New genera and species of Afrotropical Entedoninae (Hymenoptera, Eulophidae)

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Key words: Hymenoptera; Eulophidae; Entedoninae; Afrotropical region; propodeum; new genera; new species.
Two new genera of Entedoninae are described from Afrotropical region. The genus *Janicharis* gen. nov. (type species: *J. africana* spec. nov.) is described from Cameroon, Nigeria and Madagascar. The genus *Hakuna* gen. nov. (type species: *H. matata* spec. nov.) is described from Uganda. Both genera have a rather characteristic habitus and a peculiar propodeum bearing large anterolateral strips. A new, but yet unnamed, species of the genus *Trisecodes* Delvare & LaSalle, 2000, is recorded from Cameroon. This is the first Afrotropical record of this genus, originally described from the Neotropical region.

Introduction

Afrotropical and Malagasy Entedoninae are probably the least studied group within the family Eulophidae. They include only 107 of almost 1200 species known worldwide so far. Compared to this, 603 entedonines are known from the Holarctic region, 239 from the Neotropics and more than 300 from the Indo-Pacific area (Noyes, 2001, 2003). There have been relatively few (less than one hundred in total) works dealing with African Entedoninae. These are ranging from bare descriptions (e.g. Walker, 1862; Silvestri, 1914; Waterston, 1915, 1916; Ferrière, 1938; Bouček, 1972), biological control reports (e.g. Gahan, 1928; Philippe et al., 1979), reviews of parasitoid-host associations (e.g. Annecke, 1962; Waterston, 1925; Ferrière, 1936; Kerrich, 1969, 1970; Bouček, 1977; Polaszek & LaSalle, 1995), to occasional taxonomic reviews (e.g. Risbec, 1951, 1952, 1955, 1957, 1958; Kerrich, 1973; Bouček, 1976; Rasplus, 1990). The latter group of papers is limited; no revision or even generic keys are available to estimate the diversity of the Afrotropical and Malagasy Entedoninae.

A study of the collections of the Natural History Museum (London, BMNH), the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD, Montpellier, France), the Muséum National d'Histoire Naturelle, Paris (MNHN) and the Nationaal Natuurhistorisch Museum, Leiden, Netherlands (RMNH), allowed us to discover some new species belonging to new and poorly known entedonine genera.

Materials and methods

The scanning electron microscopy (SEM) photographing was carried out in the Mineralogy Department of the Natural History Museum (London) using an ISI ABT-55 low-vacuum and LEO 1455VP microscopes, which allow imaging of uncoated specimens, and in the Max-Planck Institute for Metal Research (Stuttgart, Germany, MPI) using an LEO 1530VP microscope.

Terminology largely follows that of Gibson et al. (1997), and the following abbreviations are used: POL, post-ocellar distance; OOL, oculo-ocellar distance; OCL, oculo-occipital distance; MDO, major diameter of ocellus; F1-F5, flagellar segments; RW, the part of disc of fore wing apically from the virtual longitudinal line drawn at point of juncture of stigmal vein.

Genus *Janicharis* Gumovsky & Delvare, gen. nov.

Type-species: *Janicharis africana* spec. nov.

Diagnosis.— Habitus: the habitus of the type species of this genus is similar to that of *Hakuna* gen. nov. described below, and *Pediocharis* Bouček, and might bear also some similarity with species of *Chrysocharis* Förster.

Autapomorphy: propodeum anteriorly in middle with two large foveae, anterolateral propodeal strip wide, somewhat angulate above spiracle (fig. 1, als).

Shared characters: - with *Hakuna*: pronotum dorsally reduced, placed significantly below the level of mesoscutum; propodeum with anterolateral propodeal strips; - with *Pleurotropopseus* Girault, *Mestocharis* Förster: anterior propodeum with basal cup and foveae on sides; - with *Mestocharis*: metanotum with anteriorly delimited foveae at sides of dorsellum (figs 1, 2, mf); - with *Chrysocharis* and the complex of genera allied to *Pleurotroppopsis* Girault: long postmarginal vein.

Description.— Head nearly evenly round, eyes large, frons not narrowed; ocelli in wide-angular triangle which not delimited by sutures, occipital margin not carinate, evenly concave; frontal ridge absent; frontal groove angulate at nearly 90º; scrobal grooves present as distinct sutures, relatively long; mandibles stout, oriented downwards; clypeus not delimited; tentorial pits absent; subtorular grooves absent; occipital median line indicated as deep impression. Pronotum dorsally shortened, not carinate, situated much below anterior part of mesoscutum; lateral margins of pronotum evenly rounded; propleuron without flange. Mesoscutum convex anteriorly, alveolate to scrobiculate (fig. 8); notauli traceable in their anterior part; scutellum evenly smooth, its anterior margin somewhat produced, its posterior margin bears a shallow somewhat flanged groove; axillae nearly smooth, axillulae flat, roughly scrobiculate (fig. 8); dorsellum narrow medially, with small foveae on sides, lateral panels of metanotum irregularly rugose. Anterior margin of propodeum in lateral quarter raised into a flat smooth strip (fig. 1, als); broad median area somewhat irregularly areolate, areolae lighter on bottom, but anteriorly between spiracles with two large median pentagonal areolae flanked by one transverse areola on each side; median propodeum delimited by lateral plicae; tubercles below spiracles absent. Metapleural protuberance relatively short; transepimeral groove present as a curved suture. Metasomal petiole elongate, as long as or slightly longer than median propodeum, distinctly alveolate. First gastral tergite without oval

membranous areas; gaster in female oval or trapezoidal. First tergite with straight hind margin, reaching 4/5-5/6 of gastral body (fig. 7).

Discussion.— The main character supporting the monophyly of this genus is the propodeal pattern, i.e. double basal cup surrounded by the lateral foveae and metanotum with foveae outside of the dorsellum. The basal cup is also present in the Australian monotypical genus *Pleurotropopseus* Girault, from which *Janicharis* differs mainly in having long postmarginal vein and in the lack of the propodeal median carina (the postmarginal vein short and the carina is present in *Pleurotropopseus*), and also in having the metanotal foveae. The rugosely sculptured median propodeum bearing basal cup and the metanotum with sublateral foveae indicate similarity with *Mestocharis*. Also, both genera, as well as *Hakuna* described below, possess widened anterolateral propodeal strips stretching under the posterior margin of the metanotum. However, these strips are quite different from the strips bearing the posterior projections in *Mestocharis* (the main apomorphy for that genus, fig. 2, als), what makes separation of these genera easy. Habitual similarity indicates possible relationships between *Hakuna* and *Janicharis*, but this might be just a superficial impression. *Janicharis* differs from *Hakuna* in the median propodeal structure, length of postmarginal vein and shape of the head.

Biology.— Unknown.

Distribution.— Afrotropical (Cameroon, Nigeria) and Malagasy (Madagascar).

Etymology.— The generic epithet is a composition of the roots jani- (Swahili for "green", "bush" and "foliage") and -charis (e.g. *Chrysocharis*). Gender feminine.

Janicharis africana Gumovsky & Delvare, spec. nov.
(figs 1, 3-8)

Material.— Holotype, ♀, "**Cameroon**: Maroua, Djarengol, Malaise trap, 26.ix.1984 (G. Delvare)" (MNHN); paratypes 3 ♀♀, ibid. (CIRAD); 3 ♀♀, ibid. (RMNH); 1 ♀, "**Nigeria**: Oyo, Ibadan, IITA Compound, x.1987 (J. Noyes)" (BMNH). Additional material.— 1 ♂, "**Madagascar**: Lac Alaotra, on *Oryza sativa*, 17.x.1991" (P. Bousses) (CIRAD).

Female (figs 1, 3, 4, 7, 8).— Length 1.5-2.0 mm. Body bright green except for pale antennal scape, tibiae and femora; tarsi brownish, darkening apically; forewing venation pale brown, tegula pale (figs 3, 4).

Head.— Head in dorsal view twice as broad as long; temples moderate, occipital margin blunt. Ocelli small, POL:OOL:OCL in ratio 6:2:5. Head in frontal view 1.2-1.3 times broader than high. Eye densely setose, 5 times as long as malar space; malar groove absent. Face with light reticulate sculpture between antennal toruli and frontal groove, the rest of face smooth; scrobal grooves not meeting below frontal groove, the latter complete. Oral fossa 3 times as long as malar space. Mandibles bidentate. Lower margin of clypeus straight.

Combined length of pedicel and flagellum 0.7 times as long as breadth of head. Antennal scape 4.3 times longer than broad; pedicel 1.66 times longer than broad. Flagellum 5-segmented (clava indistinct): F1 1.5 times as long as broad, slightly longer than F2, the latter twice as long as broad, F3 and F4 slightly longer than broad, F5 2.5 times as long as broad, thin, with short terminal spine. Antennae inserted at level of lower eye margin.

Mesosoma.— Mesosoma 1.5 times as long as broad. Pronotum dorsally reduced, situated much below upper level of mesoscutum (like in *Hakuna*), not carinate. Mesoscutum convex anteriorly (due to lower position of pronotum), obscurely areolate, with short median groove posteriorly, and bearing 2 pairs of setae. Notauli reduced, slightly traced anteriorly and posteriorly. Axillae each with one seta. Axillulae flat but sloping, roughly scrobiculate. Scutellum smooth, polished, with 1 pair of setae. Lateral panels of metanotum with minute foveae delimited by small plicae at sides of dorsellum (Fig. 1, mf), which is narrower than the rest of the metanotum, its anterior margin somewhat emarginate. Propodeum as described in the generic diagnosis. Propodeal callus with 1 seta, without any spines below. Spurs of mid and hind tibiae as long as breadths of their tibiae, spur of the fore tibia rather short. Prepectus somewhat overlapped by the mesepisternal projection. Lower mesepimeron delimited by sutured, curved transepimeral sulcus.

Wings.— Forewing 2.8 times as long as broad, costal cell rather narrow, about 20 times as long as broad, subcosta of submarginal vein with 2 setae on its dorsal surface before the break, where it meets thicker parastigma; speculum closed below; intercubital hair row consisting of about 10 setae; marginal vein 1.75 times as long as costal cell; stigmal vein short, stigma petiolate; postmarginal vein more than twice longer than the stigmal vein (about 2.5 times), about 1/3 of RW; fringe of the apical margin in its lower part twice longer than breadth of marginal vein in its broadest basal part.

Metasoma.— Petiole robust, 1.6 times as long as broad, as long as median propodeum, with areolate sculpture. Gaster oval, subpentagonal, 1.5 times as long as broad, first gastral tergite covering most of the surface, following terga telescopically drawning, so that the length of the posterior part of the gaster may be variable.

Male.— Similar to female (figs 5, 6), except for wider scape (3 times as long as broad) and slightly longer petiole.

Etymology.— Name pointing to the African distribution of the type-species.

Biology.— Unknown.

Distribution.— Cameroon, Nigeria, Madagascar.

Genus *Hakuna* Gumovsky & Bouček, gen. nov.

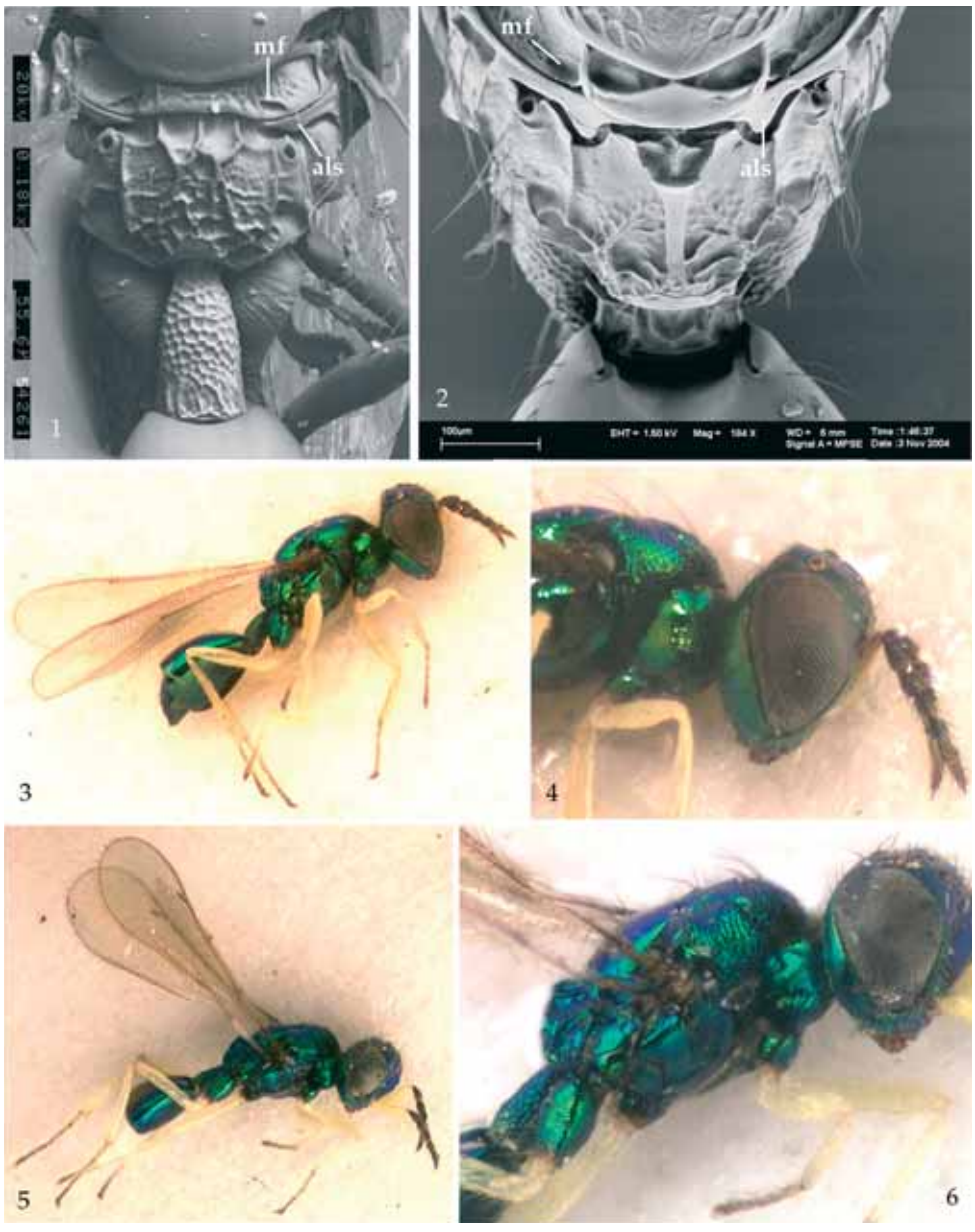
Type-species: *Hakuna matata* Gumovsky & Bouček spec. nov.

Diagnosis.— Habitus: the habitus of the type species of this genus (figs 9-13, 16-23) is peculiar and somewhat reminds that one of *Pediocharis* (large eyes, petiolate metasoma, large rugose propodeum).

Autapomorphies: propodeum with broad and roughly sculptured median area, head subcubical with narrow face and unusually large eyes.

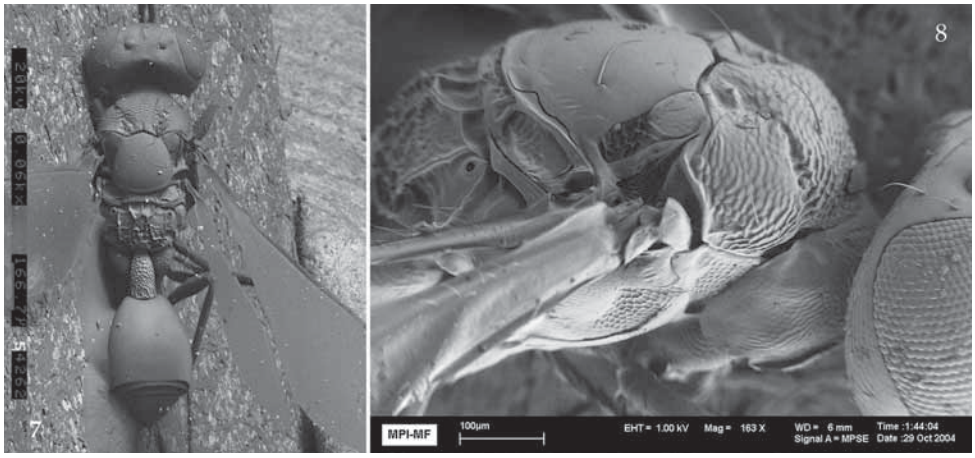
Shared characters: - with *Pediobopsis* Girault, *Closterocerus* Westwood, and allies: two-segmented funicle; - with *Janicharis*: pronotum dorsally strongly reduced, without trace of collar; - with *Janicharis*, *Mestocharis*: propodeum with anterolateral strips (fig. 10, als).

Description.— Head subcubical (figs 16, 17, 20-23), with large eyes and relatively narrow frons; ocelli in wide-angular triangle; hind margin of the vertex forming a sharp raised occipital crest, occiput deeply concave; frontal transverse ridge absent; frontal groove distinct, angulate at almost 90°; scrobal grooves short; frons concave, with dis-

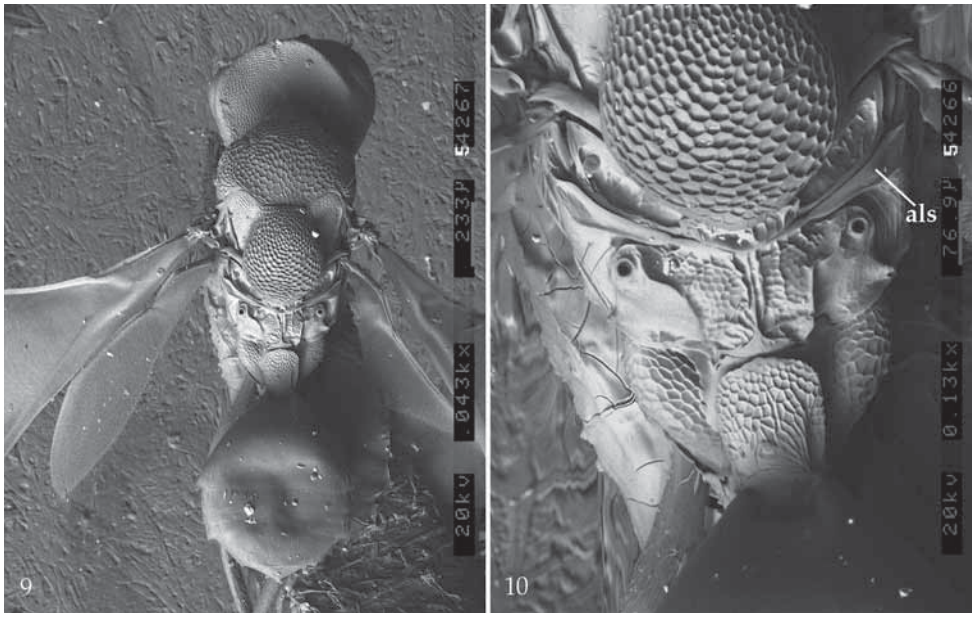


Figs 1, 3-6, *Janicharis africana* gen. nov. & spec. nov., 1, 3, 4, ♀; 5, 6, ♂; fig. 2, *Mestocharis maculata* (Förster). 1, 2, posterior part of mesosoma and anterior part of metasoma; 3, 5, habitus; 4, 6, head and anterior part of mesosoma.

tinct interantennal projection; genae very short; mandibles stout, 2-toothed; clypeus not delimited. Pronotum dorsally reduced, very low, collar not indicated but hind margin narrowly smooth; propleuron without any flanges. Mesoscutum strongly convex (figs 9, 16, 18), with dense deep puncturation, with two setae in mid part; notauli reduced to



Figs 7, 8, *Janicharis africana* gen. nov. & spec. nov., ♀. 7, habitus, dorsal view; 8, head and anterior part of mesosoma in lateral view.



Figs 9-10, *Hakuna matata* gen. nov. & spec. nov., ♀. 9, habitus, dorsal view; 10, posterior part of mesosoma and anterior part of metasoma, dorsal view.

short shallow grooves. Advanced axillae only with shallow alveoli, each bearing one seta; scutellum also strongly convex (figs 9, 10, 18), very densely alveolate. Axillulae vertical, concave, with one or two small rugae; dorsellum narrow, uneven with rugosity. Propodeum (fig. 10) anteriorly on either side with distinct smooth flanged strips (fig. 10, als), their hind margins straight; median area of propodeum as a large trapezium, flat but coarsely rugose-reticulate, its middle channel slightly irregular, doubled by a

percurrent median carina, nucha virtually absent; lateral areas uneven but without puncturation, posteriorly with short projection below spiracle. Metapleural protuberance blunt; transepimeral groove absent. Metasomal petiole large, dorsally almost flat and densely rugose-reticulate, its anterior margin slightly overlapping posterior margin of propodeum (fig. 10). Gaster in female oval, first tergite with straight hind margin reaching slightly beyond half of gastral body (Fig. 9).

Biology.— Reared from an insect gall on a forest plant (H.C. Taylor's note), figs 14, 15.

Distribution.— Afrotropical (Uganda).

Etymology.— The generic epithet, if accompanied with species name (*matata*) perpetuates the catchword from "Lion King" cartoon as best converging an African spirit. Gender feminine.

Discussion.— Presence of the anterolateral propodeal strips suggests similarity with *Mestocharis*, but in this genus the strips are rather narrow and their lower margins (Fig. 2, als) projecting downward (straight in *Hakuna*). The possession of these strips and also the characteristic structure of the mesosoma, with convex mesoscutum and scutellum, and pronotum situated much below them, suggest an affinity of this genus with *Janicharis*, described above. From the latter genus, *Hakuna* differs mainly in the structure of the propodeum and the shape of the head.

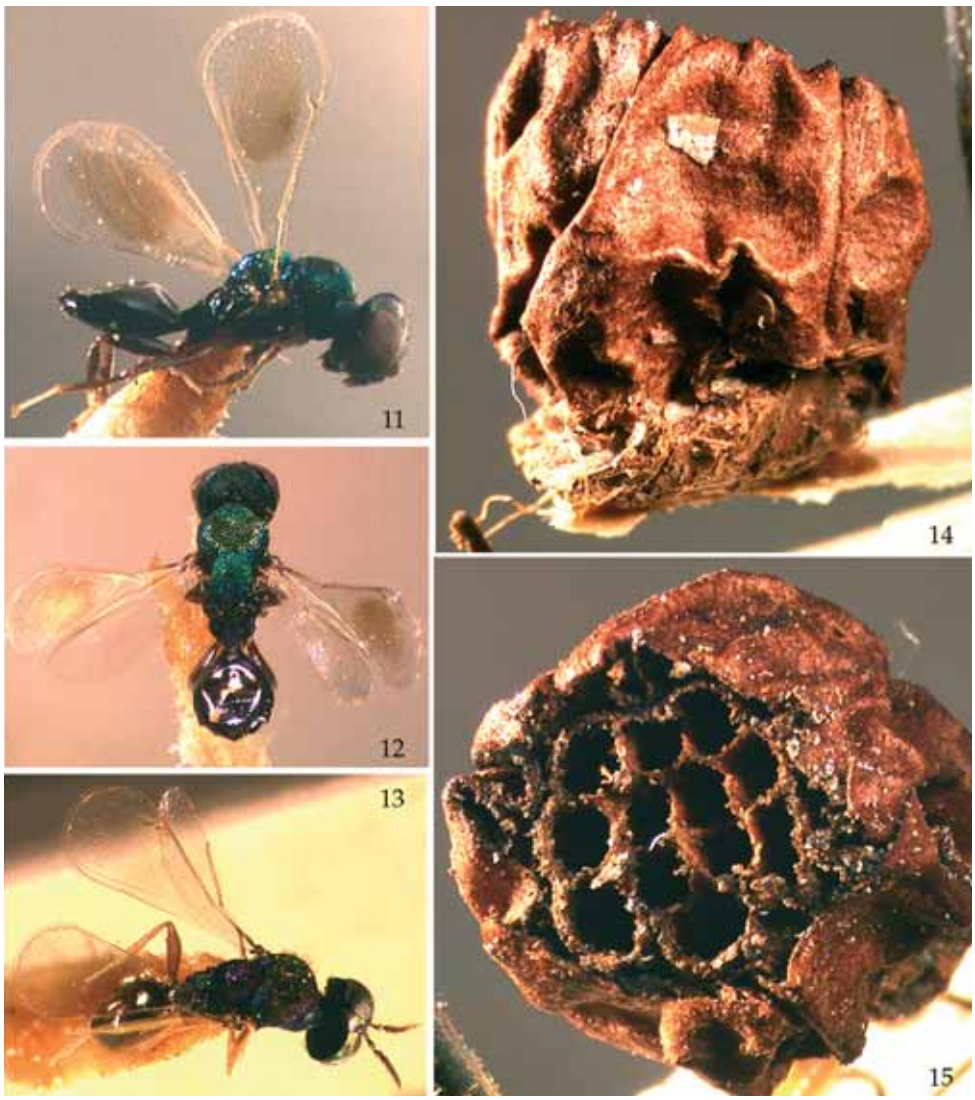
Hakuna matata Gumovsky & Bouček, spec. nov.
(figs 9-13, 16-23)

Material.— Holotype, ♀, "**Uganda**: Kawanda, vii.1939, reared from a gall (H.C. Taylor) (BMNH). Paratypes: 7 ♀♀, 1 ♂.

Female (figs 9-12, 16-19, 22).— Length 2.5 mm. Body mostly dark green, darker on face, propodeum and petiole; metasoma dark, fore and mid coxae pale, hindcoxa dark with weak copper-violet tint; trochanters pale, femora and tibiae brown, hind and mid tarsi pale with pretarsi darker, fore tarsi pale brown; antennae brownish, pedicel pale in its distal 2/3. Forewing with broad discal cloud in middle; venation pale brown to pale.

Head.— Antennae inserted at distance subequal to 1/4 of eye height above lower eye margin. Combined length of pedicel and flagellum about half of head breadth. Scape slightly more than 6 times longer than broad; pedicel twice longer than broad. Funicle two-segmented: F1 1.4 times as long as broad, F2 subquadrate; clava 3-segmented, slightly more than twice as long as broad. Head in dorsal view (fig. 17) 1.36 times as broad as long, vertex almost smooth, with wide temples, distinctly margined occiput and medially impressed frons with distinct interantennal projection. Ocelli large, posterior ocellus 3 times closer to eye margin than to occipital carina (OCL:OOL in ratio 12:4). Occipital margin (figs 9, 16, 17, 19) sharp, forming a raised crest. Head in frontal view (fig. 22) somewhat broader than high. Eye very large (figs 16, 17, 22), with short sparse setae; its height about 25 times longer than the malar space, which is rather narrow; malar groove present as short, weakly impressed line. Oral fossa about 12 times as long as malar space. Lower margin of clypeus produced; tentorial pits distinct.

Mesosoma.— 1.7-1.8 times as long as broad, most of its surface convex; mesoscutum about 1.3 times as broad as long (in dorsal view); scutellum 1.2 times as long as broad. Axillae very finely reticulate, strongly advanced, with one seta. Axillulae vertical,



Figs 11-15, *Hakuna matata* gen. nov. & spec. nov., ♀, but 13 of ♂. 11, dorsal habitus; 12, lateral habitus; 13, dorso-lateral habitus; 14, host gall laterally; 15, host gall from above.

▶

Figs 16-21, *Hakuna matata* gen. nov. & spec. nov., ♀, 16-19, 22, ♀; 20, 21, 23: ♂. 16, head laterally and anterior part of mesosoma; 17, head dorsally and anterior part of mesosoma; 18, body in lateral view; 19, anterior part of mesosoma and occiput; 20, head and anterior part of mesosoma in lateral view; 21, head in dorsal view; 22, 23, face.

with one or two vertical rugae. Propodeum as described for the genus (fig. 10). Propodeal callus bearing one seta; another seta placed in adspiracular groove laterad to spiracular elevation, which delimited by the pliciform border and bearing a short very sharp spine below. Spur of mid tibia 1.6 times as long as breadth of tibia, spur of hind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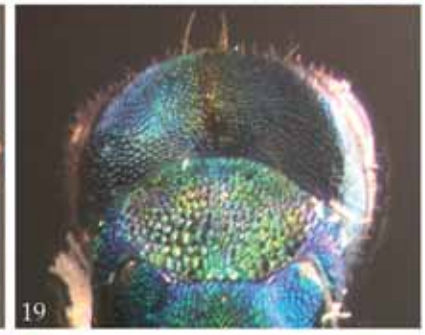
17


18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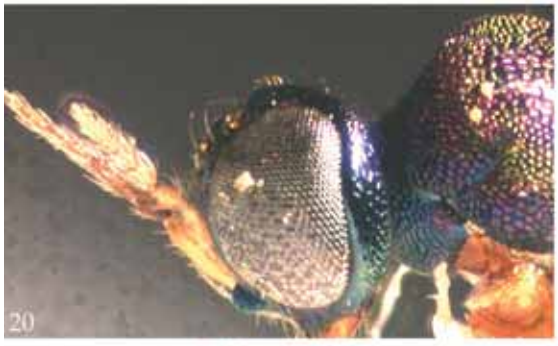
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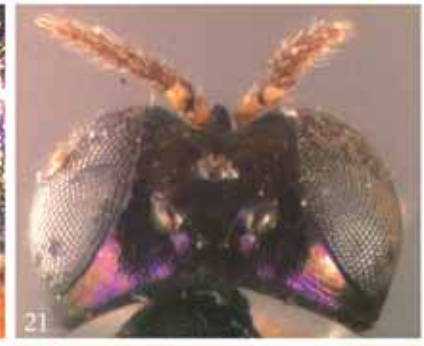
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tibia as long as breadth of tibia, spur of fore tibia hardly visible. Fore wing about twice as long as broad, costal cell bare, narrow, about 16 times as long as broad; subcosta of submarginal vein with 3 setae at its dorsal surface before the "break" where it meets parastigma; marginal vein almost twice longer than costal cell, postmarginal vein and stigmal vein subequal in length; intercubital hair row consisting of 4 setae, speculum open below; fringe of apical margin about twice as long as the breadth of the marginal vein in its mid part, and about as long as marginal vein in its basal part.

Metasoma.— Petiole robust, 1.2 times as long as broad, as long as the propodeum in middle, with broad coarsely reticulate "sloping roof" forming a collar, anterior margin of which touching posterior margin of propodeum (fig. 10). Gaster about 1.3 times as long as broad, ovipositor reaching along major part of it.

Male (figs 13, 20, 21, 23).— Similar to female except: body color mainly violet, scape paler, pedicel pale, with dark stripe on its ventral margin, flagellum paler than in the female (very pale brown), legs pale except for the fore and mid coxae, which are dark basally; intertorular peak protuberant forward as a blunt flattened crest. Antennal scape 5, pedicel 1.6, F1 1.6, F2 1.75 times as long as broad, clava (including long terminal spine) 5.75 times as long as broad; combined length of pedicel and flagellum (including long terminal spine) almost 0.7 of head breadth. Metasomal petiole 1.64 times as long as broad, gaster 1.7 times as long as broad.

Biology.— Probably parasitic, reared from conical galls on a forest plant. Each gall contained several pupae (figs 14, 15) in separate cells; adults emerged through a single hole at the apex of the gall (from the collector's notes).

Distribution.— Uganda.

Etymology.— The specific name is a noun perpetuating the generic name into the mentioned above catchword ("Hakuna matata").

Genus *Trisecodes* Delvare & LaSalle, 2000

Trisecodes Delvare & LaSalle, 2000: 305.

Type species (by original designation): *Trisecodes agromyzae* Delvare & LaSalle, 2000.

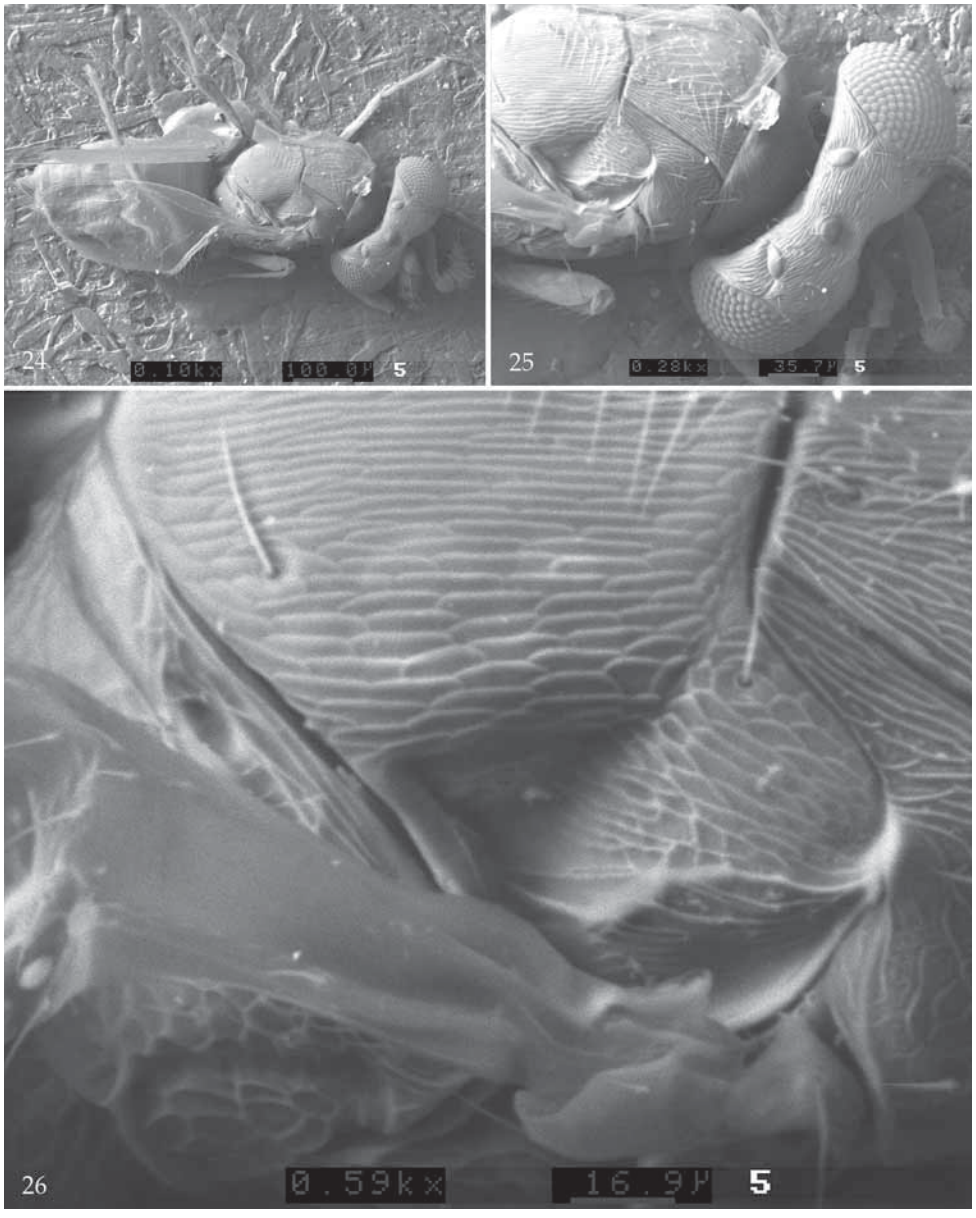
The genus *Trisecodes* was recently described by Delvare & LaSalle (2000) for a single species *T. agromyzae* reared from larvae of agromyzid leaf-miners (Diptera) in the Neotropics. This genus is rather unique within Entedoninae in having three-segmented tarsi (previously known for Trichogrammatidae and some Agaonidae). Our study of the BMNH collection has led to the discovery of apparently new congeneric species (figs 24-26) from Africa (Cameroon). Discovery of this new species expands the distribution area of this genus and is a contribution to the present knowledge of possible associations of the Neotropical and Palaeotropical faunas.

Diagnosis.— Tarsi 3-segmented (unique within Entedoninae), notauli complete, impressed; subtorular grooves present, diverging downwards.

Additional characters.— Frontal groove angulate, V-shaped, placed far below median ocellus, scrobal grooves disconnected from each other, fore wing with characteristic pattern of hairlines originating from stigmal vein and bare areas above them (Delvare and LaSalle, 2000).

Biology.— The type species of this genus is recorded as a larval parasitoid of agromyzid flies on various host plants.

Distribution.— Neotropics (Belize, Costa Rica and Guadeloupe): Delvare & LaSalle (2000) and Afrotropics (Cameroon, new record).



Figs 24-26, *Trisecodes* spec., ♀. 24, habitus; 25, head and anterior part of mesosoma; 26, sculpture of mesosoma.

Trisecodes spec.
(figs 24-26)

Material.— 1 ♀, "**Cameroon**: Nkoemvone, 30.iii-19.iv.1980, Ms. D. Jackson" (BMNH).

Comparative notes.— This species is very similar to the type-species of the genus, *T. agromyzae*, but differs in having the dorsal mesosoma strigate (alveolate in *T. agromyzae*), and the mesoscutum and scutellum without median grooves (these grooves are present in *T. agromyzae*), figs 25, 26. We postpone the naming of this species until more specimens are available.

Female.— Body brown, only two first tarsi of all legs pale. Mesosoma with longitudinal strigation, notauli complete, impressed; mesoscutum 1.43 times as broad as long; scutellum slightly longer than wide; mesoscutum and scutellum flat medially, without any depressions; propodeum rather finely reticulate, axillulae with reduced projections, not so acute as in *T. agromyzae*. Metasoma with reduced transverse petiole, gaster 1.7 times as long as broad.

Male.— Unknown.

Distribution.— Cameroon.

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