251 (Bogotá); – GARRISON, 1991: 11 (New World); – TSUDA, 1991: 30 (Colombia); – BRIDGES, 1993, VII: 66

Repository of holotype(♀). – ICN

Material (1 ♂, 1 ♀). – COLOMBIA: Bogotá, Parque La Florida, 1 ♂, 1 ♀, 17-V-1986, F. Cruz (MIZA).

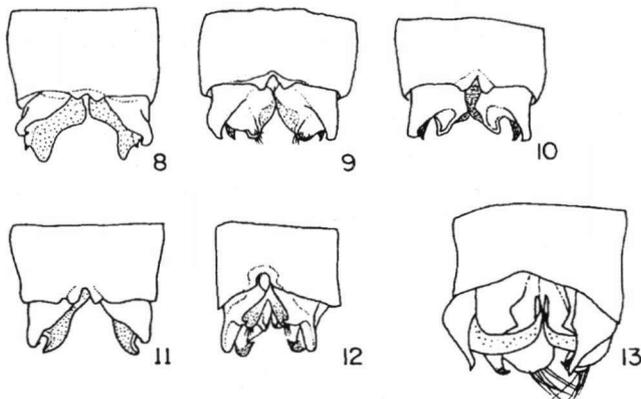
The original description by CRUZ (1986) is somewhat precarious, the diagnosis (p. 744) useless to separate this species from its relatives. However, his figures 2 and 4 (abdominal pattern), and figure 6 (pronotal hind lobe of female) are of diagnostic value. – Description and illustrations given in the present paper are made from typical material.



Figs 1-7. Left male caudal appendages (left lateral view) of some *Cyanallagma*: (1) *demarmelsi* (Bogotá); – (2) *gaianii* (holotype); – (3) *laterale* (La Culata); – (4) *ovigerum* (holotype; drawn by R. W. Garrison); – (5) *tamaense* (holotype); – (6) *tepuianum* (holotype); – (7) *thelkterion* (holotype). – [d=dorsal branch; i=internal branch; v=ventral branch of cercus].

MALE. – The specimen, which is preserved in an alcohol/glycerine solution, has a very pale appearance. – H e a d and m e s e p i s t e r n u m hairy. Large, well-defined, blue, circular postocular spots. Median process of pronotal hind lobe slightly spoon-shaped with lateral margins sharply raised, therefore forming a short, distally open gutter (Fig. 32). Lateral portion of hind lobe very narrow and almost fused to median lobe. Pale antehumeral stripe interrupted in upper third; general pattern as illustrated (Fig. 44). – W i n g s hyaline; pterostigma very small, higher than broad, in FW covering about two thirds of underlying cell (Fig. 50), in HW about half or less that distance; petiolation ceasing as much before CuP as this latter is long (HW), or at almost two thirds this length (FW). 11 px in FW, 9 px in HW; IR1 springing at px 7 (8) in FW, at px 7 in HW; RP2 branching at px 5 FW, after px 4 in HW. – External spines of hind t i b i a e almost as long as spaces separating them. – A b d o m e n dorsally dark with peculiar blue pattern on segments VII-IX (Fig. 56). Penis with distal lateral lobe obtuse, proximal lateral lobe spiniform, directed straight backwards; internal process large with hooked tip (Fig.

Figs 8-13. Male caudal appendages (dorsal view) of some *Cyanallagma*: (8) *demarmelsi* (Bogotá); - (9) *gaiarii* (holotype); - (10) *laterale* (La Culata); - (11) *tamaense* (holotype); - (12) *tepuianum* (holotype); - (13) *thelkterion* (holotype).

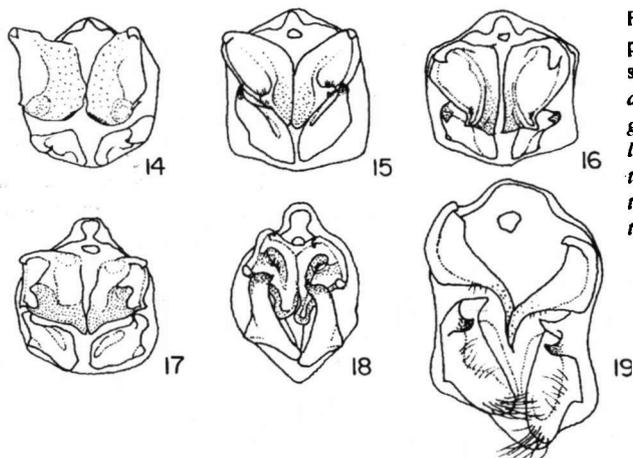


26). Cerci with apically hooked dorsal branch and with longer, distad and ventrad directed ventral branch, the latter ending in a small point; ventral edge of internal branch chitinized proximally (Figs. 1, 8, 14, 20).

M e a s u r e m e n t s (in mm). - Total length 29.0; abdomen 22.5; FW 17.0; HW 16.4.

FEMALE. - Preserved as male. Colour pattern of head and thorax as in male, but dark parts better marked. Median process of pronotal hind lobe also similar, but with ventral subapical knob (Fig. 39). Wings as in male, but pterostigmata almost covering underlying cell. 10 px in HW. Abdomen black dorsally, but intersegmental membrane between segments VII and VIII, and between VIII and IX, blue; a triangular blue dorsal spot on segment IX; segment X dorsally blue with black lateral basal lunule. Cerci and ovipositor pale, the latter just surpassing segment X; a strong vulvar spine on segment VIII (Fig. 65).

M e a s u r e m e n t s (in mm). - Total length 30.9; abdomen 24.0; FW 19.1; HW 18.4.



Figs 14-19. Male caudal appendages (posterior view) of some *Cyanallagma*: (14) *demarmelsi* (Bogotá); - (15) *gaiarii* (holotype); - (16) *laterale* (La Culata); - (17) *tamaense* (holotype); - (18) *tepuianum* (holotype); - (19) *thelkterion* (holotype).

CYANALLAGMA GAIANII SPEC. NOV.

Figures 2, 9, 15, 21, 27, 33, 40, 45, 51, 57, 66, 71-81, 83

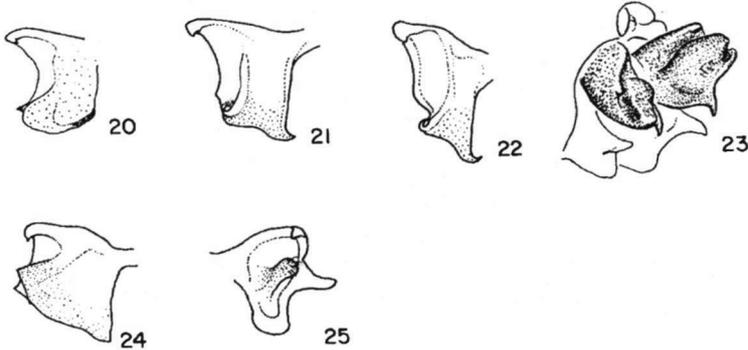
Material (30 ♂, 9 ♀; 1 ♂ exuviae). – **Holotype** ♂: VENEZUELA (Trujillo State): Laguna Negra, 1650 m, 9 km E of Mosquey, 2-IX-1991, J. De Marmels (MIZA). – **Paratypes**: same locality, 5 ♂, 2 ♀, same date as holotype; – 4 ♂, 1 ♀, 19-X-1991; – 2 ♂, 20-X-1991; – 6 ♂ (one reared, with its exuviae), 3-IV-1993, all J. De Marmels; – 1 ♀, 22/25-VIII-1995, J. Camacho & M. García; – 5 ♂, ancient road Boconó-Trujillo, Páramo La Cristalina, 29-VIII-1991, all J. De Marmels; – 1 ♂, 2 ♀, road Boconó-Guaramacal, Guaramacal National Park, northern slope, 2000 m, 26-XII-1993, M. Gaiani; – 1 ♂, La Mesa, 12-VII-1973, J. Terán & M. Gélvez; – (Mérida State): 1 ♂, Timotes, 9-V-1948, W.+L.; – (Lara State): 1 ♂, El Blanquito, Sanare (Yacambú National Park), 1450 m, 30/31-I-1987; – 1 ♂, Road Cubiro-La Escalera, 1650 m, 12-XI-1989; – 1 ♀, La Capilla, 1800 m, 25-III-1993, all A. Chacón (MIZA); – 1 ♂, between La Aguada and Fila de Los Nepes, 2350 m, 12-VIII-1991, A. Viloria & J. Camacho; – (Zulia State): 1 ♂, 2 ♀, Sierra de Perijá, Municipio J. E. Lossada, Rio Socuy, 600-700 m, 19/21-XII-1993, J. Camacho (all in MALUZ).

Etymology. – I dedicate this species to Mr. Marco A. Gaiani, who guided me to many interesting places in the Andes of Trujillo where to collect dragonflies, including the present species.

MALE (holotype). – **Head**: labium and rear of head pale; mandibles and labrum pale blue, the latter with mediobasal black spot; clypeus and top of head black; postocular spots large, blue; antennae black. – **Thorax**: pronotum black dorsally, with blue transverse stripe on anterior lobe, pale blue laterally; hind lobe with rounded median process, the lateral margins of which are obliquely truncated (Fig. 33). Mesepisternum black with sky blue antehumeral stripe, the latter slightly constricted in upper fourth; broad black humeral band, and a black stripe also along second lateral suture, both narrowly connected along antealar sinus; remaining parts of pterothorax sky blue, venter whitish (Fig. 45). – **Legs**: brown black externally, pale blue internally on femora; coxae pale yellowish to blue. Black tibial spines as long as intervening spaces; subapical tooth of claws considerably shorter than tip of claw. – **Wings**: hyaline; pterostigma as long as cell below it, lozenge-shaped, brown black with narrow, pale margin along veins (Fig. 51). Petiolation ceasing as much before CuP as this latter is long; three cells after quadrangle in discal field of all wings. 12 px in FW, 11 px in HW; IR1 branching at px 9 in FW, at px 8 in HW; RP2 originating between px 5 and 6 in FW, between px 4 and 5 in HW. Four to five poststigmatal cells in costal space. – **Abdomen**: Segment I-VI, basal half (or slightly less) of VII and whole of X black dorsally; blue are: a distal band on segment I, the distal half (or slightly more) of segment VII and the whole of VIII and IX (Fig. 57). Segments I-III laterally also blue; segments III-VI with blue basal lunule, on each side. Segment X with two broad, triangular lobes dorsally on distal margin, these lobes separated from each other by deep incision. Cerci as long as paraprocts, with short dorsal branch ending in a small hook; ventral branch narrow, directed ventrad; internal branch quadrate with ventral, proximad directed basal spine. Paraprocts ventrally not prolonged caudad; dorsal process short with slightly hooked tip (Figs. 2, 9, 15, 21). All caudal appendages partly suffused with blue internally.

Measurements (in mm). – Total length 33.5; abdomen 26.5; cerci 0.4; hindwing 20.0.

MALE (paratypes). – In some specimens the black humeral stripe confluent ventrally with black stripe of second lateral suture. Some males may have 11-14 px in FW, 9 in HW. Pterostigma may lack pale margin along veins (older specimens). In not fully mature males the black markings on head and thorax brown and abdominal segments II and III bright orange red dorsally. Penis shaft with only single setae, or these entirely wanting. Distal lateral lobes of apical segment with tip expanded; proximal lateral lobes large, slightly chitinized, twisted and directed ventrally. Internal process long, apically hooked (Fig. 27).



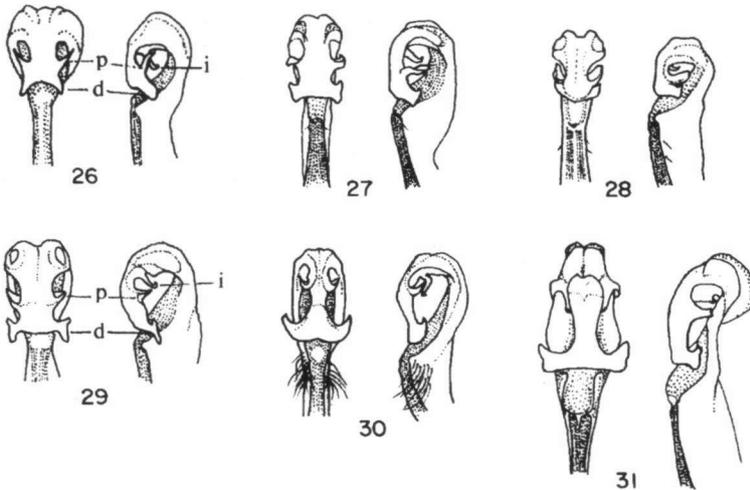
Figs 20-25. Male cercus (internal view) of some *Cyanallagma*; – (20-22, 24) left cercus; (23, 25) right cercus: (20) *demarmelsi* (Bogotá); – (21) *gaianii* (paratype, Laguna Negra); – (23) *ovigerum* (holotype; drawn by R. W. Garrison); – (24) *tamaense* (paratype); – (25) *tepuianum* (paratype).

Measurements (in mm). – Total length 31.5-36.5; abdomen 26.0-29.0; hindwing 18.0-20.3.

FEMALE (paratypes). – There is a colour transparency of a living, not fully mature female from the type locality: compound eyes brown above, pale yellowish below; top of head and dark thoracic stripes, black; pterothorax otherwise pale blue, or yellowish (metepimeron and venter). Abdominal segments II and III orange red dorsally; remaining segments black, except for large blue dorsomedian spot on segments VIII and IX; segment X entirely blue above (Fig. 66); all segments pale yellow laterally. An older female of the same locality has dark areas on head and thorax brown black, and abdominal segments II and III black dorsally, blue laterally, as in male. One of the two females from Perijá has segments VIII-X all black dorsally. – Pronotal hind lobe raised, its median part only very moderately prolonged rearwards, and shallowly concave in middle. Mesostigmal laminae broad, triangular, with raised anterior and mesial margins (Fig. 40). Venation as in male. Vulvar spine present; ovipositor surpassing end of segment X. Cerci conical, as long as segment X, the latter with dorsal longitudinal carina.

Measurements (in mm). – Total length 33.4-36.0; abdomen 26.1-29.0; hindwing 19.6-21.8.

LARVA (1 ♂ ultimate instar; reared). – Pale brown, largely unpatterned (Fig. 71). A dark dash between each compound eye and corresponding lateral ocellus; a pale mediodorsal line on abdominal segments III-IX. Antenna seven-jointed (Fig. 72).



Figs 26-31. Penis of some *Cyanallagma* (left: ventral view; right: rightlateral view): (26) *demarmelsi* (Bogotá); – (27) *gaianii* (paratype, Laguna Negra); – (28) *laterale* (La Carbonera); – (29) *tamaense* (paratype); – (30) *tepuianum* (paratype); – (31) *thelkterion* (paratype, Mte. Zerpa). – [d=distal lateral lobe; p=proximal lateral lobe; i=internal process].

Postocular lobes with rounded lateral angles beset with short spiniform setae posteriorly. Labium reaching to between first and second coxae; 4 premental setae, on each side, the inner most seta shorter than remaining setae; palp with 6 setae; apical serration of palp weakly developed (Figs 73-75). Gonapophyses as shown in Figure 76. Caudal gills pointed, tracheated as in Figs 80-81. There is no transverse division. Cerci as illustrated (Figs 77-79).

Measurements (in mm). – Total length (excl. caudal gills) 13.0; lateral caudal gill 4.5; hind femur 3.5; hind tibia 3.3.

HABITAT. – The larva was found in a very small affluent of Laguna Negra, overgrown with sedges and grasses. Adults have been observed also at swampy stretches and along slowly running small streams, always in open landscape.

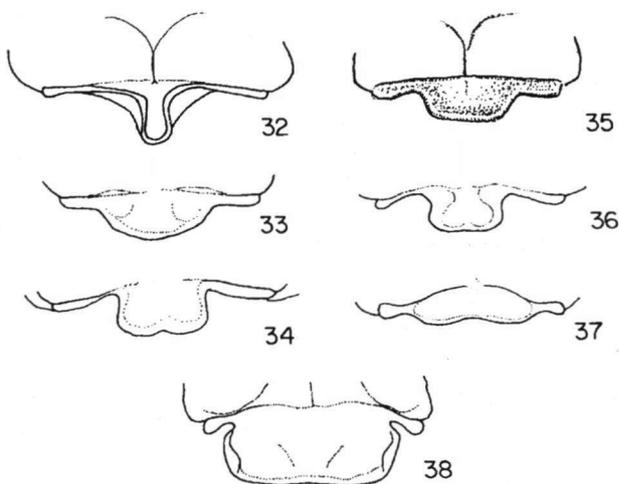
DISTRIBUTION. – From Timotes (Mérida), on the upper Río Motatán, and from the upper Río Santo Domingo northeastwards across Trujillo State into the Andes of southern Lara, and, in apparent disjunction, in the Sierra de Perijá (Zulia State), here at unusually low elevation, if the data forwarded by the collector being correct (Fig. 83).

REMARKS. – *C. gaianii* is remarkably similar to *C. laterale* Selys, described from Colombia and also recorded from Venezuela (see below). A male of each was sent to Dr S. Brooks (The Natural History Museum, London) who kindly compared them with the lectotype of *laterale*. He concluded that the Venezuelan specimen identified as *laterale* was conspecific with the lectotype, *C. gaianii* therefore being new. Both species differ in structural characters (e.g., pronotal hindlobe in either

sex; penis; cerci). The blue spot on segment VII is much more extended in male *laterale* than in *gaianii*. None of the females *gaianii* examined has any blue on dorsum of segment VII, but female specimens with all-black abdomen occur in both species.

The only known larvae in this genus are those of *C. interruptum* (Sel.) described by NEEDHAM & BULLOCK (1943) and by BULLA (1973), and of *C. bonariense* (Ris) described by BULLA (1973). *C. gaianii* differs from both in lacking any strong serration of the labial palp, and in having much broader caudal gills.

Figs 32-38. Male pronotal hind lobe of some *Cyanallagma* (dorsal view): (32) *demarmelsi* (Bogotá); - (33) *gaianii* (holotype); - (34) *laterale* (La Culata); - (35) *ovigerum* (holotype; drawn by R. W. Garrison); - (36) *tamaense* (holotype); - (37) *tepuianum* (holotype); - (38) *thelkterion* (holotype).



CYANALLAGMA LATERALE (SELYS, 1876)

Figures 3, 10, 16, 22, 28, 34, 41, 46, 52, 58, 67, 68, 83

Acanthagrion laterale SELYS, 1876: 306 (Nouvelle Grenade); - KIRBY, 1890: 145 (N. Granada); - KENNEDY, 1916: 329 + pl. XVIII (Bogotá); - RIS, 1918: 122 (Colombia: Miraflores, 2000 m); - KIMMINS, 1970: 187 (New Granada; lectotype in NHM)

Cyanallagma laterale: KENNEDY, 1920: 87 (new comb.); - DONNELLY & ALAYO, 1966: 112 [(*Argia ternaria* Navás, jun. synonym of *C. laterale* (Sel.)); - DAVIES & TOBIN, 1984: 66 (Colombia); - DE MARMELS, 1988: 98 [Venezuela: Rubio (Táchira), Mérida]; - DE MARMELS, 1989: 246 (generic affiliation); - DE MARMELS, 1990b: 337 (Venezuelan checklist); - DONNELLY, 1989: 15 (Venezuela: Andes); - GARRISON, 1991: 11 (New World) [(*Argia trina* Navás, jun. synonym of *C. laterale* (Sel.)); - TSUDA, 1991: 30 (Colombia, Venezuela); - BRIDGES, 1993, VII: 130.

Argia ternaria NAVAS, 1934: 142 (Colombia: Choachí, Pensilvania, Quetame)

Argia trina NAVAS, 1934: 143 (Colombia: La Unión)

Repository of lectotype (♂).- NHM

Material (15 ♂, 25 ♀).- COLOMBIA (Santander Dept.): 1 ♂, Peña Blanca, 8-III-1917, M. A.

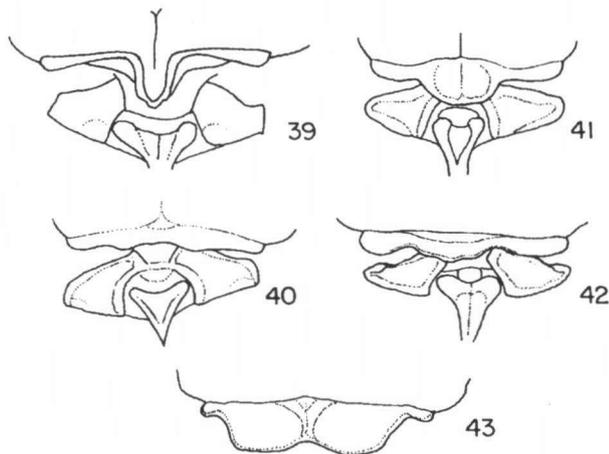
Carrier; – VENEZUELA (Mérida State): 1 ♂, 17 km E of La Azulita, 2000 m, 26-VII-1989, T. W. Donnelly; 7 ♂, 13 ♀, La Carbonera, 31-XII-1960, J. Racenis; 3 ♀, San Eusebio (La Carbonera), 2200 m, 5-VII-1991, L. D. Otero; – 1 ♂, 2 ♀, La Cuchilla, 19-IX-1966, C. J. Rosales & J. Salcedo; – 2 ♂, 1 ♀, road to La Culata, 4-VII-1991, J. De Marmels; – 2 ♀, La Mucuy, 2300 m, 1-VIII-1988, F. Cerdá & A. Chacón; – 1 ♂, Carretera Panamericana (Jaji-Boconó), La Chorrera, 5-IX-1979, L. D. Otero; – (Táchira State): 2 ♀, Betania (El Tamá National Park), 2400 m, 17/20-III-1983, J. De Marmels; – 1 ♂, 28/29-V-1994, A. L. Vilorio et al.; – 1 ♂, Rubio, 5-XI-1982 (all in MIZA).

This species happens to be the first Andean representative described in what later should be recognized as the genus *Cyanallagma*. Until 1988 it was also the only member of this genus known to occur in Venezuela.

HABITAT. – Small streams or ponds, or swampy slopes in open subparamo or pasture land, usually at elevations above 2000 meters.

DISTRIBUTION. – Occurs from the surroundings of Bogotá (i. e. Parque La Florida) northeastwards to the Tamá and the Cordillera of Mérida (Venezuela). Does not trespass the Chama-Motatán watershed northeastwards, nor does it enter the Río Santo Domingo basin.

NAVAS' (1934) record (sub *Argia ternaria*) from Pensilvania, in the Caldas Department (Colombia), needs confirmation.



Figs 39-43. Female pronotal hind lobe (dorsal view) of some *Cyanallagma*: (39) *demarmelsi* (Bogotá); – (40) *gaianii* (paratype, Laguna Negra); – (41) *laterale* (La Carbonera); – (42) *tamaense* (paratype); – (43) *thelkterion* (paratype).

CYANALLAGMA OVIGERUM CALVERT, 1909

Figures 4, 23, 35, 59, 85

Enallagma ovigerum CALVERT, 1909: 159 (Colombia: Bogotá)

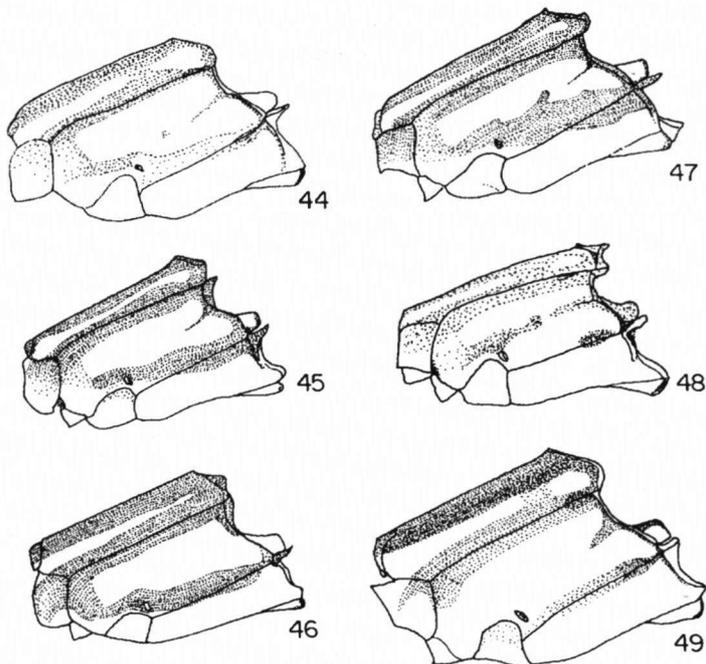
Archaeallagma ovigerum: KENNEDY, 1920b: 87 (new comb.); – DAVIES & TOBIN, 1984: 65 (Colombia)

Cyanallagma ovigerum: DE MARMELS, 1989: 250 (in part; new comb.); – GARRISON, 1991: 11 (New World); – TSUDA, 1991: 30 (Colombia); – BRIDGES, 1993, VII: 176

Repository of holotype (δ). – MCZ

Material. – Dr R. W. Garrison (Azusa, California, USA), has examined the type male at Harvard (MCZ). His figures are reproduced here with his kind permission. Unfortunately, the apical segment of the penis was found to be lost and can not, therefore, be described. – The female is unknown.

REMARK. – This peculiar species lacks a well-defined dorsal branch on the male cerci, a structure otherwise present in all other Andean species so far known.



Figs 44-49. Pattern of male pterothorax (left lateral view) of some *Cyanallagma*: (44) *demarmelsi* (Bogotá); – (45) *gaianii* (holotype); – (46) *laterale* (La Azulita); – (47) *tamaense* (holotype); – (48) *tepuianum* (paratype); – (49) *thelkterion* (holotype).

CYANALLAGMA RISI SPEC. NOV.

Figure 84

Enallagma ovigerum: RIS, 1918: 117 (Colombia: Fusagasugá, Anolaima, Pacho)

Cyanallagma ovigerum: DE MARMELS, 1989: 250 (in part; new comb.); – DE MARMELS, 1990a: 74 (Colombia: Anolaima)

Designation of holotype (δ). – COLOMBIA (Cundinamarca): Pacho, 2200 m, X-1910, A. H. Fassl (SENCK Register No. 9731).

Material (3 δ). – The specimens listed were studied at an earlier opportunity (DE MARMELS,

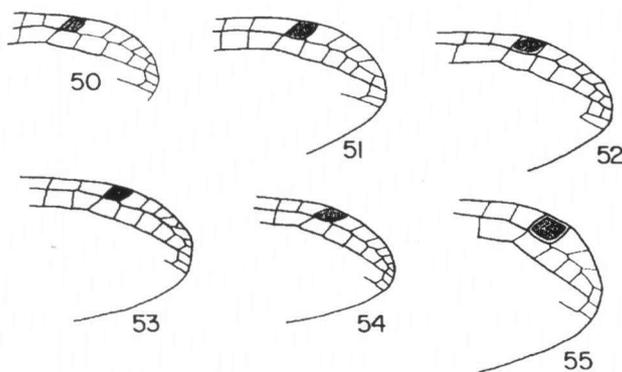
1989; 1990, respectively) and could not be reexamined: COLOMBIA (Cundinamarca): 1 ♂ (**holotype**), see above; – 1 ♂ (**paratype**), Anolaima, 2000 m, XII-1910, A. H. Fassl (SENCK Register No. 9733); – 1 ♂ (**paratype**), Quebrada El Mojón, Anolaima, 1400 m, 20-I-1987, F. Cruz & D. González (probably ICN). – Other material. – The remaining specimens listed by RIS (1918; sub *Enallagma ovigerum*), viz. 3 ♂, 4 ♀, Fusagasugá (Cundinamarca Dept.), an additional ♂ from Anolaima, and three additional ♂ from Pacho should be considered paratypes.

E t y m o l o g y. – Named after the great Swiss odonatologist, Dr Friedrich R i s, who gave the first description of this species (sub *Enallagma ovigerum*; RIS, 1918).

The new species has been thoroughly described by RIS (1918; sub *Enallagma ovigerum*). Ris already noted several differences between his material and the original description of *E. ovigerum* by CALVERT (1909). DE MARMELS (1989) added further characters of the specimens in the Ris Collection studied by him, and again emphasized on the differences between them and the *ovigerum* type. The latter author included illustrations of two males, now recognized as holotype and paratype of the new species. A recently captured male, now also a paratype, from Anolaima, was recorded and its penis was illustrated by DE MARMELS (1990a; sub *C. ovigerum*).

I have not seen any female, but RIS (1918: 117) states that the pronotal hind lobe is shaped as in male, e. g. “with transverse, rectangular process, [the distal margin of which] slightly emarginated in a shallowly sinuous curve”. Abdominal segment VIII blue dorsally in distal third; segment IX also blue, in distal half; dorsum of segment X blue, except for narrow, black basal line. A strong vulvar spine is present (RIS, 1918: 118).

Measurements (after RIS, 1918; in mm). – Abdomen 30.0; hind wing 24.5.



Figs. 50-55. Tip of male forewing of some *Cyanallagma*: (50) *demarmelsi* (Bogotá); – (51) *gaianii* (holotype); – (52) *laterale* (La Culata); – (53) *tamaense* (holotype); – (54) *tepuianum* (holotype); – (55) *thelkterion* (holotype).

CYANALLAGMA TAMAENSE DE MARMELS, 1988

Figures 5, 11, 17, 24, 29, 36, 42, 47, 53, 60, 61, 69, 85

Cyanallagma tamaense DE MARMELS, 1988: 98 [Venezuela: Betania and Páramo El Tamá (Táchira)]; – DE MARMELS, 1989: 246 (generic affiliation); – DE MARMELS, 1990: 337 (Venezuelan checklist); – GARRISON, 1991: 11 (New World); – TSUDA, 1991: 30 (Venezuela); – BRIDGES, 1993.VII: 230

Repository of holotype (♂). – MIZA

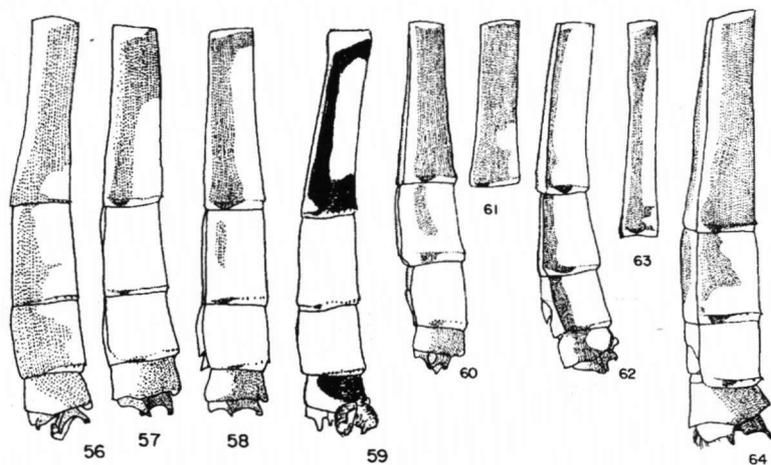
Material (9 ♂, 4 ♀). – COLOMBIA (Santander Dept): 1 ♂, La Pica, 13-II-1917, M. A. Carriker; – VENEZUELA (Táchira State): 8 ♂, 2 ♀ from the type series (incl. holotype); – 2 ♀, Betania, 22-III-1983, M. Vivas (all in MIZA).

Since the original description of this species was published in a local periodical, I decided to offer new and additional illustrations in the present paper.

VARIABILITY. – In two males abdominal segment VII has a blue distal dorsal mark, as in Figure 61 (Táchira), or smaller (Colombia). Segment VIII lacks, in the Colombian male, the black lateral stripe, as present in the specimens from Venezuela (Fig. 60). Two females have colour of the apical abdominal segments ill-preserved, in one of them the dorsum of segment VIII is probably black. In the third female the last three segments are lost. The fourth specimen is illustrated (Fig. 69).

HABITAT. – Similar to that of *laterale*.

DISTRIBUTION. – Colombian Eastern Cordillera, northeastwards to Páramo El



Figs 56-64. Male apical abdominal pattern (left lateral view) of some *Cyanallagma*: (56) *demarmelsi* (Bogotá); – (57) *gaianii* (holotype); – (58) *laterale* (La Azulita); – (59) *ovigerum* (holotype, drawn by R. W. Garrison); – (60) *tamaense* (holotype); – (61) same (segment 7 ♂ paratype); – (62) *tepuianum* (paratype); – (63) same specimen (segment 6); – (64) *thelkterion* (holotype).

Tamá, on the Colombia/Venezuela border (Fig. 85).

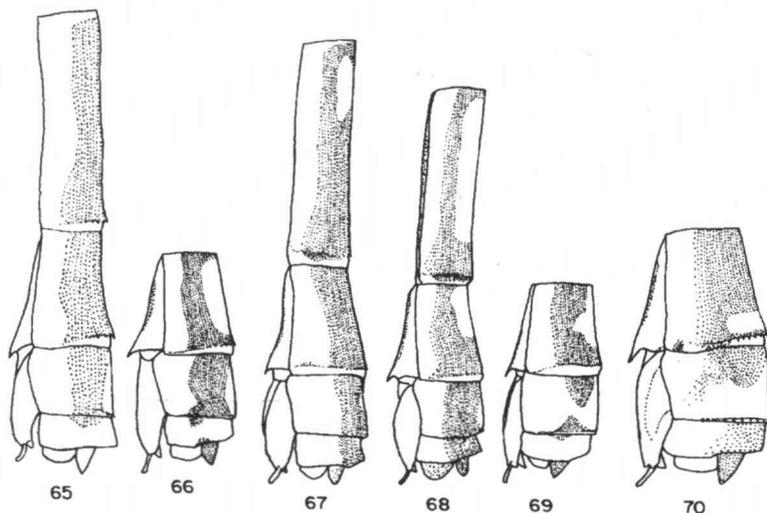
REMARKS. – The female is overall similar to *C. laterale*, but median projection of pronotal hindlobe is shorter and irregularly truncated (longer and smoothly rounded in *laterale*). Mesostigmal laminae are, in *tamaense*, narrower and have anterior edge raised into small elevation close to lateral angle (broader with low anterior edge in *laterale*). *C. tamaense* also has smaller pterostigmata than *laterale*. A female of the type series, with dorsum of abdominal segment VII largely blue, proved to be misidentified; it is rather corresponding to *C. laterale*. – *C. tamaense* also resembles *C. risi*.

CYANALLAGMA TEPUIANUM SPEC. NOV.

Figures 6, 12, 18, 25, 30, 37, 48, 54, 62, 63, 82

Material (2 ♂). – **Holotype** ♂: VENEZUELA (Amazonas State): Mt Duida, Caño Sina, 2100 m, 3°22'N, 65°42'W, 29-XI-1991, Rafael García. – **Paratype** ♂: same data as holotype (both in MIZA).

MALE (holotype). – **H e a d:** labium and rear of head pale; labrum and mandibles pale (blue?), labrum with black lateral basal angles and black centrobasal spot; clypeus and top of head ferruginous; there is some indication of pale blue postocular spots; occipital border ridged behind vertex; antennae dark brown. Long hairs present on labrum, clypeus, frons and postocular lobes. – **T h o r a x:** pronotum ferruginous above, pale blue laterally; a black spot distally between the two halves



Figs 65-70. Female apical abdominal pattern (left lateral view) of some *Cyanallagma*: (65) *demarmelsi* (Bogotá); – (66) *gaianii* (paratype, Laguna Negra); – (67) *laterale* (San Eusebio); – (68) same (La Carbonera); – (69) *tamaense* (paratype); – (70) *thelakterion* (paratype).

of median lobe; black mark also at level of lateral angles of hind lobe. Hind lobe only little prolonged backwards, slightly raised and shallowly emarginated in middle (Fig. 37). Pterothorax (Fig. 48) dark ferruginous with narrow, pale blue antehumeral stripes; mesepimeron and metepisternum largely blue; metepimeron, ventral parts of thorax, and coxae, pale. – **L e g s**: pale brown; tibial spines slightly shorter than intervals separating them; claws with subapical tooth. – **W i n g s**: hyaline, venation black; pterostigma a narrow lozenge, pale brown, its ventral edge much shorter than cell below it (Fig. 54). Petiolation ceasing slightly before CuP; three cells after quadrangle in discal field of all wings. 16 px in FW, 14 (13) in HW; IR1 originating at px 12 in FW, at px 10 (11) in HW. RP2 branching at or after px 7 in FW, at or before px 6 in HW. 6 poststigmatal cells in costal space of FW, 7 in HW. – **A b d o m e n**: segment I pale blue with brown black dorsomedian spot; segment II blue laterally, brown black dorsally; segments III-V brown black dorsally with basal lunules and latero-ventral portion pale; segments VI-X blue or violet dorsally, with black lateral line; segments VI and X with some additional black basally and distally on dorsum (Figs 62-63). Hind margin of segment X with short, blue, bilobate dorsal process separated from the remainder of segment X by black coloured furrow. Caudal appendages black. Cerci in lateral view with short, hooked, dorsal branch, and with long, finger-like ventral branch, which is blunt-tipped and directed rearwards (Figs 6, 12, 18, 25). In posterior view, a large, ventrally directed internal branch is discernible, with a blunt, hairy tubercle internally between dorsal and ventral branch. Paraprocts black, directed dorsad and ending in a mesiad directed hook.

M e a s u r e m e n t s (in mm). – Total length 35.7; abdomen 28.9; cerci 0.4; hindwing 20.5.

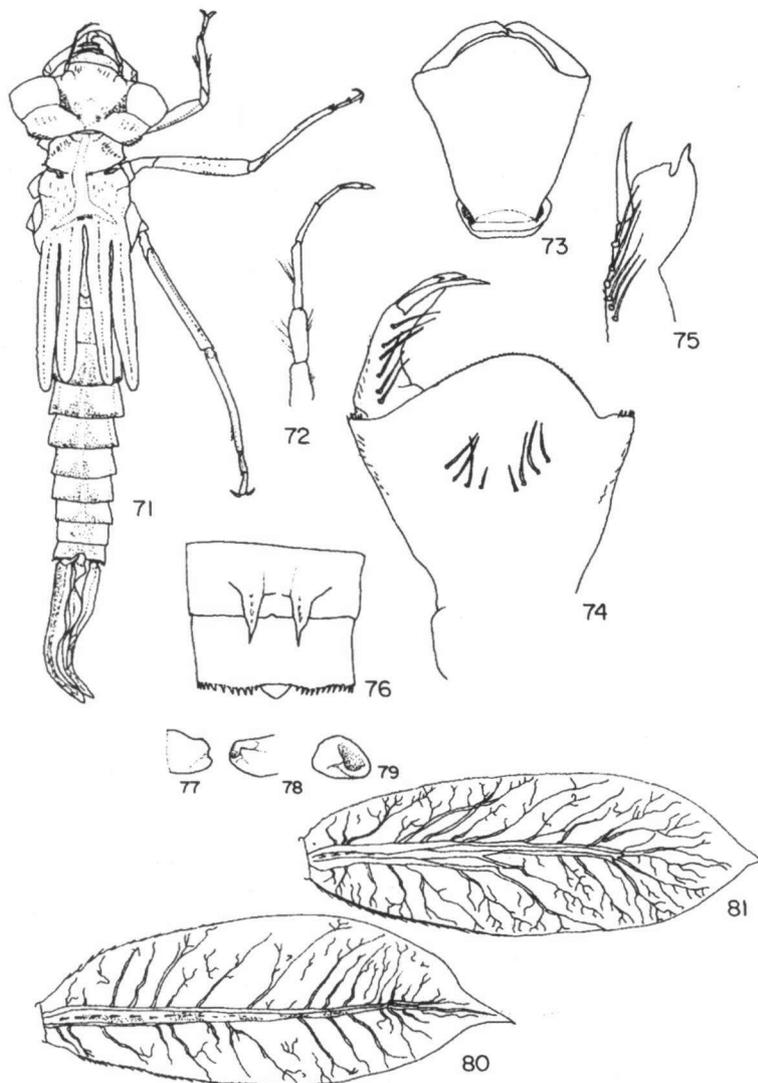
MALE (paratype). – Similar to holotype; pterothorax with brown line in front of metastigma (Fig. 48). Only 13 px in FW, 12 in HW. IR1 originating at px 10 (FW) and px 9 (HW); RP2 branching before or after px 6 in FW, between px 5 and 6 in HW; 5 poststigmatal cells in costal field of FW, 6 in HW. Penis shaft devoid of setae, but membranous area on each side with dense stand of soft hairs (Fig. 30); apical segment with pointed, recurved distal lateral lobes; proximal lateral lobes chitinized, spine-like, recurved; internal process long, apically hooked.

M e a s u r e m e n t s (in mm). – Total length 35.4; abdomen 28.8; hindwing 19.8.

FEMALE, LARVA and HABITAT. – Unknown.

DISTRIBUTION. – Known only from Mt Duida.

REMARKS. – The genus *Cyanallagma* is here for the first time recorded from Pantepui. The new species is closely related to its Andean congeners, but differs from all other species (males) in having abdominal segment VI also blue, not black, and in shape of penis and cerci.



Figs 71-81. Male ultimate instar exuviae of *C. galianii* (Laguna Negra): (71) exuviae (dorsal view; left legs removed); - (72) left antenna; - (73) labium (ventral view); - (74) labium (dorsal view; right labial palp omitted); - (75) left labial palp; - (76) abdominal segments IX and X, with gonapophyses (ventral view); - (77) left cercus (left lateral view); - (78) same (right internal view); - (79) same (posterior view); - (80) left lateral gill; - (81) median gill.

CYANALLAGMA THELKTERION SPEC. NOV.

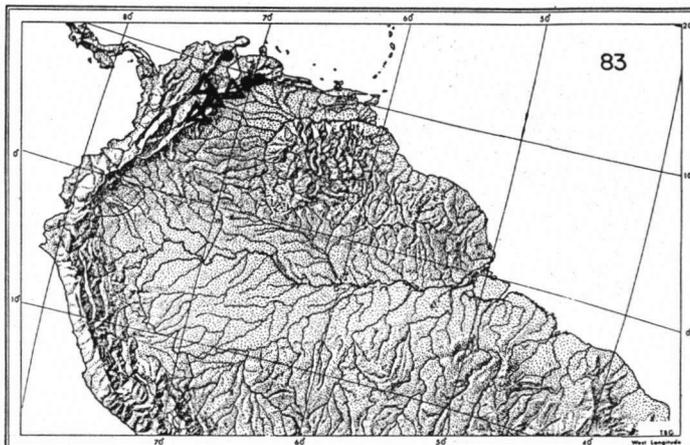
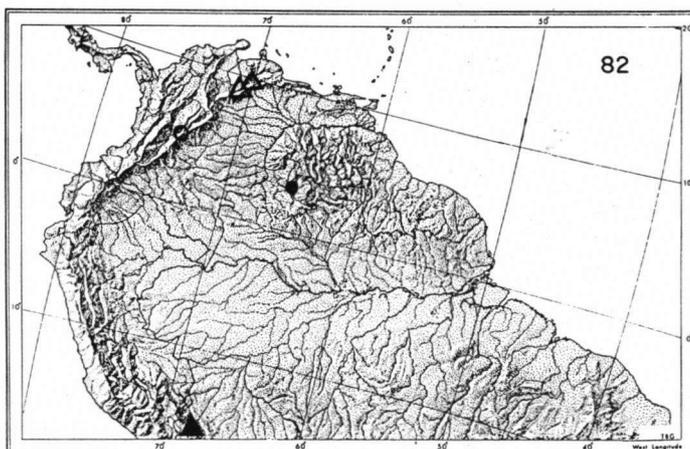
Figures 7, 13, 19, 31, 38, 43, 49, 55, 64, 70, 82

Material (6 ♂, 1 ♀). – **Holotype** ♂: VENEZUELA (Mérida State): Monte Zerpa, Santa Rosa Experimental Station, 2000 m, 29-III-1992, C. Chaboo M. (MIZA). – **Paratypes**: 3 ♂, same data as holotype; – (Trujillo State): 1 ♂, Laguna Negra, 9 km E of Mosquey, 1650 m, 3-IV-1993, J. De Marmels; – 1 ♀, road Boconó-Guaramacal, southern slope, 2000 m, Guaramacal National Park, 12-VI-1986, J. Lattke (all in MIZA). – **Additional material**: (Trujillo State): 1 ♂ (badly damaged), Loma del Santuario, northern slope, Guaramacal National Park, 5-IV-1993, J. De Marmels (MIZA).

Etymology. – “*thelkterion*” (Greek) means “fascinating”, “enchanting”.

MALE (holotype). – **Head**: labium and rear of head pale; mandibles almost white; labrum pale blue, a rounded mediobasal spot and lateral margins finely black; clypeus and top of head brown, with paler and darker areas, almost black around sky blue postocular spots. **Antennae** dark brown. – **Thorax**: pronotum dark brown dorsally, a pale transverse line on anterior lobe; posterior lobe prolonged in mid-

Figs 82-83. Known distribution of some *Cyanallagma*: (82) *acutum* (solid triangle), *thelkterion* (empty triangles), *tepui-anum* (solid circle), and *demarmelsi* (empty circle); – (83) *laterale* (triangles) and *gaianii* (circles).



dle and forming a broad, basally constricted lamina with slightly raised lateral angles; hind margin almost straight, little concave in middle (Fig. 38). Mesostigmal laminae narrow. Mesepisternum dark brown with sky blue antehumeral sripe, the latter interrupted in its upper third, letting an isolated blue spot at antealar sinus; a dark brown humeral stripe and a narrow, triangular brown spot at upper end of first lateral suture; a pale brown stripe also on second lateral suture (Fig. 49). Mese-pimeron and metepisternum otherwise sky blue; metepimeron and venter pale, almost white. – **L e g s**: brown black externally, pale brown internally, coxa and trochanter pale; black tibial spines at least as long as intervening spaces; claws with subapical tooth almost as long as tip of claw. – **W i n g s**: hyaline; pterostigma almost quadrangular, shorter than cell below it, and brown with narrow, pale margin along veins (Fig. 55). Petiolation ceasing slightly before CuP; three cells after



Figs 84-85. Known distribution of some *Cyanallagma*: (84) *risi*; – (85) *ovigerum* (triangle) and *tamaense* (circles).

quadrangle in discal field of all wings. 15 px in FW, 12 (13) in HW. IR1 branching at px 9 in FW, at px 7 (8) in HW. RP2 originating at px 6 (FW), at px 4 (5) in HW. Three poststigmatal cells in costal space in FW, four in HW. – **A b d o m e n**: dark brown dorsally on segments I-III, black on segments IV-VII and X; segments VIII and IX sky blue (Fig. 64). Segments III-VII with pale basal lunule, on each side; each narrowly connected middorsally with its counterpart. Segment I pale blue laterally, remaining segments pale brown; distal margin of segment X weakly emarginated; this emargination, as well as a minute basal dorsomedian spot, blue. Cerci black with slender dorsal branch, the tip of which is slightly spatulate, not hooked, and with long, inwards and proximad curved internal branch. Ventral branch rudimentary (Figs 7,13,19). Paraprocts with a hair brush ventrally, and with short, chitinized dorsal branch, ending in a mesiad directed hook. There is a pale coloured, dorsomesiad directed, triangular process proximally on chitinized dorsal branch.

M e a s u r e m e n t s (in mm). – Total length 44.1; abdomen 35.6; cerci 0.7; hindwing 25.3.

MALE (paratypes). – Similar to holotype. FW with four cells in discal field after quadrangle. 14 (16) px in FW. – Penis shaft devoid of setae; apical segment with distal lateral lobe shaped as in Figure 31, or with simple rounded lateral margin (two other paratypes). Proximal lateral lobe slightly chitinized, ventrally directed, triangular or truncated. Internal process as a minute, chitinized hooklet sitting on a transverse, membranous ridge.

A colour transparency of the male from Trujillo State shows compound eyes which are pale brown above and pale green below. The males from Mérida State are reddish brown dorsally on abdominal segments II and III, probably due to their younger age.

M e a s u r e m e n t s (in mm). – Total length 44.5-45.8; abdomen 36.2-37.0; hindwing 25.3-26.5.

FEMALE (paratype). – Not fully mature. Face and top of head pale brown; blue postocular spots confluent with brown areas. Pronotal hind lobe similar to male, but central projection shorter, with central emargination better developed; subbasal constriction absent and lateral angles not raised (Fig. 43). Pterothorax similar to male, paler. Legs pale. 14 (13) px in FW, 11 (12) px in HW. Abdominal segments II and III pale orange dorsally, remaining segments successively darker. Segment VIII with blue mediodorsal transverse spot along distal margin; segment IX mostly blue dorsally, with dark triangular mark basally, on each side; segment X probably brown in life. A strong vulvar spine present; ovipositor surpassing end of segment X, but not reaching to tip of cerci. Cerci shorter than segment X, with tip curved laterad (Fig. 70).

M e a s u r e m e n t s (in mm). – Total length 43.3; abdomen 34.2; hindwing 25.7.

HABITAT. – The specimens from Trujillo State were taken in the neighbourhood of ponds rich in riparian vegetation.

DISTRIBUTION. – *C. thelkerion* is probably endemic to the Cordillera of Mérida where it occurs on both sides of the Chama/Motatán watershed (fig. 82).

REMARKS. – This is by far the largest species presently known of the genus. Its

closest relative appears to be *C. acutum* (Ris), from Bolivia. Males of the two species closely resemble each other in colour pattern of head, thorax and abdominal segments VII-X, as well as in shape of pronotal hind lobe (the female of *C. acutum* is unknown). Hind margin of segment X and internal branch of cerci are also similar in both species. Differences can be observed in shape of the dorsal branch of cercus, which is very much longer and apically hooked in *C. acutum*, but shorter and slightly spatulate in *C. thelakterion*. The ventral portion of the paraproct is much better developed in *C. acutum*. There are also differences in the shape of the lateral lobes of penis. Illustrations of *C. acutum* have been published by DE MARMELS (1989).

ACKNOWLEDGMENTS

I am especially indebted to Mrs CAROLINE CHABOO (USA) for her kind permission to study the specimens collected by her in Mérida (Venezuela); to Dr R.W. GARRISON (Azusa, CA, USA) for his notes, figures and comments, and for his permission to use his illustrations in the present article. Ing. Agron. RAFAEL GARCÍA (Caracas) collected for me the two specimens of *C. tepuianum* and other highly valuable Zygoptera, in remote regions of Pantepui. Professor Dr A.B.M. MACHADO (Belo Horizonte, Brazil) furnished figures and specimens of some Brazilian *Cyanallagma*, and Ing. Agron. JESUS CAMACHO (Universidad del Zulia, Maracaibo, Venezuela) allowed me to study the specimens collected by him and his collaborators. The map used for showing distributions comes from the Smithsonian Institution (Washington, USA) and was given to me by Dr. O.S. FLINT, Jr.

The "Consejo de Desarrollo Científico y Humanístico" (CDCH) of the Universidad Central de Venezuela gave financial support (Project No. 01.38.2663.91 and 94, as well as additional funds).

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