



A new species of planthopper in the genus *Anchimothon* (Hemiptera: Auchenorrhyncha: Derbidae) on palms from Costa Rica

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Abstract

Anchimothon is a small genus of derbid planthoppers known from Mesoamerica and northern South America. Recent survey efforts in the Caribbean basin have documented many new taxa of fulgoroidea from palms. During this survey, a novel taxon identified as *Anchimothon* was collected from palm seedlings at La Selva Biological Station in Costa Rica. Here, the novel taxon is described as *A. myriei* **sp. n.** with molecular data for the cytochrome *c* oxidase subunit I (COI) and 18S rRNA providing support for placement of the new species in *Anchimothon*. An updated key is provided for the current species of *Anchimothon*.

Key words: Fulgoroidea, taxonomy, phylogeny, biodiversity, new species

Resumen

Anchimothon es un pequeño género de chicharritas perteneciente a la familia derbidae y descrito para Mesoamérica y el norte de Sudamérica. Diversas investigaciones de campo que se han llevado a cabo recientemente en el Caribe, han documentado muchos taxones nuevos de fulgoroides en las palmeras. Durante este estudio, se recolectó un nuevo taxón identificado como *A. myriei* **sp. n.** en plántulas de palmeras en la Estación Biológica La Selva en Costa Rica. En este documento, el nuevo taxón se describe como *A. myriei* **sp. n.** con datos moleculares para la subunidad I del citocromo *c* oxidasa (COI) y para ARNr 18S que respaldan la ubicación de la nueva especie bajo el género *Anchimothon*. Además, se proporciona una clave actualizada para las especies de *Anchimothon*.

Palabras clave: Fulgoroidea, taxonomía, filogenia, biodiversidad, especie nueva

Introduction

Anchimothon Fennah, 1952, is a small genus of planthoppers in the tribe Cenchreini (Derbidae: Derbinae), established to accommodate *Phaciocephalus parishii* Muir, 1918 (from Guyana; Fennah 1952). *Anchimothon* is most like *Omolicna* Fennah, 1945, but has the anterior margin of the vertex (dorsal view) concave, without an apical transverse carinae (in *Omolicna* apex of vertex straight, transverse carina present), and some general patterns

of the male terminalia. The genus remained monotypic until recent phylogenetic analyses placed *Omolicna dubia* (Caldwell 1944), in *Anchimothon* based on molecular data and morphology (Bahder *et al.* 2020). While molecular data for *A. parishi* is not available, characters observed in the male terminalia (Fig. 1) are consistent with the general characters observed in *A. dubia*.

The tribe Cenchreini are diagnosed as ‘cixiid-like’ (less specialized) derbids of the Derbinae bearing sensory pits on the vertex, frons and forewing (at least on the A1 vein), genae without subantennal process (vs. *Cedusa*), but the paranota foliate, forming conspicuous semicircular fossae behind the antennae (e.g., Fennah 1952, Emeljanov 1996). The forewing CuA has a ‘double apex’ usually forming an open marginal cell but is sometimes closed forming a ‘procubital cell’ (Emeljanov 1996, cell C5 of Bourgoïn *et al.* 2015).

During recent survey work in Costa Rica to assess the planthopper diversity associated with palms, an *Anchimothon* was collected at La Selva Biological Station and subsequently determined to be an undescribed species. Here we describe a new species of *Anchimothon* from lowland tropical rainforest in Costa Rica, provide and updated molecular phylogeny based on the COI and 18S genes, provide a modified description and assessment of the genus *Anchimothon*, and provide a key to the species of *Anchimothon*.

Materials and methods

Locality and Specimen Collection. Individuals of the novel taxon were swept from palm seedlings along trails and were immediately transferred to 95% ethanol. Specimens were collected (permit no. SINAC-ACTo-GASPPNI-016-2018) at La Selva Biological Station from 20-V-2018 to 22-V-2018, Heredia province, Costa Rica (10.431269, -84.005961), and exported under permit number DGVS-256-2018 to the U.S.A. under permit number P526-170201-001. All specimens collected were measured, photographed and dissected using a Leica M205 C stereoscope. Images of specimens and all features photographed were generated using the LAS Core Software v4.12. Voucher specimens, including primary types, are stored at the University of Florida—Fort Lauderdale Research and Education Center (FLREC) in Davie, FL, U.S.A and the Florida State Collection of Arthropods (FSCA) in Gainesville, FL, U.S.A.

Morphological terminology and identification. Morphological terminology follows that of Bartlett *et al.* (2014), except forewing venation following Bourgoïn *et al.* (2015) and with male terminalia nomenclature modified after Bourgoïn (1988) and Bourgoïn & Huang (1990).

Dissections and DNA Extraction. The terminalia that were dissected also served as the source of tissue for DNA extraction. The terminal end of the abdomens was removed and placed directly into a solution of tissue lysis buffer (buffer ATL) and proteinase K (180 µl ATL and 20 µl proteinase K) from the DNeasy® Blood and Tissue Kit (Qiagen). The abdomen was left to lyse for 24 hours at 56°C. Following lysis, eluate was transferred to a new 1.5 ml microcentrifuge tube and DNA extraction proceeded as per the manufacturer’s instructions. The terminalia were then immersed in 200 µl of buffer ATL and 200 µl of buffer AL from the same kit and placed at 95°C for 24 hours to remove fat, wax, and residual tissue. The cleared genitalia were then used for morphological characterization and photography.

PCR Parameters, Sequence Data, and Analysis. To obtain COI sequence data, DNA template from specimens was amplified using the primers LCO1490 (5’-GGTCAACAAATCATAAAGATATTG-3’) and HCO2198 (5’-TCAGGGTGACCAAAAAAATCA-3’) (Folmer *et al.* 1994). To obtain 18S sequence data, the primers developed by Bahder *et al.* (2019) were used as follows; forward primer 18SF (5’-ACTGTCGATGGTAGGTTCTG-3’), reverse primer 18SR (5’-GTCCGAAGACCTCACTAAA-3’). PCR reactions contained 5x GoTaq Flexi Buffer, 25 mM MgCl₂, 10 mM dNTP’s, 10 mM of each primer, 10% PVP-40, and 2.5U GoTaq Flexi DNA Polymerase, 2 µl DNA template, and sterile dH₂O to a final volume of 25 µL. Thermal cycling conditions for COI were as follows: 2 min initial denaturation at 95°C, followed by 35 cycles of 30 sec denaturation at 95°C, 30 sec annealing at 55°C, 1 min 30 sec extension at 72°C, followed by a 5 min extension at 72°C. Thermal cycling conditions for 18S were as follows: 2 min initial denaturation at 95°C, followed by 35 cycles of 30 sec denaturation at 95°C, 30 sec annealing at 55°C, 2 min extension at 72°C, followed by a 5 min extension at 72°C. PCR products of the appropriate size were purified using the Exo-SAP-IT™ PCR Product Cleanup Reagent (ThermoFisher Scientific, Waltham, Massachusetts, USA). Purified PCR product was quantified using a NanoDropLite spectrophotometer (ThermoFisher Scientific, Waltham, Massachusetts, USA) and were sequenced on a SeqStudio Genetic Analyzer (Applied Biosystems) using the MedSeq and LongSeq options for COI and 18S, respectively. Contiguous files

were assembled using DNA Baser (Version 4.36) (Heracle BioSoft SRL, Pitesti, Romania), aligned using ClustalW as part of the package MEGA7 (Kumar *et al.* 2016). A matrix of pairwise differences using number of differences among COI and 18S was calculated with MEGA7 (Kumar *et al.* 2016). The bootstrap method was used for variance estimation at 1,000 replicates and using the p-distance model. Maximum Likelihood trees were generated using the Bootstrap method at 1,000 replicates based on the Tamura-Nei model for both the COI and 18S loci as well as for a consensus tree based on concatenated data for COI and 18S.

Taxon sampling. For COI and 18S comparisons, only one ingroup taxon was available, *A. dubia*, in addition to the new species (Table 1). For outgroup comparisons based on the COI and 18S gene, the genus *Agoo* Bahder & Bartlett, 2019 (in Bahder *et al.* 2019), *Omolicna* Fennah, 1945, *Tico* Bahder & Bartlett, 2021 (in Bahder *et al.* 2021a), *Cenchrea dorsalis* Westwood, 1840, *Herpis soros* Bahder & Bartlett, 2021 (in Bahder *et al.* 2021b), *Oropuna halo* Bahder & Bartlett, 2021 (in Bahder *et al.* 2021c) and *Neocenchrea heidemanni* (Ball, 1902) were included (Table 1). *Anotia firebugia* Bahder & Bartlett, 2020 (in Barrantes *et al.* 2020) was used as an outgroup to polarize these data and root the Cenchreini. For morphological comparisons, male terminalia of *A. parishi* (Fig. 1A) and *A. dubia* (Fig. 1E) were used.

TABLE 1. Taxa used for molecular analyses to confirm placement of new taxon in *Anchimothon*

Species	Source	Locality	GenBank Accession No.	
			COI	18S
<i>Agoo beani</i>	FLREC ¹	Jamaica	MT413388	MT415403
<i>Agoo dahliana</i>	FLREC	Costa Rica	MN496467	MH472754
<i>Agoo luzdenia</i>	FLREC	Costa Rica	MT085818	MN999709
<i>Agoo xavieri</i>	FLREC	Costa Rica	MK443068	MK443073
<i>Anchimothon dubia</i>	FLREC	Costa Rica	MN496470	MN474755
<i>Anotia firebugia</i>	FLREC	Costa Rica	MT084365	MT945942
<i>Cenchrea dorsalis</i>	UD ²	St. Vincent	MT413387	MN472756
<i>Herpis soros</i>	FLREC	Costa Rica	MT085817	MT415406
<i>Neocenchrea heidemanni</i>	UD	U.S.A., DE	MN496473	MT415406
<i>Omolicna mariajosae</i>	FLREC	Costa Rica	MT422534	MT424915
<i>Omolicna cubana</i>	FLREC	Jamaica	MT413386	MT415404
<i>Omolicna joi</i>	FLREC	U.S.A., FL	KF472312	MN472753
<i>Omolicna latens</i>	FLREC	Costa Rica	MN496472	MN472757
<i>Omolicna puertana</i>	UPR ³	U.S.A., PR	MN496468	MN472751
<i>Omolicna tarco</i>	FLREC	Jamaica	MT422533	MT424914
<i>Omolicna triata</i>	FLREC	Costa Rica	MK443069	MK443072
<i>Oropuna halo</i>	FLREC	Costa Rica	MZ836006	MZ828126
<i>Tico emmettcarri</i>	FLREC	Costa Rica	MT085816	MT526036
<i>Tico pseudosororius</i>	FLREC	Costa Rica	MT997938	MT526037
<i>Tico sierra</i>	FLREC	Costa Rica	OK575934	OK577947

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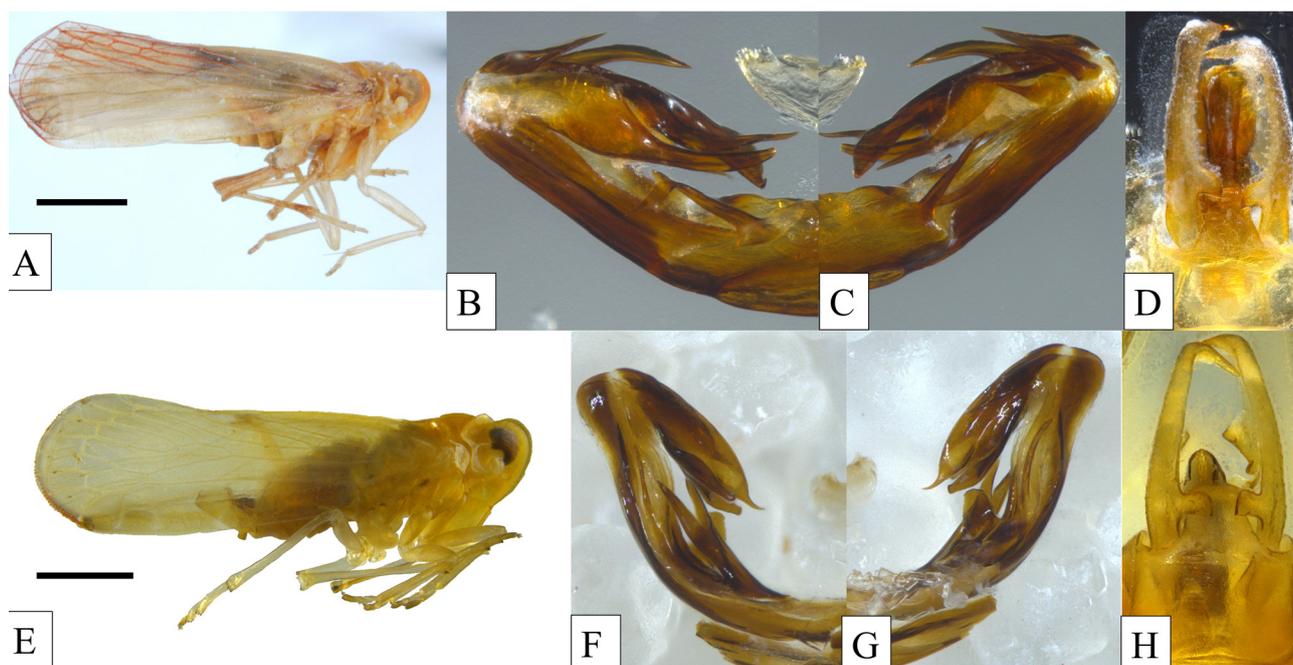


FIGURE 1. Adult males of *Anchimothon*; (A) *A. parishi*, habitus, lateral view, (B) aedeagus right lateral view, (C) aedeagus left lateral view, (D) terminalia in ventral view, (E) *A. dubia*, habitus, lateral view, (F) aedeagus right lateral view, (G) aedeagus left lateral view, (H) and ventral view of terminalia (H); scale = 1 mm.

Results

Systematics

Family Derbidae Spinola 1839

Subfamily Derbinae Spinola 1839

Tribe Cenchreini Muir 1913

Genus *Anchimothon* Fennah 1952

Type species: *Phaciocephalus parishi* Muir 1918

Amended Diagnosis. Robust, moderate sized (5–7 mm, with wings) cenchreine derbids. Head smoothly rounded in lateral view, slightly projecting beyond eyes, in dorsal view much narrower than pronotum. Vertex roughly trapezoidal in dorsal view, broader at base than along midline, narrowing apically, apex concave (transverse apical carina absent) and posterior margin concave, lateral carinae foliate and raised (vertex medially concave), bearing 2 rows of pits, median carina obsolete. Frons compressed and relatively broad (narrower than *Herpis* Stål, 1862 and *Oropuna* Fennah, 1952; broader than *Agoo*, comparable to *Omolicna*), narrowest between eyes, broadest slightly above frontoclypeal suture; lateral carinae foliate (contiguous with vertex), bearing a row of pits (with partial second row in widest portions); frons medially concave, median carina absent. Frontoclypeal suture approximately straight, clypeus elongate-triangular, bearing median carinae. Antennae short, scape very short, pedicel spheroid, bearing sensory plaques, flagellum bristle-like with bulbous base. Lateral ocelli distinct, in front of and slightly below antennae.

Pronotum along midline slightly narrower than frons, anterior margin following contours of head, posterior margin broadly concave, in lateral view, pronotum distinctly inclined posteriorly; paranota strongly foliate behind antennae, foliate margins, in frontal view, greatly exceeding antennae. Mesonotum along midline much longer than

combined vertex and pronotum, width subequal to pronotum, tricarinate. Tegmina with subcostal cell long (vs. *Cenchrea* Westwood, 1840).

Pygofer narrowly quadrate in lateral view, medioventral process of pygofer large and elongate, longer than broad, apically rounded or truncate. Gonostyli elongate, in ventral view with mesally directed quadrate lobe proximally, apex medially curved and pointed. Aedeagus bilaterally asymmetrical, shaft in lateral view weakly upturned, generally bearing a variably bifid process on right lateral side and simple process on left lateral side and complex apical retrorse endosoma and processes. Anal tube elongate and slender (vs. *Omolicna*).

Remarks. There are currently 11 genera represented in New World Cenchreini. *Anchimothon* can be diagnosed most readily from *Herpis* and *Oropuna* by having a narrower and more strongly concave frons (lacking a median carina). The frons of *Anchimothon* is broader than *Agoo*, *Cenanges* Fennah, 1952 and *Contigucephalus* Caldwell, 1944. The head of *Anchimothon*, in lateral view, is smoothly rounded, not projected (as in *Persis* Stål, 1862, subgenus *Persis*) or obtusely angle (unlike *Neocenchrea* Metcalf, 1923 and *Persis* subgenera *Anapersis* Fennah, 1952 and *Eritalaena* Fennah, 1952), with foliately lateral carinae on the vertex. The genera *Cenchrea* and *Tico* are smaller than *Anchimothon* (~3 mm vs ~6 mm), have fewer closed cells in the forewing (e.g., cell C3aa is present in *Anchimothon*, absent in *Tico* and *Cenchrea*) and the medioventral lobe of the pygofer is present in *Anchimothon*, absent in *Tico* and *Cenchrea*. The genus *Omolicna* is the most similar genus diagnostically and phylogenetically. *Omolicna*, as currently comprised, varies and may be heterogeneous. Compared with *Omolinca proxima* Fennah, 1945, *Anchimothon* has the anterior margin of the vertex in dorsal view concave with the transverse carinae at the head apex absent (in *Omolicna* apex of vertex straight, transverse carina present). In *Anchimothon*, the medioventral lobe of the pygofer is large and apically rounded or truncate, lacking lateral projections, whereas in *Omolicna* the medioventral process usually has lateral projections (usually near apex, but sometimes near base, but there may be exceptions), gonostyli in ventral view with proximate quadrate median lobe (varied in *Omolicna*). The definitive feature is that in *Anchimothon* the anal tube is relatively slender and elongate (exceeding the gonostyli), versus shorter and stouter in *Omolicna* and *Anchimothon* bears a bifid process on the right lateral side of aedeagal shaft. Fennah (1952) noted that the aedeagus of *Anchimothon parishii* was symmetrical (noted also by Caldwell 1944) and attributed this feature to the genus, but the processes of the endosoma and aedeagal shaft are asymmetrical.

Included species:

Anchimothon dubia (Caldwell, 1944)—Mexico (Chiapas), Costa Rica

Anchimothon myriei sp. n.—Costa Rica

Anchimothon parishii (Muir, 1918)—Guyana

Key to species of *Anchimothon* (males)

1. Dark species, forewing largely fuscous; male terminalia with apex of anal tube elongate, inflected in apical third to form outer concavity, bifid process on right lateral side small, processes asymmetrical, apices blunt (Fig. 6A, process A1) *myriei* sp. n.
- 1.- Paler species; male terminalia with apex downcurved, but not greatly elongate 2
2. Bifid process on right lateral side with processes elongate, pointed caudad (Fig. 1F) *dubia*
- 2.- Bifid process on right lateral side with processes relatively short, angled laterad (Fig. 1B) *parishii*

Anchimothon myriei Bahder & Bartlett sp. n.

(Figures 2–6)

Type locality. La Selva Biological Station, Heredia, Costa Rica.

Diagnosis. A dark species (vs. congeners) with head and prothorax light orange, washed fuscous posterior, legs nearly white, wings nearly black. Medioventral process of pygofer broad, apically truncate. Gonostyli (ventral view) with proximal medial lobes in form of broad hooks. Bifid process on aedeagus shaft on right lateral side (near midlength) with obtusely rounded apex of ventral process, single, small process on left lateral side. Anal tube (in lateral view) with lobe on ventral margin, apex (formed by distal lateral margins) elongate and strongly downcurved with distinctive anterior inflection in apical third.

Description. *Color.* General body color fuscous, head bright yellow-orange, frons medially darker orange with lateral carinae brown, prothorax yellow-orange, washed with fuscous medially on pronotum; mesonotum brownish orange with reddish hints, especially along carinae. Wings, dark fuscous to black, paler along margins and clavus, veins at apex red, distal portion of costal cell and subcostal cell yellow, A1 vein and anal cells yellow, becoming red distally.



FIGURE 2. Adult male habitus of *Anchimothon myriei* sp. n.; (A) lateral view and (B) dorsal view; scale = 1 mm.

Structure. Body length (with wings), male 5.01–5.02 mm (n=9; Table 1). Head. In dorsal view, head much narrower than pronotum, vertex trapezoidal, narrowing distally concave at anterior and posterior margins basal width about 2x as wide as distal margin, wider than long at midline, lateral carinae foliate, bearing two rows of large pits, disc of vertex concave (Fig. 3A). In frontal view, transverse carina lacking at fastigium, frons laterally keeled (keels contiguous with vertex), narrowest at fastigium, slightly expanding ventrally, widest a little above frontoclypeal suture, then narrowed to frontoclypeal suture; median carina absent, lateral margin bearing irregular sized row of pits (plus partial second row) along entire length of lateral margins (Fig. 3B). Head in lateral view, rounded, somewhat projecting in front of eyes (Fig. 3C). Compound eyes ventrocaudally emarginated for antennae. Antennae short, scape ring-like, pedicel spheroid bearing irregularly arranged sensory plaques, flagellum elongate, bristle-like with bulbous base. Lateral ocelli distinct, located slightly in front of and below antennae.

Thorax. In dorsal view, pronotum about twice as wide as head (subequal to mesonotum), at midline about $\frac{3}{4}$ length of vertex; anterior margin of prothorax moderately convex (following contours of posterior margin of head), posterior margin concave (Fig. 3A); in lateral view, paranota of prothorax greatly foliate forming cup-like structures behind antennae (Fig. 3C); in frontal view, foliate expansions greatly exceeding antennae, apex nearly quadrate (Fig. 3B). Mesonotum in dorsal view about as wide as long (subequal in width to pronotum), tricarinate, lateral carinae subparallel, sinuate, all carinae extending nearly to posteriorly margin, becoming obsolete posteriorly; two indistinct spurious carinae extending from near midlength of lateral carinae to lateral corners of mesonotal margin (evident also in lateral view), in lateral view, mesonotum arched (Fig. 3C). Tegulae large and conspicuous (Fig. 3A). Spinulation of hind tibia, basitarsus, and second tarsomere 5-6-6.

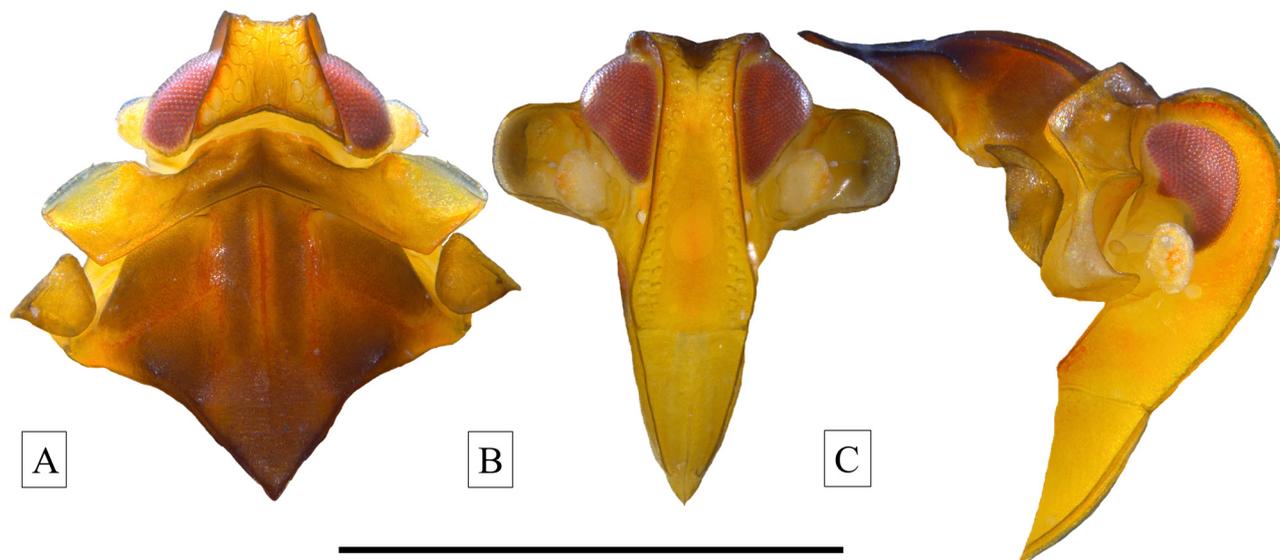


FIGURE 3. Adult *Anchimothon myriei* sp. n.; (A) head, pronotum and mesonotum dorsal view, (B) head, pronotum, and mesonotum frontal view, and (C) head and pronotum lateral view; scale = 1 mm.

Forewing (Fig. 4) with tubercles along composite vein Sc+R(+M) and A1 veins (and faintly along portion of costal near apex of Sc). Apex of clavus near wing midlength (about at level of Sc apex). Fork of Sc+RA from RP in basal quarter of wing, creating a very long C1 cell. Sc reaching wing margin just past wing midlength creating a relatively short cell between apices of Sc and RA (the ‘subcostal cell’ of Fennah 1952). Vein branching pattern RA 1-branched, RP 3-branched, MP 5-branched, CuA 2-branched. In clavus, CuP fused with Pcu near claval midlength with A1 joining composite vein much closer to claval apex, composite vein intercepting icu near wing apex (as similar claval vein arrangement is seen in *Omolicna mariajosae* Bahder and Bartlett, 2021, in Echavarría *et al.* 2021).

Terminalia. Pygofer in lateral view roughly elongate-quadrate, narrowest dorsad, expanding ventrad, anterior and posterior margins irregularly sinuate (Fig. 5A). In ventral view, medioventral process large, longer than wide at base, nearly quadrate, apex nearly truncate with rounded corners, slightly invaginated at midpoint (Fig. 5B). Gonostyli, in lateral view, broad, ventral margin with a broad rounded lobe proximally, distally broadly rounded to apex; dorsal margin with a complex process proximally (bearing a rounded distal projection and a biramous curved process) broadly angled distally, apex dorsal acuminate projection (Fig. 5B); in ventral view, narrow and parallel-sided curved mesad, bearing a proximate, quadrate a process (apex rounded, proximal apex hooked cephalad, appearing avicephaliform) on inner margins at approximately $\frac{1}{4}$ length from base, (Fig. 5B); apex sharply pointed, angled mesad (Fig. 5B). Aedeagus robust, asymmetrical, shaft angled slightly upward, bearing three processes: a bifurcated process near midlength on right lateral side (A1), ventral bifurcation longer, truncate (A1a), dorsal bifurcation shorter, pointed (A1b, Fig. 6A), second process arising on left lateral side on dorsal margin, strongly curved caudad (A2, Fig. 6B) and third process arising basally, extending to left lateral side (A3). Endosoma complex, bearing 5 sclerotized retrorse apical processes: including a pair (E1 & E2) of long, relatively narrow, heavily sclerotized, reaching midpoint of shaft, apices twisted, E1 slightly longer than E2 (Fig. 6C), a second pair (E3 & E4, subtending E1 & E2) more robust and similar in length (E4 just exceeding E3), exceeding E3, membranous proximally, more sclerotized distally, apex of E3 greatly constricted to acute process, E4 apex curved mesad with blunt apex (Fig. 6), final single process narrow arising on left lateral side (E5), sclerotized, similar in length to E3 (Fig. 6). Anal tube

very elongate and slender, in lateral view sinuate on dorsal margin, ventral margin with broad, rounded lobe in distal third; apex bifurcated, elongate and strongly curved ventrad, abruptly angled near midlength bearing small knob on distal margin, outer surface concave after knob (Fig. 5A), in ventral view, bifurcations of apex crossed (Fig. 5B).

TABLE 2. Biometric data for *Anchimothon myriei* sp. n.

Character	Male, n=9		Female, n=8	
	Range	Average ± SE	Range	Average ± SE
Body length, with wings	5.00–5.02	5.01±0.01	5.99–6.02	6.01±0.02
Body length, no wings	3.60–3.61	3.60±0.01	4.50–4.52	4.51±0.01
Forewing length	4.18–4.20	4.19±0.01	4.65–4.66	4.65±0.01
Vertex length	0.24–0.24	0.24±0.00	0.26–0.26	0.26±0.00
Vertex width, basal margin	0.50–0.50	0.50±0.00	0.51–0.51	0.51±0.00
Vertex width, distal margin	0.20–0.20	0.20±0.00	0.22–0.22	0.22±0.00
Pronotum length, midline	0.16–0.16	0.16±0.00	0.18–0.18	0.18±0.00
Mesonotum length, midline	0.87–0.88	0.87±0.01	0.90–0.90	0.90±0.00
Mesonotum width	1.17–1.17	1.17±0.00	1.20–1.20	1.20±0.00
Frons width, dorsal margin	0.22–0.22	0.22±0.00	0.24–0.24	0.24±0.00
Frons width, clypeal suture	0.32–0.32	0.32±0.00	0.33–0.33	0.33±0.00
Frons width, widest	0.37–0.37	0.37±0.00	0.39–0.39	0.39±0.00
Frons width, narrowest	0.22–0.22	0.22±0.00	0.23–0.23	0.23±0.00
Frons length, midline	0.76–0.77	0.76±0.01	0.78–0.78	0.78±0.00
Clypeus length	0.51–0.53	0.51±0.01	0.51–0.54	0.53±0.01

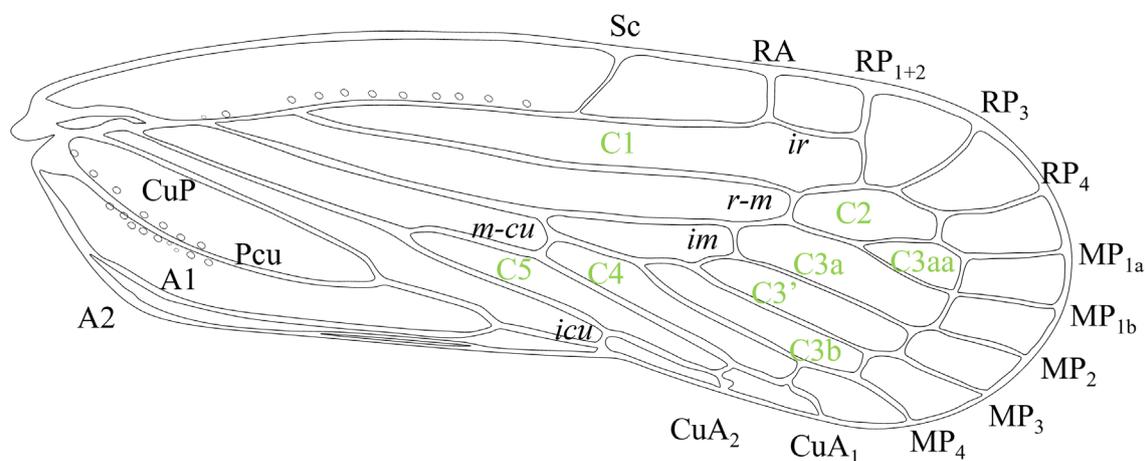


FIGURE 4. Forewing venation of *Anchimothon myriei* sp. n.; black = vein, italics = crossvein, green = cell.

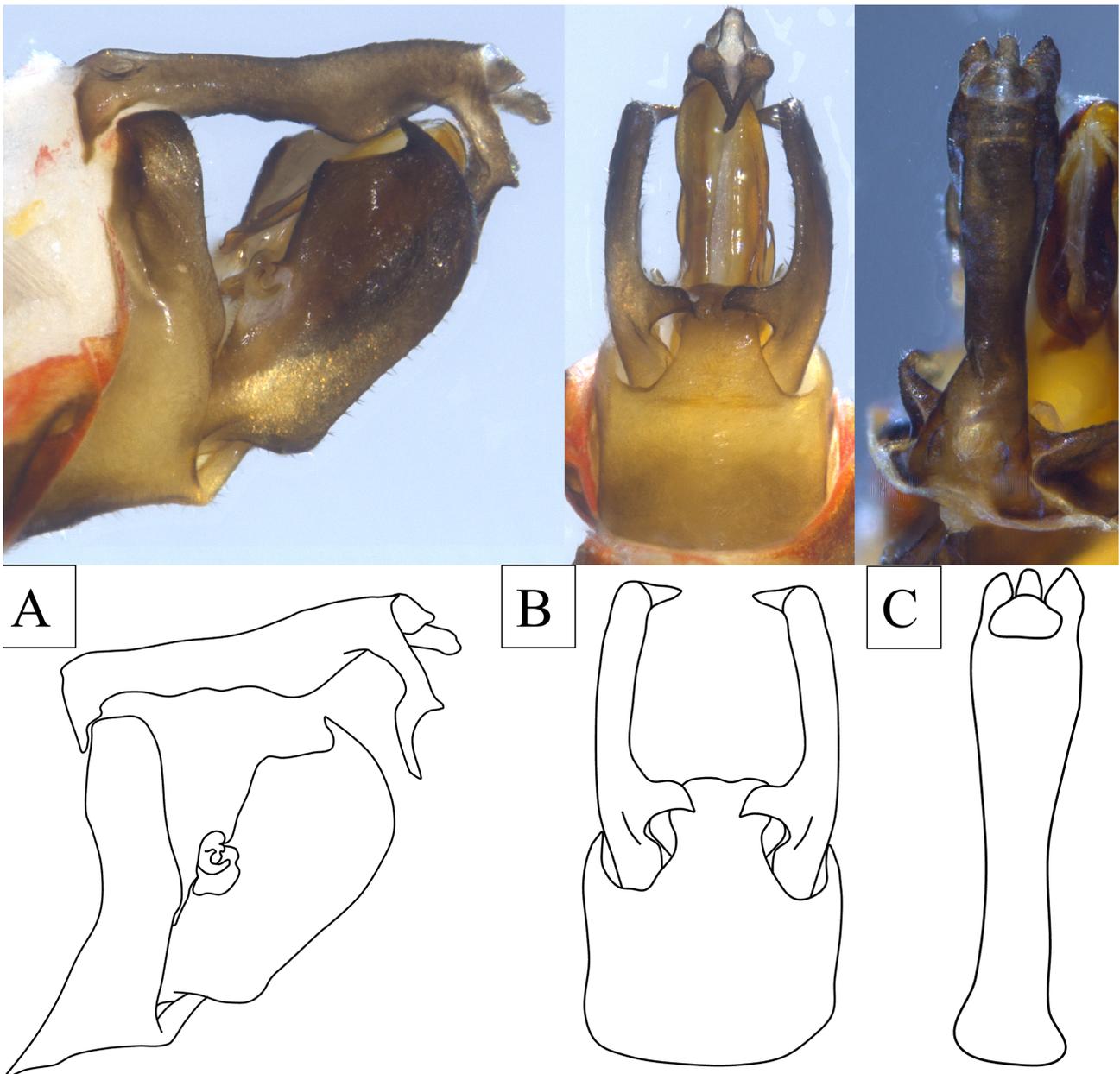


FIGURE 5. Male *Anchimothon myriei* sp. n. terminalia; (A) lateral view, (B) ventral view, and (C) dorsal view.

Plant associations. *Geonoma* sp. (Arecaceae), a palm.

Distribution. Limón Province, Costa Rica.

Etymology. The specific name is given in honor of Dr. Wayne Myrie, whose collaboration has been critical in the discovery of new planthoppers.

Material examined. Holotype male “Costa Rica, Heredia / La Selva Biological Station / 15.V.2018 / Coll.: B.W. Bahder, sweeping palms / Holotype *Anchimothon myriei* ♂” (FLREC); paratypes same as holotype (3 males, 6 females, FLREC and FSCA).

Sequence Data. For COI, a 707 bp product was generated (GenBank Accession No. ON231398) and for 18S, a 1,431 bp product was generated (GenBank Accession No. ON230027). The Maximum Likelihood analysis for COI placed *A. myriei* sp. n. in a clade adjacent to *Omolicna* with weak bootstrap support (70), however it did not resolve adjacent to *A. dubia*, which was placed within *Omolicna* (Fig. 7A). Statistical support for relationships based on COI were weak (mostly <70). For 18S, *Anchimothon* resolved as a clade with good bootstrap support (90). The consensus analysis of concatenated COI and 18S data also show good bootstrap support (85) for placing *A. myriei* sp. n. adjacent to *A. dubia*, supporting placement of the novel taxon in *Anchimothon*. However, the placement of *Anchimothon* adjacent to *Omolicna* had weak bootstrap support (53).

Remarks. The novel taxon conforms to *Anchimothon* based on morphology as the genus is currently understood. A synoptic genus diagnosis, compared with other New World cenchreines, would be vertex trapezoidal with apex concave (in dorsal view), apical transverse carina absent, medioventral process of pygofer large and apically rounded (or truncate, without lateral projections), gonostyli in ventral view elongate, proximal median margin bearing a quadrate lobe, anal tube narrow and greatly elongate. *Anchimothon dubia*, *A. myriei* **sp. n.** and *A. parishi* all have a bifurcated process on the right side of the aedeagus and simple process on the left which appears to be a genus-level feature. The form of the medioventral process of the pygofer and shape of the parameres, are similar in form among the species currently in *Anchimothon*.

The monophyly of *Anchimothon* is generally supported (despite the absence of molecular data for *A. parishi*) by the combined COI and 18S molecular data. While COI generally is not a reliable phylogenetic marker in derbids, it is helpful for delineating closely related species; the data generated for 18S is far more useful for constructing phylogenies among genera of Cenchreini.

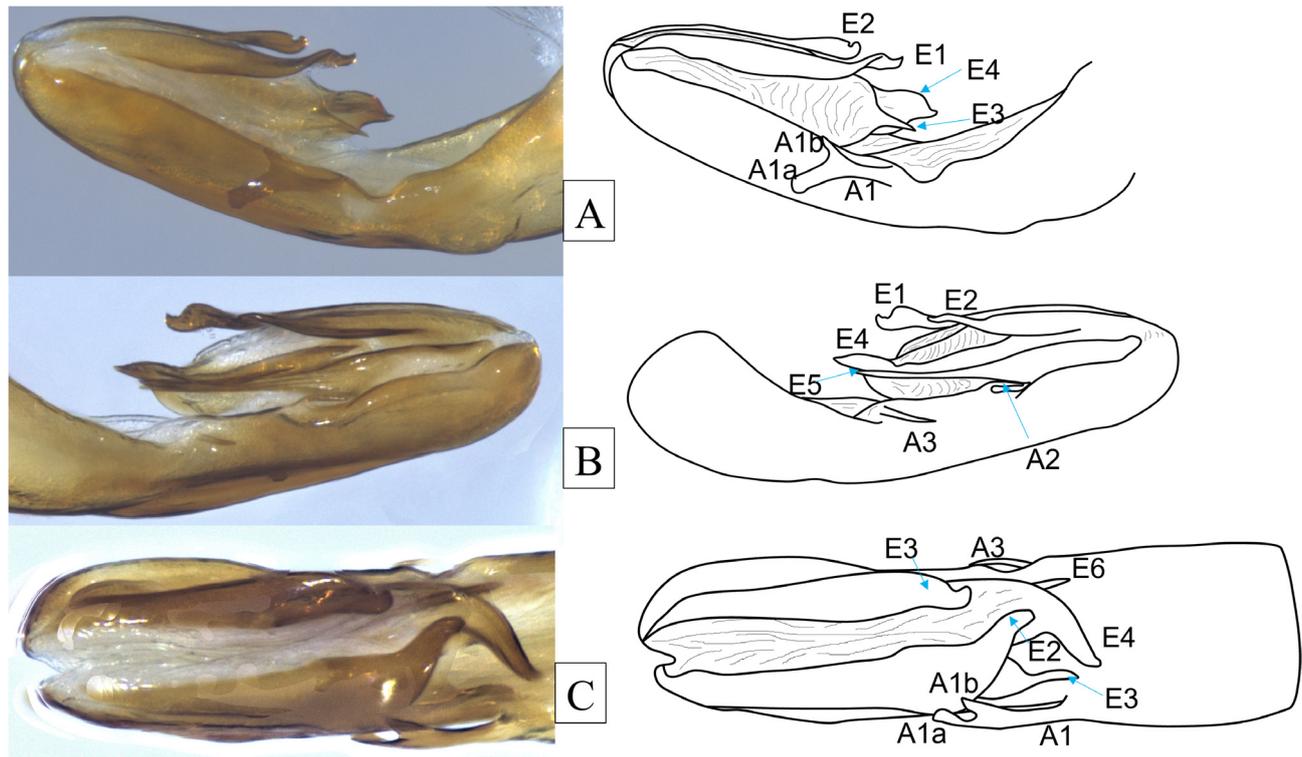


FIGURE 6. Aedeagus of *Anchimothon myriei* **sp. n.**; (A) left lateral view, (B) right lateral view, (C) dorsal view, and (D) ventral view.

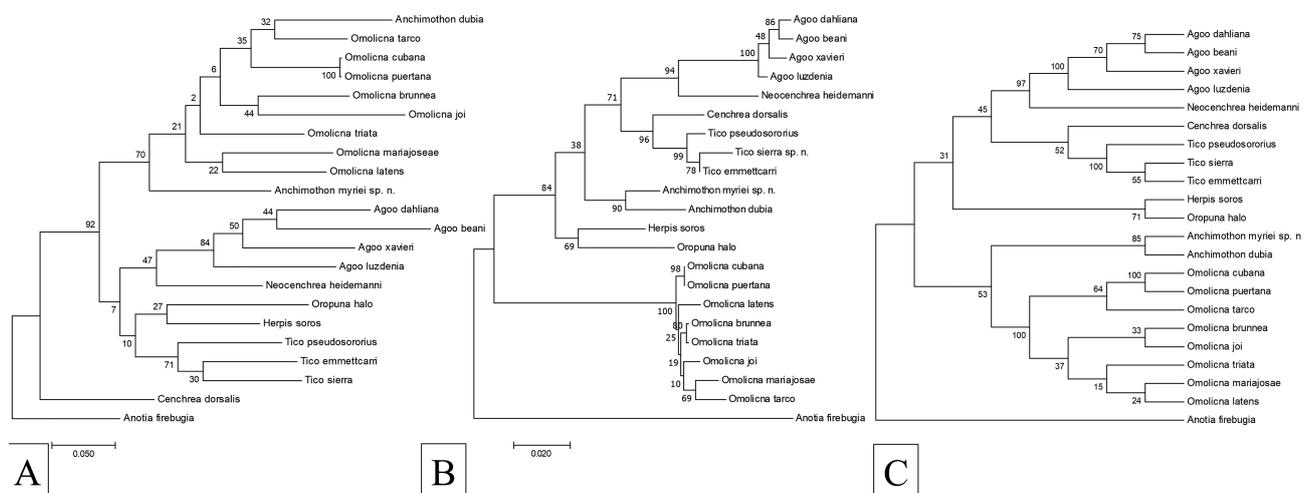


FIGURE 7. Maximum likelihood phylogenetic tree based on 1,000 replicates; (A) COI gene, (B) 18S rRNA gene, and (C) consensus tree of concatenated COI and 18S sequences; scale bar = percent nucleotide difference.

Discussion

This discovery of a new species within *Anchimothon* occurred during survey work on palms and further highlights the potential for species discovery in the tropics on plants that have largely been ignored in the past. No biological data on *Anchimothon* is known (aside from the palm association recorded here); however, derbids are commonly believed to be fungal feeders as nymphs (e.g., Howard *et al.* 2001) and the presence of *Anchimothon* on palm seedlings may place them close to nymphal habitat in the understory leaf litter.

Of the 11 genera of New World Cenchreini, at least one representative species from eight genera has been recorded from palms in the Caribbean Basin. The three remaining genera, we have not yet had opportunity to study (viz. *Cenanges* Fennah, 1952, *Neocenchrea* Metcalf, 1923, *Persis* Stål, 1862). The association of derbids with palms has been reported often in the past (e.g., Lepesme 1947, Wilson 1987, Wilson and O'Brien 1987). The nature of recent survey efforts establishes a clear sampling bias, so it is uncertain if these new taxa are specialists on palms or prefer them; however, based on lack of data from nearby, non-palm hosts appears to indicate that they prefer palms. Understanding this relationship is the focus of future research efforts in the area.

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