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## First record of *Anodontoceras* (Diptera: Cecidomyiidae: Lestremiinae) from the Afrotropical Region, with a description of a new species

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### ABSTRACT

The genus *Anodontoceras* Yukawa is newly recorded from the Afrotropical Region and *Anodontoceras harrisi* sp. n. is described from South Africa. The new species is most closely related to *A. saigusai* Yukawa, which is of East Palaearctic/Oriental distribution. The female of *A. saigusai* is described for the first time. New data on the distribution of *A. saigusai* and *A. yukawai* Jaschhof in Japan are presented.

**KEY WORDS:** Diptera, Cecidomyiidae, Lestremiinae, *Anodontoceras*, new species, female, Afrotropics, Japan.

### INTRODUCTION

Wood midges (Lestremiinae), a subfamily of the gall midge family (Cecidomyiidae), are virtually unstudied in the Afrotropics. Harris (1980) listed six genera of Lestremiinae, to which Gagné (1995) added another genus. With the exception of *Tricampylomyza* Kieffer, 1919 all these genera have representatives in other biogeographic regions and each genus has only one known Afrotropical species. An enigmatic lestremiine described from Cameroon is *Tricampylomyza parvula* Kieffer, 1919, of which only the female was described. According to the description, it is clearly a species of the Micromyidi, but peculiar for its one-segmented maxillary palpi and tripartite eyes, which are apparently similar to those found in the genus *Campylomyza* Meigen, 1818. Confusingly, the antenna of *T. parvula* illustrated in Kieffer (1919, fig. 8) is very similar to that in male *Micromya*, which is a genus known to occur in the Afrotropics (Harris 1980). There are no doubt dozens of genera and hundreds of species of Lestremiinae to be found throughout Africa, so to deal with their taxonomy is a truly pioneering work on a large scale.

In 2005 we began to collect and study Lestremiinae in South Africa. Here we report on a first result of that study, the identification of *Anodontoceras harrisi* sp. n. This is the first record of the genus *Anodontoceras* Yukawa, 1967 in the Afrotropical Region and the third species of this small, distinctive genus. The other two species, *A. saigusai* Yukawa, 1967 and *A. yukawai* Jaschhof, 1998, are known from Japan and Malaysia (Yukawa 1967; Jaschhof 1998a, b). In this paper we describe the new species, discuss interspecific relationships, present new data on the distribution of the two previously known species and describe the female of *A. saigusai*.

The genus *Anodontoceras* belongs to the Micromyini, one of the three tribes which, to our present knowledge, exhibits quite a diversity of genera and species in South Africa. Other well-represented tribes are the Lestremiini and the Peromyiini, the latter with a single genus, *Peromyia* Kieffer, 1894 but with many species in South Africa. As regards previous knowledge of South African Lestremiinae, the occurrence of the genera *Micromya* Rondani, 1840 (in Micromyini, one unnamed species) and *Conarete* Pritchard,

1951 (in Lestremiini, one named species) is mentioned in the literature (Harris 1980; Gagné 1995). Consequently, our *Anodontoceras harrisi* is only the second species of Lestremiinae to be described from South Africa, and is a very remarkable one.

#### MATERIAL AND METHODS

The specimens studied were collected using standard entomological methods such as Malaise traps, sweepnets and aspirators. Specimens were stored in 70 % ethanol for almost two years, then treated briefly with an ethanol/formaldehyde mixture, transferred to beechwood creosote, and, after partial dissection under a stereo microscope, mounted on microscope slides in Canada balsam (Jaschhof & Jaschhof 2009). The holotype and some paratypes of the new species are deposited in the Natal Museum, Pietermaritzburg, South Africa. Some other paratypes of *A. harrisi* and the studied specimens of *A. saigusai* and *A. yukawai* are in the Jaschhof collection in the Senckenberg Deutsches Entomologisches Institut, Müncheberg, Germany. For light microscope study and the preparation of drawings we used an Olympus BX50 microscope in combination with the U-DA drawing unit. Usage of morphological terminology follows Jaschhof & Jaschhof (2009).

#### TAXONOMY

Genus *Anodontoceras* Yukawa, 1967

***Anodontoceras harrisi* sp. n.**

Figs 1, 2

**Etymology:** With this species name we honour Dr Keith M. Harris, Ripley, United Kingdom, a respected cecidomyiidologist who contributed more than anyone else in the second half of the 20<sup>th</sup> century to increasing our knowledge of Afrotropical Cecidomyiidae.

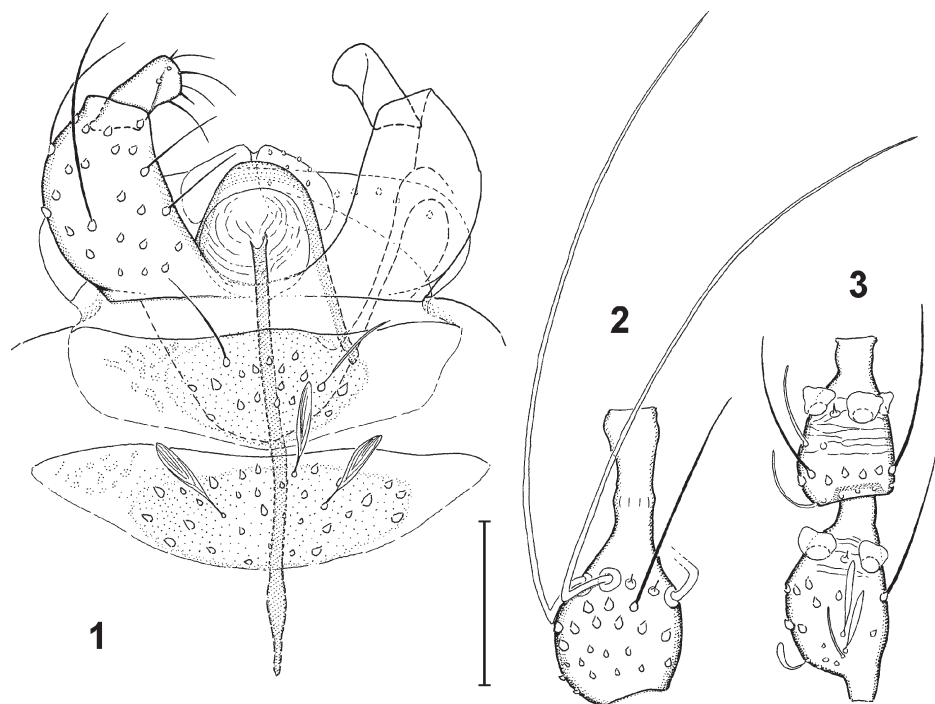
**Diagnosis:** Among Micromyini, *Anodontoceras* is peculiar for the antennal flagellomeres of males, which have almost globular nodes, very strong and long hair-shaped translucent sensilla, and lack crenulate whorls of sensory hairs (Fig. 2). The male gonocoxites lack a sclerotized ventrobasal bridge (Fig. 1), which is another character state unknown from any other Micromyini. A unique feature of *A. harrisi* is the extremely long ejaculatory apodeme that is more than twice as long as the tegmen and extends anteriorly to the sixth abdominal segment (Fig. 1). The apodeme has a large circular widening at its apex, which is more weakly sclerotized than the rod-like portion and is adorned with concentric circles, the latter possibly representing foldlines. The outline of the gonostyli, comma-shaped and lacking an apical spine (Fig. 1), is more simple than that in the congeners.

**Description:**

*Male.*

Body size 0.9–1.1 mm. Most of the body vestiture, including wings, is broad scales.

**Head:** Postfrons setose. Postocular bristles in 2 long rows. Eye bridge 3 ommatidia long. Neck of fourth antennal flagellomere longer than node; node with 1 incomplete double whorl of short sub-basal setae, 1 double whorl of long mesal setae and typically 4 distal hair-shaped translucent sensilla, latter characteristically flexed sub-basally and often more than twice as long as flagellomere body (Fig. 2). Apical flagellomere typically



Figs 1–3. Morphology of *Anodontoceras* spp.: (1) *A. harrisi* sp. n., holotype, male terminalia and abdominal sternites 7 and 8, ventral view; (2) *A. harrisi* sp. n., male paratype, fourth flagellomere in ventrolateral view; (3) *A. saigusai* Yukawa, first and second flagellomeres of female, lateral view, Okinawa, Japan. Scale bar = 0.05 mm.

with 2 very fine, evenly curved hair-shaped translucent sensilla. Maxillary palpus 3-segmented; first and second segments with hair-shaped translucent sensilla; third segment pointed, usually longest of all.

*Wing*: R1 2.5 times as long as Rs.

*Legs*: Pretarsal claws of mid leg with fine teeth at midlength, otherwise toothless. Empodia half as long as claws.

*Terminalia* (Fig. 1): Tergite 9 sclerotized throughout, i.e. also mesally. Ventrobasal bridge of gonocoxites membranous; dorsal transverse bridge extending far anteriorly. Gonostyli small, comma-shaped, with sparse setae including 2 or 3 short, thick setae near apex. Tegmen large, evenly tapered towards apex, broadly rounded apically. Ejaculatory apodeme unusually long, often twice as long as tegmen, extending far anteriorly into abdominal cavity, with large circular widening at apex. Sternite 10 (not pictured) two-lobed, large, weakly membranous, pubescent. Cerci two-lobed, large, with ventral and distal setae.

*Female and preimaginal stages*. Unknown.

*Holotype*: ♂ SOUTH AFRICA: *KwaZulu-Natal*: Royal Natal National Park, Gudu Forest, 28°40.9'S: 28°55.8'E, 1680–1730 m, mature indigenous forest, 28–29.xi.2005, aspirator, M. Jaschhof.

*Paratypes*: 4♂ same data as holotype; 3♂ same data but 29.xi.2005, sweepnet; 2♂ same data but 8.xii.2005; 4♂ same locality, 28.xi–13.xii.2005, Malaise trap, M. Mostovski, M. & C. Jaschhof; 2♂ Royal Natal National Park, Devil's Hoek valley, 28°42.7'S:28°55.3'E, 1650 m, indigenous forest, 11.xii.2005, sweepnet & aspirator,

M. Jaschhof; 1♂ Cathedral Peak Nat. Res., Rainbow Gorge, 28°57.6'S:29°13.6'E, 1500 m, mature indigenous forest, 4.xii.2005, sweepnet, M. Jaschhof.

Remarks on distribution: To our knowledge, the distribution of *Anodontoceras harrisi* is confined to the indigenous forests of the Drakensberg mountains. We have seen quite a number of Malaise samples from other parts of South Africa, but none of those contained specimens of *Anodontoceras*.

*Anodontoceras saigusai* Yukawa, 1967

Fig. 3

This species is known to occur in the Far East of Russia (Primorskiy Kray), in Japan (Kyushu) and Malaysia (Selangor Province on the Malay Peninsula) (Jaschhof 1998*a, b*). As shown here, *A. saigusai* is actually widely distributed across the Japanese archipelago, occurring from Hokkaido in the north to Iriomote, in the Ryukyu Islands, in the south. It is worth noting that this species copes with forest environments as different as cool temperate deciduous forest (Hokkaido, Honshu) and tropical rain forest (Malay Peninsula). A female that we captured by aspirator together with a conspecific male on Okinawa, Japan, is the first known example of a female *Anodontoceras* and is described below.

Description:

*Female.*

Body size 1.1 mm.

*Head:* Antenna broken, maximally 4 flagellomeres retained. Basal flagellomeres (Fig. 3) with barrel-shaped nodes and short stems, the latter inserted not centrally on node but shifted dorsally. Node wrinkled, with 1 basal whorl of short hair-shaped translucent sensilla, 1 sub-basal whorl of long setae, 1 mesoventral row of short hair-shaped translucent sensilla, and 4 large monoporous leaf-shaped translucent sensilla. Node of first flagellomere with basal scales and only single hair-shaped translucent sensilla (Fig. 3).

*Wing:* R1 barely 1.5 times as long as Rs.

*Abdomen:* Abdominal cavity filled with innumerable eggs of ordinary size and shape.

*Terminalia:* Telescopic, lacking any striking features. Basicercus and disticercus subequal in size. Spermathecae 2, comparatively large, sclerotized, disc-shaped, lacking light plaques.

Discussion: Characters of the female, in particular those of the antennae and spermathecae, support the classification of the genus *Anodontoceras* with the tribe Micromyini. A unique feature among female Lestremiinae is the flagellomere necks inserted more dorsally, not centrally, on the nodes, which is actually a character typical of lestremiine males (cf. Fig. 3). A wrinkled surface of the flagellomere node, as present in female *Anodontoceras*, is similarly found in female *Trichopteromyia* (also in Micromyini), but there are no other characters that would support a closer relationship of these two genera, so we think this must be due to convergence.

Material examined: JAPAN: 5♂ Hokkaido, Sapporo City, Toyohira, 29.vi–26.vii.1999, K. Fukuyama & M. & C. Jaschhof; 2♂ Hokkaido, Tomakomai City, Hokkaido University Experimental Forest, 30.vi–26.vii.1999, M. & C. Jaschhof; 5♂ Honshu, Iwate Pref., Tamayama Village, Koma, 26.v–15.vi.1999, T. Gotoh; 1♂ same

locality, 13.ix–12.x.1999; 3♂ Honshu, Aomori Pref., Towadako Town, Tsuta Onsen, 25.vi–28.vii.1999, M. & C. Jaschhof; 2♂ Honshu, Ibaraki Pref., Abukuma Highlands, Kitaibaraki City, Sadanami, Ogawa Research Forest, 6–20.viii.1996, K. Maeto; 1♂ same locality, 11.v–1.vi.1999, M. & C. Jaschhof; 2♂ Honshu, Kyoto Pref., Kyoto City, Kuta Research Forest, 22.ix–24.x.1999, M. & C. Jaschhof; 1♂ Kyushu, Miyazaki Pref., Aya Town, Aya Research Forest, 5–20.x.1999, M. & C. Jaschhof; 9♂ Okinawa Pref., Okinawa, Yambaru Peninsula, Yona Village, 17–21.iii.1999, M. & C. Jaschhof; 4♂ Yambaru Peninsula, Benoki Dam, 6–18.v.2000, M. & C. Jaschhof; 1♂ 1♀ same locality, 13.v.2000, M. Jaschhof; 3♂ Yambaru Peninsula, Mt. Nishimedake, 6–18.v.2000, M. & C. Jaschhof; 2♂ Okinawa Pref., Ryukyu Islands, Iriomote, Funaura, Mare R., 5–15.iii.1999, M. & C. Jaschhof.

### *Anodontoceras yukawai* Jaschhof, 1998

This species was described from specimens collected in Malaysia (Pahang and Selangor Provinces on the Malay Peninsula) (Jaschhof 1998*b*). Here we report the first records of *A. yukawai* from Japan, where we found it on the southern islands, such as Kyushu and Okinawa.

Material studied: JAPAN: 1♂ Kyushu, Miyazaki Pref., Aya Town, Aya Research Forest, 7.x.1999, M. Jaschhof; 4♂ Okinawa Pref., Okinawa, Yambaru Peninsula, Benoki Dam, 6–18.v.2000, M. & C. Jaschhof; 4♂ same peninsula, Mt Yonahadake, 6–18.v.2000; 6♂ same peninsula, Mt Nishimedake, 12–13.v.2000, M. Jaschhof.

#### INTRAGENERIC RELATIONSHIPS AND BIOGEOGRAPHIC TRAITS

*Anodontoceras harrisi* and *A. saigusai* appear to be sister species, which is supported by the following characters: the structure of the antennae is identical; the gonostyli lack an apical spine; and in the ejaculatory apodeme the rod is elongated and the apex is strongly widened. In *A. yukawai*, which is closely related to the two congeneric species: the hair-shaped translucent sensilla are shorter and inserted basally, not distally, on the flagellomere node; the gonostyli bear an apical spine; and both the rod and apex of the ejaculatory apodeme are unmodified.

The sister-species relationship between *A. harrisi* and *A. saigusai* is the first evidence of a close affinity between the Lestremiinae faunas of the Afrotropical and the Oriental Regions. In the Palaearctic Region, species of *Anodontoceras* are not known to occur west of the Russian Far East, which leads us to conclude that *Anodontoceras* is a primarily Oriental element. Coupled with the fact that Oriental Lestremiinae are largely unstudied (with the exception of those from a small part of the Malay Peninsula), we anticipate the discovery of more *Anodontoceras* species in the Oriental Region, e.g. in India. The distribution pattern exhibited by *Anodontoceras* is shared by other genera of the Micromyini, such as *Pseudoperomyia* Jaschhof & Hippa, 1999 and several new genera awaiting description (Jaschhof unpubl.). It will be interesting to discover whether these genera occur in the Afrotropics as well.

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