

# *Alvamaja chlorometallica* gen. n., sp. n. from Europe – the first metallic Rhinophoridae (Diptera)

Knut Rognes

*Alvamaja chlorometallica* gen. n., sp. n. is described from the southern part of Serbia. It has a perplexing combination of characters for an oestroid fly: green metallic body colour with silvery pollinosity; absence of swollen subscutellum; a small metathoracic spiracle without lappets, latter represented by small anterior and posterior fringes; prealar seta long and strong, close to suture and longer than any of the notopleural setae; postalar wall with 1–3 setae; an elongate lower calypter, with an inner edge diverging from the long axis of the fly and bare on upper surface; cell  $r_{4+5}$  of wing stalked, stalk moderately long; bend of vein M angulated with a small appendix, and the second costal sector bare below. Its systematic position among the oestroid flies is discussed. A phylogenetic analysis performed with NONA suggests that it belongs in the Rhinophoridae. A new genus is created for it since it does not fit into any of the currently recognised genera of Rhinophoridae.

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## Introduction

In June 2008 Liekele Sijstermans of the Zoological Museum in Amsterdam sent me photographs of a metallic green calypterate fly he had found in the collections and could not identify with the aid of existing literature. Subsequent examination of the specimens made me believe that they belonged to a new species in the family Rhinophoridae. In view of the fact that they represented the first metallic rhinophorid fly ever known, and that they did not accommodate easily into any of the accepted rhinophorid genera in other features, it seemed justified to assign the material to a new genus. The purpose of the present paper is to describe and diagnose the new genus and species, and to discuss and establish its systematic position.

## Material and methods

### Depositories

OUMNH Oxford University Museum of Natural History, Hope Entomological Collections, Oxford, United Kingdom.

ZMAN Zoölogisch Museum, Universiteit van Amsterdam, Amsterdam, Netherlands.

### Abbreviations

acr – acrostichal setae; dc – dorsocentral setae; h – humeral setae; ia – intra-alar setae; keptst – katepisternal setae; npl – notopleural setae; ph – posthumeral setae; pra – prealar seta; sa – supra-alar setae; ad – anterodorsal; av – anteroventral; d – dorsal; p – posterior; pd – posterodorsal; pv – posteroventral; v – ventral; ST – abdominal sternites; T – abdominal tergites.

**Table 1.** Characters of *Alvamaja chlorometallica* gen. n., sp. n. added to the matrix of Pape & Arnaud (2001: Table 2, p. 293). Character numbers and states are explained in that paper and in Rognes (1997).

Taxon	1	1111111112	222222223	333333334	444444445	5555555
	1234567890	1234567890	1234567890	1234567890	1234567890	12345678
<i>Alvamaja</i>	0101110010	0002030011	1101001101	0001??????	??????????	?????000

### Terminology

Morphological terms follow Rognes (1991), except for terms regarding costal chaetotaxy which follow Hackman & Väisänen (1985).

### Photography

Photographic methods as described in Rognes (2009).

### Phylogenetic analysis

The data matrix of Pape & Arnaud (2001) was supplemented by the data for the new species described here (Table 1) and analysed with the parsimony program NONA (Goloboff 1993). All characters were treated as unordered and only unambiguous support for clades was considered (option amb-). The command sequence was hold 15 000; mult\* 100; max\*; Two trees were obtained each of 191 steps (not counting the internal steps within the polymorphic terminals), the strict consensus of which is shown in Fig. 17. The support of the clades (Bremer support) was calculated in NONA (hold 15 000; bsupport 5;) and the support values entered in Fig. 17. Trees were output and printed through WinClada (Nixon 2002) and printouts photographed for further treatment in Photoshop Elements.

The data file *alvamaja.ss* containing the data matrix and the character and state names can be downloaded from <http://home.gethome.no/~akrognes/PublicationsInZoology.htm> or as supplementary material to this paper on the journal's website.

### Family Rhinophoridae Robineau-Desvoidy

#### Genus *Alvamaja* gen. n.

Type species: *Alvamaja chlorometallica* sp. n.

#### Etymology

The name of the new genus is a feminine noun formed in honour of my two granddaughters Alva and Maja.

#### Diagnosis

See diagnosis of the type species, below.

The genus *Alvamaja* gen. n. has only a single species, *Alvamaja chlorometallica* sp. n., known only from the male sex.

#### Distribution

Europe (Serbia).

#### *Alvamaja chlorometallica* sp. n.

Figs 1–16.

**Type material. Holotype:** ♂, Serbia, Vranjska Banja (42°33' N, 22°00' E) [co-ordinates obtained from Google Earth], 13.vi.1963 (C.A.W. Jeekel) (dissected; dissected parts in glycerol in vial on pin; abdominal T1–4 glued to carton on pin, T5 lost; right hind leg glued to carton, right hind tarsus lost; three distal tarsomeres of right middle tarsus lost).

**Paratypes.** 2 ♂, same data as holotype, labelled as paratype 1 and paratype 2. All types have identical original labels which are shown as insets on Fig. 1. All material is in ZMAN.

#### Etymology

The specific epithet *chlorometallica* is a latinized word to be treated as an adjective in the nominative singular, and is derived from *chloros* (Greek, meaning green) and *metallum* (Latin, meaning metal), referring to the shining green metallic body colour.

#### Diagnosis

*Alvamaja chlorometallica* sp. n. is recognisable on the following combination of characters which is unique among oestroid flies: Ground colour black; thorax and abdomen green metallic with silvery pollinosity; head with genal dilation 0.2× eye height; eye large, oval in outline; frons much longer than face; vibrissal angle behind a vertical line through lunula; vibrissa level with lower eye margin; a typical rhinophorid metathoracic spiracle, small and without lappets, latter represented by small anterior and posterior fringes; prealar seta long and strong, close to suture and longer than any of the notopleural setae; postalar wall with 1–3 short setae; an elongate lower calypter, with an inner edge diverging from the long axis of the fly and bare on upper surface; cell  $r_{4+5}$

of wing stalked, stalk moderately long; bend of vein M angulated with a small appendix; second costal sector bare below; hind tibia with strong *ad*, *d* and *pd* preapicals, an apical *pv* seta present. Aedeagus with stout, pointed paraphallic processes with tips free from aedeagal wall; no mesophypophallic mid-ventral sclerotisation, but strongly sclerotised bands along each side of distiphallus mimic a midventral mesohypophallic rod in profile view. Membrane of distiphallus denticulate.

### Description

**Male.** Length: 8 mm ( $n=3$ ). All setae black, even those on lower occiput.

**Head.** As shown in Figs 1–5. Frons width at narrowest part / head width ratio (0.054–0.066,  $n=3$ ) (Figs 2–3). Ground colour black, dense white microtomentum on fronto-orbital and parafacial plates, less dense on facial plate. Frontal vitta dark brown, with longitudinal wrinkles. Frontal vitta not quite obliterated at narrowest part of frons. Genal dilation appearing shining black from some angles of view, with a very thin layer of shifting white microtomentum appearing under other angles. Occiput with thin layer of microtomentum. In upper half of occiput behind posterior eye margin a broad transverse band as wide (high) as longest postocular cilia and appearing shining black under some angles. Fronto-orbital plate with 11–15 strong frontal setae reaching posteriorly to narrowest part of frons. Anterior-most frontal seta at level with upper end of pedicel in profile view. No row of small setulae outside row of frontal setae, except for 1–3 small ones close to foremost two frontal setae, one of these setulae situated slightly below anterior-most frontal seta on one side of head in all specimens. Ocellar triangle with a strong pair of ocellar setae between anterior and posterior ocelli, three further pairs of setae behind it, gradually diminishing in length. A short pair of setae in front of main ocellar pair, latter longer than longest frontal seta. A pair of long inner vertical setae, about as long as main ocellar setae. No outer vertical setae differentiated. Postocular row of setae with alternating long and short setae, the short ones are about  $\frac{2}{3}$   $\times$  length of the long ones. Parafacial bare, in broadest aspect  $1.5 \times$  wider than first flagellomere. Lunula bare, with a thin layer of microtomentum. Facial plate, with no keel, sloping slightly forwards in lower third. Lower facial margin just visible in profile view of head and ending slightly below level of large vibrissa. Vibrissal corner not prominent and vibrissa inserted at level of lowermost end of eye. Vibrissal corner and anterior part of gena with numerous strong setae apart from the main vibrissa. Subvibrissal, parastomal and genal setae numerous

and long. Supravibrissal setae ascending at most to lowermost fourth of facial ridge, some quite strong. Genal dilation prominent, with long setae. Height of gena  $0.2 \times$  height of eye in exact profile view of head. Occiput with short black setae only, also present on shining upper area. Antenna short, black. First flagellomere slightly longer than pedicel. Tip of antenna separated from lower facial margin by a distance as long as first flagellomere. Arista plumose with long cilia in a single row both above and below, except above near base, where the row of cilia seems to be double for a short distance; arista stalk slightly swollen in basal half, distal half of swollen part whitish, mostly so in lateral view (Fig. 4). Minute setulae present on sides of stalk at base. Pedicel with 1–2 long setae, numerous shorter setae around it. Scapes almost touching in midline. Palpus black, almost filiform, but very slightly thickened in apical half, slightly longer than antenna, with numerous black setae in distal half, longest setae  $0.4 \times$  length of palpus. Proboscis elongate, labella conspicuous, prementum slender, subshining (Fig. 5).

**Thorax.** Ground colour black with green metallic coating. Dorsum of thorax with thin layer of microtomentum in a shifting pattern according to angle of view. Seen obliquely from a posterodorsal angle there are two broad, densely dusted white stripes in front of suture filling the space between *acr* and *dc* rows of setae. These bands fuse into a single broad band at the level of the anterior-most *acr* pair of setae. Between the *acr* rows of setae the thorax appears undusted in this view. The dusted bands are thinning out postsuturally, but inspected from behind under a very low angle they can be seen to reach back almost to the scutellum. White microtomentum present on humeral callus and base and sides of scutellum. Ground setulae scarce but erect and sometimes difficult to distinguish from small exemplars of main setae. Main setae strong. Humeral callus with 3 *h* setae, in a curve or on a slightly angulated line. Notopleuron bare (paratype 1) or with 1–2 setulae in addition to the main *npl* setae. In the latter case one setula in front of anterior-most *npl* (on left side only, in holotype), the other setula between the two *npl* setae (both sides, holotype and paratype 2). Front *npl* seta  $1.5 \times$  longer than hind *npl* seta. 2 (3) + 3 *acr*. The second presutural pair is the strongest of the presutural *acr* setae; this second pair is far in front of suture and on a level midway between the two strong pairs of presutural *dc* setae. In paratype 2 there is a supplemental third pair of presutural *acr* setae just in front of suture, this *acr* pair is weak and only slightly stronger than the ground setulae. The posterior-most postsutural pair is the strongest of the postsutural *acr* setae. 4 (5) + 4 *dc*. The two

anterior pairs of presutural *dc* setae much stronger than the ground setulae, but much shorter than the next two presutural pairs of *dc*. The posteriormost postsutural pair is the strongest of the postsutural *dc* setae. On the left side of the holotype is a supplementary fifth presutural *dc* just in front of the suture and behind the strongest presutural *dc*. 1 + 2 (3) *ia*. The anterior strong postsutural *ia* is closer to suture than to the second postsutural *ia* (both paratypes), or equidistant from both (holotype). Midway between the suture and the first postsutural *ia* and slightly mediad of the latter is a short supplementary seta (stronger than the ground setulae) that might be interpreted as the true first postsutural *ia*. 1 inner *pb*, no outer. Some strong ground setulae in this region may masquerade as an outer *pb*, but this is not constant among the specimens available. 3 strong *sa* of which the first—the *pra*—is very strong, almost  $1.5\times$  longer than hindmost *npl* seta. The second is stronger again,  $1.5\times$  longer than the *pra*; while the third is the shortest of the three, about  $\frac{2}{3}\times$  length of the *pra*. Scutellum shorter than wide, with strong apical and lateral marginal setae. The tip of the apical reaches posteriorly much further than the tip of the lateral seta. The distance between the bases of the apicals is slightly less than the distance between the bases of the apical and the lateral. The latter distance is much larger than distance between lateral seta and base of scutellum. Anterior to the lateral is a short basal seta. Disc of scutellum covered with semi-erect ground setulae, which become almost erect at the anterior part. Toward apex there is a stronger pair of discal setae,  $0.3\times$  as long as apical setae. Scutellum laterally covered with same type of semi-erect ground setulae as on the disc, and these partly invade the ventral surface of scutellum. No ground setulae present between the bases of the apical setae and no ground setulae invade the underside of the scutellar apex. No swollen or protruding subscutellum. Postalar wall with 1–3 setae in middle, of varying size (Fig. 6). Thorax laterally with thin layer of white microtomentum on all sclerites. One strong upturned proepisternal and one proepimeral seta present, each accompanied by a much smaller supplementary seta just below each of them and curving in the same direction. Proepisternal depression bare. Anterior spiracle small with dark brown fringes. Anepisternum with 6–8 anepisternal setae in a full row, in uppermost part close to anterior *npl* seta a small bundle of strong setae, the strongest  $0.6\times$  as long as the anterior *npl* seta. Disc of anepisternum covered with erect ground setulae in upper posterior half, lower anterior half bare (to accommodate the fore femur). Anepimeron bare in anterior half; posterior half below lesser ampulla with a bundle of 4–5

short setae of which 2–3 are markedly stronger than the others, behind and below this bundle are some slender black setulae. Katatergite bare. Anatergite with a few small black setulae ventral to base of lower calypter. Katepisternum with long ground setulae and 2+1 *kepst*. In the lower part there are rows of long, strong setae in front of mid coxa. Meron with a vertical row of 6–7 strong meral setae. Katepimeron bare. Coxopleural streak present, reaching almost all the way to katepisternum. Metathoracic spiracle without lappets, only anterior and posterior fringes present, both brown (Fig. 7). Metakatepisternum (area dorsad of hind coxa) bare. Metasternal area (anterior to hind coxae) bare. Prosternum bare.

**Wing.** As in Fig. 1. Yellowish brown membrane, darkening somewhat towards costal margin. Veins yellowish brown. Basicosta brown, tegula dark brown. Subcosta slightly sinuous with an inconspicuous, forward bend at middle. Cell  $r_{4+5}$  stalked; stalk slightly shorter than crossvein *r-m*. Bend of vein M angulated with a small appendix,  $1.5\times$  longer than width of a vein. Distal section of vein M (posterior crossvein) slightly sinuous. Crossvein *dm-cu* much closer to bend of vein M than to crossvein *r-m*. Anal vein not reaching margin. Stem-vein bare on both surfaces of wing. Subcostal sclerite yellow, bare, only pale microtomentum present. Costal spine strong. Costa bare ventrally beyond junction with subcosta, thus second costal sector bare ventrally. Costal spinules end distally at basal fourth or fifth of costal sector 4. Node at junction of  $R_{2+3}$  and  $R_{4+5}$  with 2–3 small setulae ventrally and 2–5 setulae dorsally, one setula occasionally invading  $R_{4+5}$ . Upper calypter yellow, lower calypter yellowish brown with a paler central area, bare. Lower calypter tongue-like and rather long,  $2.5\times$  longer than upper calypter, inner edge diverging from long axis of fly; bare on both surfaces. Halter with yellow stalk and yellowish brown head.

**Legs.** All black with black setae. Hind coxa bare on posterior surface. Femora with a very slight trace of metallic lustre, but no green shine. No *pv* ctenidium on mid femur, setae in this position long and thin. Tibial setae long. Tarsi as long as tibiae, except on fore leg, where the tarsus is longer than the tibia. Claws about as long as last tarsomere, except on the fore leg, where the claws are slightly longer. Fore tibial shaft with 4 *ad*, 1 *p* (at about basal third in holotype and paratype 1; a little further distad in paratype 2) and 1 *pv* seta, latter situated between middle and distal third. Holotype with an additional small *pd* seta at level of the *pv* seta on the right side. There are also preapical *ad*, *d* (both strong and about the same size), *pd* (weaker than the *p* preapical), *p* (half the length of the *d* preapical) and *pv* (about the same size as the

*pd*, weaker than the *p* preapical) setae, and an almost *v* apical seta about as strong as and of the same size as the *d* preapical seta. Mid tibia on shaft with 3 *ad*, 1–2 *pd*, 2 *p* and 1 *v* seta. Hind tibia on shaft with 4 main *ad* setae (plus 2 small erect *ad* below the largest, and 2–3 additional small *ad* interspersed between the main *ad* setae), 2–3 *pd* setae (longest at middle of tibia, a few smaller interspersed); 1 strong *av* seta (at distal third); 1 *ad*, 1 *d*, 1 *pd* strong preapical setae of about the same length; 1 small seta between the *d* and *pd* preapical; 1 *av* and 1 *pv* apical seta of the same size, both less than half the length of the *d* preapical seta; 1–3 small setae interspersed between the *ad* preapical and the *av* apical seta. Hind basitarsus with a small *v* seta near base.

**Abdomen.** As in Fig. 1. Rather narrow, gradually tapering backwards. Metallic green with even, non-tessellating microtomentum that in posterodorsal view appears thin middorsally but stronger laterally and anteriorly on each segment. Segments of about the same length. Ground setulae decumbent at middle and semi-decumbent or erect laterally on each segment. T1+2 with small excavation, its posterior end widely separated from hind margin of the segment. No median marginal setae. A couple of strong lateral marginals. 3–4 discal marginals on each side. T3 with a pair of close median marginals and 2–3 lateral marginals on each side, a gap present between the median and lateral marginal groups. 1–2 lateral discals on each side. T4 with a full marginal row of about 12 setae, and a few lateral discals on each side. On paratype 1 and 2 a single middorsal discal seta present just in front of the T4 median pair of marginals (Fig. 1), latter displaced a small distance in front of the other marginals. T5 with full marginal row of setae, the median pair of setae displaced a little forwards; a few discals present laterally and medially. T6 present, and together with the epandrium, hidden beneath the posterior margin of T5. ST2–5 all with alpha-setae at anterior margin. ST1 setose. ST2–4 broadly exposed but overlapped slightly by T margins. Sternites metallic green, setulose and with strong setae along lateral margins. ST5 with long lateral flaps with long setae and a long basal piece.

**Genitalia.** Cerci triangular and acutely pointed, medial cleft longer than basal junction between the two parts (Fig. 8). Cleft widening toward apex. Surstylus connected to neighbouring sclerites by membrane, shorter than cerci, parallel-sided, broad, evenly rounded at apex (Figs 9, 10). A small medially directed projection at inner lower side of surstylus, mediad to junction with bacilliform sclerite (Fig. 10). Bacilliform sclerites simple rods. Hypandrium a hollow, bowl-shaped, oval structure (Fig. 16, partly destroyed by my dissecting forceps). Pregon-

ite triangular with 4–6 setae along posterior margin (Fig. 16, setae lost, sockets visible). Postgonite narrow and long, slightly expanded at curving tip, with a strong basal seta (Fig. 16), a small apodeme present at base (“Gelenkfortsatz” of Tschorsnig [1985]). Phallapodeme strongly sclerotised, broader in dorsal than in lateral view, with a low keel ventrally; distally with an upturned collar-like edge (Fig. 16). Ejaculatory sclerite a small simple rod, slightly longer than half the length of the postgonite. Epiphallus triangular, straight, blunt-tipped and weakly sclerotised, and joined to basiphallus in its basal half. Distiphallus (Figs 11–15) with ventral plate sclerotised into a complete ring. Paraphallus divided from level of distal edge of ventral plate into two separate, strong, and broad parallel-sided paraphallic processes, each ending in a pointed process on the side of the acrophallus. The tip of the process is free (i.e., not fused to aedeagal wall). Between and beyond the paraphallic processes the distiphallus is shaped like a laterally compressed oval tube. The tube has sharp upper and lower edges, which protrude above and below the paraphallic processes (Figs 13–15). The distiphallic tube has a strong hypophallic sclerotisation on each side some distance above the ventral edge of the tube. The two hypophallic sclerotisations appear as a single piece in lateral view (Fig. 15), but in dorsal or ventral views they are easily seen to be a double structure (Figs 11–13), especially towards their base where they diverge conspicuously from each other. They are not joined to the basal ring of the distiphallus. There is no midventral mesohypophallic sclerotisation. The distiphallic membrane is covered with denticles pointing towards the base. Distiphallus distally with the aedeagal wall weakly sclerotised all around (Fig. 14). The hypophallic sclerotisations end well behind the ejaculatory opening. The latter is as wide as distal part of distiphallic tube, slightly flaring (difficult to observe).

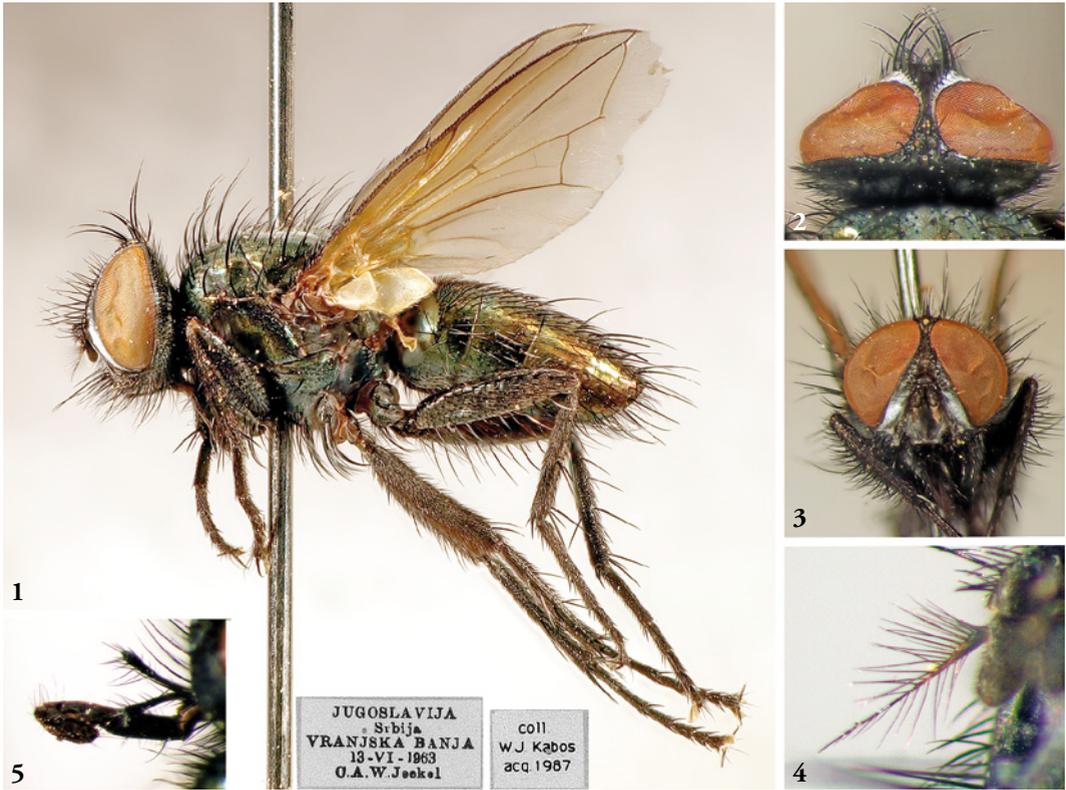
**Female.** Unknown.

**Biology.** Unknown.

## Discussion

The species described above shows a perplexing combination of characters, and although the presence of strong meral setae in a vertical row leaves no doubt about its position in the Oestroidea (= Tachinidae family group = Calliphoroidea) it is not at all obvious where in this enormous assembly of species it should be placed.

The lack of a swollen postscutellum and the presence of paraphallic processes with a free tip rule out the Tachinidae as a likely family in which to classify



**Figs 1–5.** *Alvamaja chlorometallica* gen. n., sp. n. – 1, habitus and original labels, paratype 1; 2, dorsal view of head, paratype 1; 3, anterior view of head, paratype 1; 4, arista of right antenna in medial view, paratype 1; 5, proboscis and palpi, holotype.

the new fly. The paraphallic processes with a free tip, presence of alpha-setae on abdominal sternites, position of ST2 relative to T1+2 and presence of rod-like bacilliform processes also rule out the Sarcophagidae (Pape 1992). Oestridae (s. lat.) can also be left out of consideration because *A. chlorometallica* has non-reduced mouth-parts and a normal body vestiture. The Calliphoridae (incl. Rhiniinae) and Rhinophoridae remain to be discussed.

#### A calliphorid?

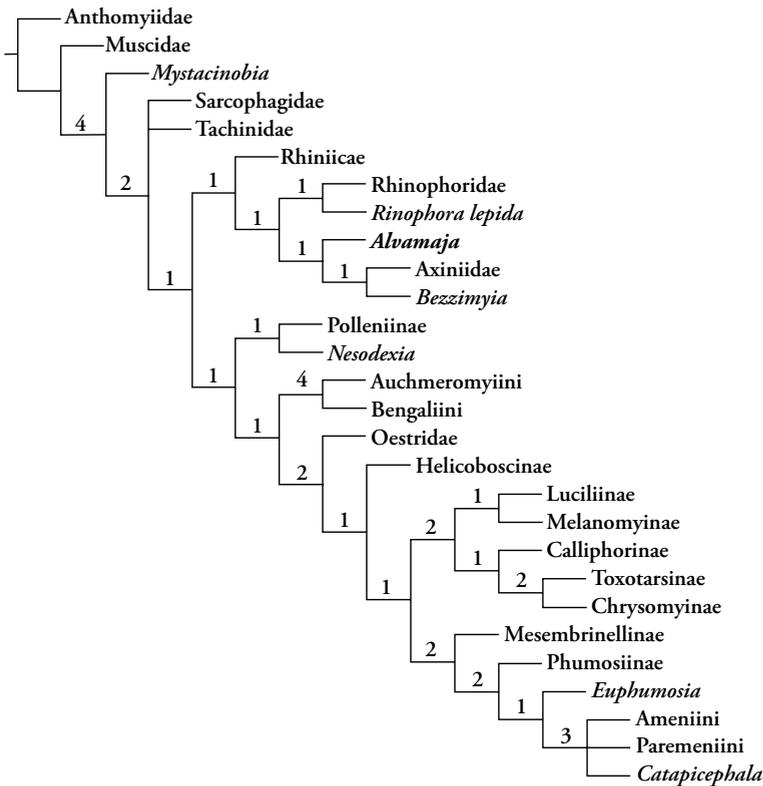
Its green metallic colour might suggest that the new species belongs in the Calliphoridae, which have many metallic members. But since Calliphoridae most likely are not a monophyletic group, i.e. no synapomorphies are known which unite all its constituent subfamilies to the exclusion of other groups (Rognes 1997), it does not make sense to argue whether it is or is not a calliphorid. It makes sense, however, to argue for an inclusion in or exclusion from any of the constituent subfamilies of the “Calliphoridae” all of which seem to be monophyletic,

i.e., on the basis of synapomorphic agreement with one or another of these groups.

Several of the “calliphorid” subfamilies can with some confidence be ruled out because of a lack of synapomorphic agreement: Aphyssurinae (Norris 1999) because *A. chlorometallica* has a bare prosternum and lacks a median subapical downturned spine (or spike; Norris uses both terms) on posterior margin of ST5; Ameniinae, because *A. chlorometallica* lacks setae on the anterior (non-existent) lappet of the metathoracic spiracle; Bengaliinae (s.lat.) (Rognes 1997, node 26) because *A. chlorometallica* has a vein M with an angular bend, an anal vein that does not reach the wing margin, a black ground colour, and a coxopleural streak. Phumosiinae because *A. chlorometallica* lacks long upstanding hairs on the katatergite; Mesembrinellinae because *A. chlorometallica* has a vein M with an angular bend and has a totally different metathoracic spiracle; Helicoboscinae, because *A. chlorometallica* has bare prosternum, proepisternal depression and metasternal area, a metathoracic spiracle without lappets, alpha-setae



**Figs 6–16.** *Alvamaja chlorometallica* gen. n., sp. n. – 6, postalar wall, holotype; 7, metathoracic spiracle, katepimeron and upper end of meron, paratype 1; 8, cerci, dorsal (posterior) view, holotype; 9, epandrium, cerci, surstylus and bacilliform sclerite, left lateral view, holotype; 10, right surstylus and cerci, oblique internal view, holotype; 11, distiphallus, dorsal view, holotype; 12, distiphallus, ventral view, holotype; 13, distiphallus, oblique dorsolateral view from right side, holotype; 14, same, but with different focus; 15, distiphallus, left lateral view, holotype; 16, hypandrium, ejaculatory apodeme, pregonite (setae lost), postgonite and basiphallus, left lateral view, holotype. Abbreviations: *l.cal.* = lower calypter; *scu.* = scutellum.



**Fig 17.** Strict consensus tree of the two most parsimonious trees found in NONA. Numbers above branches are Bremer supports. Output from WinClada.

on the abdominal sternites, and a 2+1 pattern of katepisternal setae; Chrysomyinae, Toxotarsinae, Rhiniinae because *A. chlorometallica* has a bare stem vein on the upper side of the wing; Calliphorinae, because *A. chlorometallica* has a lower calypter with a bare surface; Melanomyiinae because *A. chlorometallica* has a distiphallus with denticles and no lappets on the metathoracic spiracle; and Luciliinae because *A. chlorometallica* lacks a green metallic setose sclerite on the posterior part of the suprasquamal ridge. This leaves only Polleniinae to be considered in more detail.

Rognes (1991) listed a number of ground plan apomorphies for Polleniinae. A few will be discussed here. The new species agrees with Polleniinae in having the thoracic surfaces bare except the postalar wall, and some New Zealand *Pollenia* have a blue or green metallic abdomen (Dear 1985). But in Polleniinae the postalar wall is carrying numerous setae, not just 1–3. Furthermore, in Polleniinae most of the distiphallus is unarmed, i.e. without denticles, and the condition with denticles found in *A. chlorometallica* is most likely a primitive one (plesiomorphy at this level). However, the polleniine

genus *Morinia* Robineau-Desvoidy shares a lot of features with *A. chlorometallica*, such as a bare parafacial, lack of an outer *ph* seta, two marginal scutellar setae, and the presence of strong *ad*, *d*, and *pd* preapical setae on the hind tibia. However, *Morinia* has no *pv* apical seta on the hind tibia, the metathoracic spiracle has (unequal) lappets, and the node at the base of  $R_{4+5}$  is bare. For these reasons I do not accept an assignment in *Morinia*.

#### A rhinophorid?

Pape & Arnaud (2001: 291–292) listed ten autapomorphies for the Rhinophoridae (in the new, broadened sense, inclusive of axiniids and *Bezzimyia* Townsend) of which six were drawn from immature stages (eggs, larvae) and one from the female ovipositor. In view of the absence of knowledge of females and immatures of *A. chlorometallica* this leaves only three characters relevant to this discussion.

“Adult with subscutellum weakly convex. [NB. Groundplan ambiguous due to basal trichotomy.]” (Pape & Arnaud 2001: 291).

This refers to character and state 18:1 in Rognes (1997), the source for this character in Pape & Arnaud (2001). In *A. chlorometallica* I can find no weakly convex subscutellum, rather the subscutellum is shaped as in most “calliphorids”, thus should be coded as “normal” (i.e., with character state 18: 0). The basal trichotomy involves the composite group [(Axiniidae+*Bezzimyia*) + *Rhinophora lepida* + other Rhinophoridae (as “Rhinophoridae” on the cladograms)] (Pape & Arnaud 2001: 293, 294 fig. 12). The ambiguity (either 18:0 or 18:1) is due to the fact that both its sister-group, Rhiniinae, and Axiniidae have a “normal” subscutellum (18:0), whereas both *Bezzimyia*, other Rhinophoridae (“Rhinophoridae” in their fig. 12) and *Rhinophora lepida* (Meigen) have a weakly convex one (18:1). Because of the ambiguous nature of the ground plan state of the composite group the normal subscutellum in *A. chlorometallica* cannot be used as an argument against an inclusion among Rhinophoridae.

“Metathoracic spiracle with both anterior and posterior lappets small” (Pape & Arnaud 2001: 294).

This is the ‘cardinal’ character used to define Rhinophoridae since the family was discussed in depth by Crosskey (1977). The genera *Angioneura* Brauer & Bergenstamm, *Melanomya* Rondani and *Morinia* were included in the Rhinophoridae by Crosskey, but were subsequently removed from the group in part because they do not have this type of metathoracic spiracle (Pape 1986, 1992, 1998; Rognes 1986, 1991). This synapomorphic agreement is an argument in favour of treating *A. chlorometallica* as a rhinophorid.

“Abdominal ST2 contiguous with T2” (Pape & Arnaud 2001: 294).

This is character 22 of Pape (1992) repeated *in toto* by Rognes (1997, character 21 “ST2 – degree of exposition”) and *A. chlorometallica* agrees exactly with the coding 22:1 of Pape (1992) (coding 21:1 in Rognes 1997). This synapomorphic agreement is an additional argument for inclusion in Rhinophoridae. I therefore propose that *Alvamaja chlorometallica* be classified in that family.

A metallic body has never been recorded in Rhinophoridae (Pape 1998). Considering its occurrence in Tachinidae, although rare, and even in the Sarcophagidae (e.g. *Chlorosarcophaga* Townsend, cf. Lopes 1986), it is *a priori* not unreasonable to expect that metallic members might be found in the Rhinophoridae too. Similarly, the presence of setae on the postalar wall has never been associated with the

Rhinophoridae. But in view of the fact that the genus *Baniassa* Kugler contains species with an operculate metathoracic spiracle (Kugler 1978; Pape 1998), another apparent break with the usual concept of Rhinophoridae, one should not let the metallic colour and presence of a few setae on the postalar wall stand in the way of a classification with that family.

In order to examine more closely the hypothesis that it belongs in the Rhinophoridae a phylogenetic analysis was performed. Pertinent data on the new species (Table 1, as *Alvamaja*) was entered in the data matrix of Pape & Arnaud (2001) and analysed with NONA. Two trees were found, both with 191 steps (internal steps in polymorphic terminals not counted), differing only in the internal arrangement of the (Ameniini + Parameniini + *Catapicephala* Macquart) node (Fig. 17). In both trees *A. chlorometallica* (as *Alvamaja*) grouped with (Axiniidae + *Bezzimyia*) within the Rhinophoridae (s.lat.) clade, and there was no basal ambiguity involving character 18 (cf. discussion above). Even though the Bremer support was equal to 1, thus quite low, it seems justified to regard *A. chlorometallica* as a rhinophorid species on the basis of present knowledge. No further conclusions should be drawn from this analysis.

### What genus?

The problem of generic assignment remains. In Herting’s (1961) key to the Palaearctic species *A. chlorometallica* runs directly to *Phyto* Robineau-Desvoidy. In Crosskey’s (1977) key to the Afrotropical species *A. chlorometallica* runs to couplet 6 on account of a strong *pra* seta and other features, and here keys to *Phyto* because of the black ground colour. In Pape’s (1998) key to the Palaearctic genera it runs to couplet 9, but does not fit any of the alternatives. The first part of couplet 9 leads to *Phyto*, which is keyed to have (1) lunula setose, (2) parafacial setose at level of first flagellomere, and (3) ventral sclerotisation of the distiphallus separated from ventral plates. Neither item 1 nor 2 fit with *A. chlorometallica*. Item 3 apparently fits, but close examination of the distiphallus in ventral view has revealed that *A. chlorometallica* does not have a midventral sclerotisation, and thus does not match the condition in *Phyto* judging from the illustrations of the aedeagus of *Phyto* by Tschorsnig (1985), and Pape (1986, 1987, 1997). I have dissected a male *Phyto discrepans* Pandellé (in OUMNH), and it definitely has a midventral mesohypophallic sclerotisation, although in this species confluent with the ventral plate, which seems not usually to be the case in *Phyto* spp. In addition it has a peculiar and very complex acrophallus,

especially as seen in dorsal view, very dissimilar to the simple, tube-like acrophallus present in *A. chlorometallica* (Figs 13, 14). The structure in *A. chlorometallica* that in lateral view mimics a mesohypophallus ("medianfortsatz des Ventralsklerits" of Tschorsnig [1985]) and which basally is separated from the ring-like ventral plate is a double structure. It consists of two strong sclerotisations of the lateral wall, and not a midventral single sclerotisation.

The long ciliate arista of *A. chlorometallica* seems also to speak against an assignment with *Phyto*. The arista figured by Crosskey (1977) and Pape (1987, 1997, 1998) for this genus is short plumose or almost bare, and in those which are plumose the cilia are much shorter and neither as regular nor arranged in one plane as in *A. chlorometallica*.

The second alternative of couplet 9 leads to *Rhinomorinia sarcophagina* (Schiner), which is keyed to have (1) lunula bare, (2) parafacial bare at level of flagellomere 1 (but setose higher up according to the figure referred to in the key), and (3) ventral sclerotisation extending proximally to ventral plates. Only item 1 fits *A. chlorometallica*, which I consider insufficient for inclusion in *Rhinomorinia* Brauer & Bergenstamm.

In view of its green metallic body colour, characteristic head profile, bare and narrow parafacial, narrow genal dilation, shining upper occiput, long ciliate arista, postalar wall with 1–3 short setae, petiolate cell  $r_{4+5}$  in wing, angulated bend of vein M with an appendix, and double hypophallic sclerotisations of the distiphallus, I find it justified to establish a new genus for *chlorometallica*, here named *Alvamaja* gen. n.

### Key to identification

In Pape's (1998) key to the Palaearctic genera of Rhinophoridae, *Alvamaja chlorometallica* will run to couplet 8 (p. 687). At that point the key can be modified as follows to incorporate the new genus:

- 8 Anterior postsutural supra-alar seta (pre-alar bristle) as large as or larger than notopleural bristles ..... 9a
- Anterior postsutural supra-alar seta absent or much weaker than notopleural bristles ..... 10
- 9a Body colour green metallic; postalar wall with 1–3 small setae at middle ..... *Alvamaja* (*A. chlorometallica* sp. n. only), Europe
- Body colour non-metallic; postalar wall bare .. 9
- 9 (leading to *Phyto* and *Rhinomorinia*, unmodified)

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### References

- Crosskey, R.W., 1977. A review of the Rhinophoridae (Diptera) and a revision of the Afrotropical species. – Bulletin of the British Museum (Natural History). Entomology Series 36: 1–66.
- Dear, J.P., 1985. Calliphoridae (Insecta: Diptera). – Fauna of New Zealand 8: 1–86.
- Goloboff, P.A., 1993. NONA. Version 2.0 (for Windows). Published by the author, Tucumán, Argentina. Available from <http://cladistics.com/> (visited on: 1 December 2009).
- Hackman, W. & Väisänen, R., 1985. The evolution and phylogenetic significance of the costal chaetotaxy in the Diptera. – Annales zoologici Fennici 22:169–203.
- Herting, B., 1961. Rhinophorinae. – In: E. Lindner (Ed.), Die Fliegen der Palaearktischen Region, Lieferung 216: 1–36. E. Schweizerbart'sche Verlagsbuchhandlung, Nägele u. Obermiller.
- Kugler, J., 1978. The Rhinophoridae of Israel. – Israel Journal of Entomology 12: 65–106.
- Lopes, H. de Souza, 1986. On *Chlorosarcophaga* (Diptera, Sarcophagidae), with descriptions of three new species collected in Yungas province. – Revista Brasileira de Biologia 46: 89–97.
- Nixon, K.C., 2002. WinClada. Version 1.00.08. – Published by the author, Ithaca, NY, USA. Available from <http://cladistics.com> (visited on: 1 December 2009).
- Norris, K.R. 1999. Establishment of a subfamily Aphyssurinae for the Australian genus *Aphyssura* Hardy (Diptera: Calliphoridae), with a review of known forms and descriptions of new species. – Invertebrate Taxonomy 13: 511–628.
- Pape, T., 1986. A phylogenetic analysis of the Woodlouse-flies (Diptera, Rhinophoridae). – Tijdschrift voor Entomologie 129: 15–34.
- Pape, T., 1987. A new Afrotropical species of *Phyto* Robineau-Desvoidy (Diptera: Rhinophoridae). – Journal of the Entomological Society of Southern Africa 50: 375–381.
- Pape, T., 1992. Phylogeny of the Tachinidae family-group (Diptera: Calyptratae). – Tijdschrift voor Entomologie 135: 43–86.

- Pape, T., 1997. Two new species of the *Phyto carinata* species-group (Diptera: Rhinophoridae). – *Annals of the Natal Museum* 38: 159–168.
- Pape, T., 1998. Family Rhinophoridae. – In: L. Papp & B. Darvas (Eds.), *Contributions to a Manual of Palearctic Diptera*. Vol. 3 Higher Brachycera: 679–689. Science Herald, Budapest.
- Pape, T. & Arnaud, P.J. jr., 2001. *Bezzimyia* – a genus of native New World Rhinophoridae (Insecta, Diptera). – *Zoologica Scripta* 30: 257–297.
- Rognes, K., 1986. The systematic position of the genus *Helicobosca* Bezzi with a discussion of the monophyly of the calyptrate families Calliphoridae, Rhinophoridae, Sarcophagidae and Tachinidae (Diptera). – *Entomologica scandinavica* 17: 75–92.
- Rognes, K., 1991. Blowflies (Diptera, Calliphoridae) of Fennoscandia and Denmark. *Fauna entomologica Scandinavica*, 24, 1–272.
- Rognes, K., 1997. The Calliphoridae (Blowflies) (Diptera: Oestroidea) are not a monophyletic group. – *Cladistics* 13: 27–66.
- Rognes, K., 2009. Revision of the Oriental species of the *Bengalia peubi* species-group (Diptera, Calliphoridae). – *Zootaxa* 2251: 1–76. [Open access, available at <http://www.mapress.com/zootaxa/list/2009/zt02251.html>]
- Tschorsnig, H.-P., 1985. Die Struktur des männlichen Postabdomens der Rhinophoridae (Diptera). – *Stuttgarter Beiträge zur Naturkunde, Serie A (Biologie)* 375: 1–18.

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## Book reviews

Tristan Lafranchis, translated by Albert Vliegenthart, Jaap Bouwman & Mathilde Groenendijk, 2009. **Dagvlinders van Europa, veldgids dagvlinders met determinatiesleutels** [originally *Papillons d'Europe*]. – KNNV publishers, ISBN 978 90 5011 302 1, softcover, 400 pp. Price € 39.95 (excl. p&t) [www.knnvuitgeverij.nl](http://www.knnvuitgeverij.nl)

This is essentially the Dutch translation of the well known field guide by Tristan Lafranchis, earlier published in French and English. The present translation not only gives the original keys in Dutch, but also adds new appendices on the butterflies of the Macaronesian islands and Cyprus. For these islands photographs and short diagnoses are provided, plus a checklist, but no keys. This is a welcome addition for these popular islands.

The keys are easy to use, amply illustrated with photos of live specimens and details, and also with sketch maps of the distribution area. In general this will help to identify the majority of European butterflies, assuming one has been able to observe and/or photograph all the necessary details. On the basis of observations, identifications of several species groups in lycaenids, skippers, fritillaries or browns will still be a challenge. In the end of the book, the author provides some sketches of genitalia parts that ought to be visible with a hand lens in life specimens. I wonder, however, if someone not familiar with the morphology of these structures will be able to really correctly recognise the differences. These sketches certainly will be useful for those who have studied the genitalia of dead specimens before. The author is making a case (“a wish from the author”) for studying butterflies by photographs alone and avoid killing for collection purposes. Although I applaud the interest for live insects and increase of publication of photographs of life specimens, making a strong contradiction between the damage done by collecting versus photographing is in my opinion false. All activities to study insects damage the environment to some extent, and someone trampling the vegetation (including its invertebrates) for a unique shot may in fact do more damage than another person taking a specimen with a quick sweep of the net. In general entomologists contribute hardly to the damage of the environment by their field activities compared to the real damaging factors: urbanisation, deforestation, acidification and many other human activities. Every serious entomologist should contribute to his or her best abilities, whether by photographing

or collecting, and fight for the protection of nature rather than fighting each other. The author claims that we need especially research on habits and biology, but that is a personal view, and I would like to add that we still also need well collected specimens for studying relationships, morphology and geographic patterns (e.g. phylogeography). For DNA studies collections are now becoming increasingly important. For more considerations on this topic I refer to the earlier review of the English edition by Tarmann (2009, *Nota Lepidopterologica* 32: 11), whose opinions I share.

The translators did a good job; furthermore they wanted to bring the nomenclature up-to-date and in line with modern checklists as *Fauna Europaea*. Unfortunately the author did not agree to that, so that the nomenclature used (as in the other editions) deviates from that in several other recent texts. Luckily, a list of names proposed for *Fauna Europaea* is added by the translators. Unfortunately the book was just a bit too early, and a few of these names have been changed before the latest version of this database (2.1) went online, see [www.faunaeur.org](http://www.faunaeur.org) for the latest nomenclature.

One point that I cannot find useful is inventing Dutch vernacular names for all European butterflies that do not occur in The Netherlands or Belgium. In fact the index for hostplants only uses the Dutch names, making it almost useless for experienced readers, who know the scientific names, but never have heard the Dutch names before. Butterfly enthusiasts should be able to communicate with those from other countries, and for these one definitely needs the scientific names. The book is an essential tool for all butterfly students and the Dutch edition is a welcome addition for the Dutch language community.

Erik J. van Nieukerken

Annette van Berkel, 2009. **Dagvlinders in Nederland en Vlaanderen** [Butterflies in the Netherlands and Flanders]. – DVD. KNNV publishers, ISBN 978 90 5011 315 1, in case. Price € 14.95 (excl. p&t) [www.knnvuitgeverij.nl](http://www.knnvuitgeverij.nl)

All entomologists know that the way the insects they study move about, and their habits are almost as characteristic as the morphological characters.

*continued on page 84*