

## SYSTEMATICS, MORPHOLOGY AND PHYSIOLOGY

A New Species of *Hyperomyzus* (*Neonasonovia*) (Hemiptera: Aphididae) from Jamaica

TANNICE A HALL, ERIC GARRAWAY

Dept. of Life Sciences, Univ. of the West Indies, Mona Campus, Kingston 7, Jamaica;  
 tannice.hall02@uwimona.edu.jm; eric.garraway@uwimona.edu.jm

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Una Nueva Especie de *Hyperomyzus* (*Neonasonovia*) (Hemiptera: Aphididae) de Jamaica

RESUMEN - Esta descripción está basada en ejemplares ápteros colectados en Jamaica sobre *Eupatorium* sp. (Asteraceae). Se proveen fotografías e ilustraciones de la nueva especie. La nueva especie es comparada con una especie no descrita de Costa Rica. Se diferencia de *Hyperomyzus* (*Neonasonovia*) *nigra* (Baker) por tener siphunculi más estrechos, pocas rhinarias secundarias y el rostro más alargado.

PALABRAS CLAVES: Áfido, pulgon, *Eupatorium*

ABSTRACT - *Hyperomyzus* (*Neonasonovia*) *pullatus* Hall & Garraway sp. n (Hemiptera: Aphididae) is described based on apterous specimens collected from *Eupatorium* sp., (Asteraceae) in Jamaica. Photos and illustrations are provided. It is compared with an undescribed species from Costa Rica. It is distinguished from *Hyperomyzus* (*Neonasonovia*) *nigra* (Baker) by having narrower siphunculi, less secondary rhinaria and a longer rostrum.

KEY WORDS: Aphid, *Eupatorium*

Previous taxonomic studies of Jamaican aphids are limited. Smith & Cermeli (1979) listed 15 species from the island. McDonald *et al* (2003) reported 30 species based on samples collected by trapping in St. Catherine Parish, but the complement of aphid species present on the island and their plant hosts were not known. Until recently, there has been no comprehensive domestic collection of Jamaican aphid species. A collection of aphids caught by aerial trapping by the Jamaica Coconut Industry Board in its effort to determine the agents responsible for lethal yellowing disease in the 1970s were lodged in The Natural History Museum, London. There are also few other specimens that were sent to London and other museums for identification.

A survey of the aphids of Jamaica was conducted between 2000 and 2004. Apterous viviparous forms of a black aphid were collected in the Blue Mountains, in January 2003 and they were subsequently determined as a new species. In this paper, apterous viviparous *Hyperomyzus* (*Neonasonovia*) *pullatus* Hall & Garraway sp. n. from Jamaica is described and illustrated. The species is compared with unnamed specimens from Costa Rica collected by Jon Martin in 1983, other species of *Hyperomyzus* in Jamaica, and *Hyperomyzus* (*Neonasonovia*) *nigra* (Baker) (not known from Jamaica).

### Material and Methods

Aphids were collected from plants in a variety of locations across Jamaica. Trips were made to various habitats and biogeographic zones and aphids were collected wherever they were observed. The areas included forests, scrublands, beaches, riverbanks, roadside wastelands, farms, nurseries, and gardens. Six hundred and twenty three collections were made from 126 sites. All specimens were preserved in 80% ethanol.

Specimens were prepared for light microscopy using the method developed by Blackman & Eastop (1994). A Leitz Vario Orthomat Dialux 20 microscope with phase contrast and fitted with an ocular micrometer was used to examine the specimens. Photographs of specimens on slides were taken using a Wild Photomakroskop M 400 microscope on Kodakcolour 100. Morphological features were illustrated with the aid of a Bausch & Lomb inverted microscope.

The aphids were identified mainly by the use of keys. The sources used included Blackman & Eastop (1994, 2000), Brown (1989), Carvalho *et al* (1998), Costa *et al* (1993), Eastop (1966), Foottit & Richards (1993), Gualtieri & McLeod (1994), Halbert *et al* (2000), Heie (1980), Holman (1974), Holman *et al* (1991), Hille Ris Lambers (1974), Jensen (1997), Martin (1983), Olive (1965a,b), Remaudière

& Remaudière (1997), Richards (1965, 1972), Robinson (1977, 1980, 1985, 1986), Russell (1996), Smith *et al* (1971) and Stoetzel *et al* (1996). Comparisons were also made with specimens from the Natural History Museum, London.

**Measurement of quantitative characters.** Hair, siphunculi, cauda and segments of appendages were measured from base to tip. The antenna was measured from basal joint of segment 1 to the apex of the last segment. The terminal process was measured from apex of primary rhinarium to apex of the last antennal segment and from base of the last antennal segment to apex of the primary rhinarium. Segments IV + V of the rostrum were measured from the base of segment IV to the tip of segment V. The body length was taken from the antennal tubercles to the end of segment VIII of abdomen.

## Results

**Material examined.** Five specimens from the trail to the Blue Mountain Peak, St. Andrew Parish, Jamaica, collected on January 23, 2003. Three specimens from Chirripó National Park in Cerro, Costa Rica, collected on February 11, 1983 by Jon Martin. Measurements were obtained from one additional specimen. Two specimens from Chirripó National Park in Cerro, Costa Rica on February 13, 1983 by Jon Martin. Five specimens of *H. (N.) nigra* from Mexico in 1964 and 1980.

Each specimen was slide-mounted on an individual slide. Specimens from Costa Rica and Mexico were borrowed from the Natural History Museum, London.

**Type material.** HOLOTYPE: One apterous viviparæ; No. 5 from a single slide with five specimens collected at the Blue Mountain Peak Trail, Jamaica at approximately 2000 m a.s.l., on a trail between Portland Gap and Blue Mountain Peak. Collected on January 23, 2003 on *Eupatorium* sp. by T A Hall. Body length: 1.4 mm.

PARATYPES: Four apterous viviparæ on a single slide

(No. 1-4) with the holotype (No. 5) from Blue Mountain Peak Trail, Jamaica. Collected on January 23, 2003 on *Eupatorium* sp. by T A Hall.

Types are deposited in the Natural History Museum, London.

## Morphological Description of Apterous Viviparæ

**Body.** Almost entirely sclerotised, dark; oval shaped; black in life (Fig 1; Table 1).

**Head.** Dark, smooth; antennal tubercles smooth, shallow, diverging; lateral region of antennal tubercle rough, with two hairs; median tubercle present with two hairs; antenna longer than body, with short blunt hairs; segment III of antenna (Fig 2a) with secondary rhinaria almost in a row, other segments without secondary rhinaria; terminal process of last antennal segment 4.3- 5.7 times longer than the base; segments I and II dark, rest of antenna dusky; rostrum reaching 3<sup>rd</sup> thoracic segment, with longer hairs towards the base, segments IV+V (Fig 2b) narrow, pointed, 1.57- 1.71 times segment II of hind tarsus.

**Thorax.** Dark bands on segments II and III, band on segment III fused with those on abdomen; hind coxa and trochanter dark like body, femur and tibia dusky but darker toward their apices; hairs on femur dark, ventral ones longest; segment II of hind tarsi dark with two hairs dorsally and a row of hairs ventrally.

**Abdomen.** Dark, except for segment VIII (segments I-VII fused dark); post-siphuncular region of segments VI and VII with dark, spinulose patch; spiracular openings round, gapping; wax plates in marginal and pleural regions of segments; hairs short, pointed, inconspicuous; siphunculi long (Fig 2c), dusky, smooth, clavate, narrowest length at  $\frac{1}{3}$  from the base, widest point approximately  $\frac{2}{3}$  distance from base and with annular incision just below well developed flange; cauda pale (Fig 2d), constricted, approximately  $\frac{1}{2}$  to  $\frac{2}{3}$  siphuncular length; genital plate dark with hairs; anal plate dark.



Fig 1 *Hyperomyzus* (*Neonasonovia*) *pullatus* n.sp.

Table 1 Measurements of specimens of *Hyperomyzus (Neonasonovia) pullatus* n.sp. (lengths in mm).

Character	Range	Average	Holotype
Length of body	1.36-1.61	1.45	1.58
Antenna (entire)	1.61-1.70	1.64	1.61
Antenna segment I	0.08-0.08	0.08	0.08
Antenna segment II	0.06-0.07	0.07	0.07
Antenna segment III	0.42-0.44	0.43	0.42
Antenna segment IV	0.24-0.29	0.26	0.25
Antenna segment V	0.20-0.23	0.22	0.22
Antenna segment VI base	0.08-0.11	0.10	0.08
Antenna segment VI terminal process	0.48-0.49	0.49	0.48
Rostrum segments IV+V	0.13-0.14	0.14	0.14
Siphunculi length	0.32-0.35	0.33	0.35
Siphunculi maximum diameter	0.05-0.07	0.06	0.07
Siphunculi minimum diameter	0.04-0.05	0.04	0.05
Hind tarsus segment II	0.08	0.08	0.08
Cauda	0.19-0.21	0.20	0.20
No. secondary rhinaria, antenna segment III	10-13	11	10
No. secondary rhinaria, antenna segment IV	0	0	0
No. secondary rhinaria, antenna segment V	0	0	0
No. accessory rostral hairs	6-9	7	8
No. hairs on cauda	7	7	7
No. hairs on tarsi segment I	3,3,3	3,3,3	3,3,3

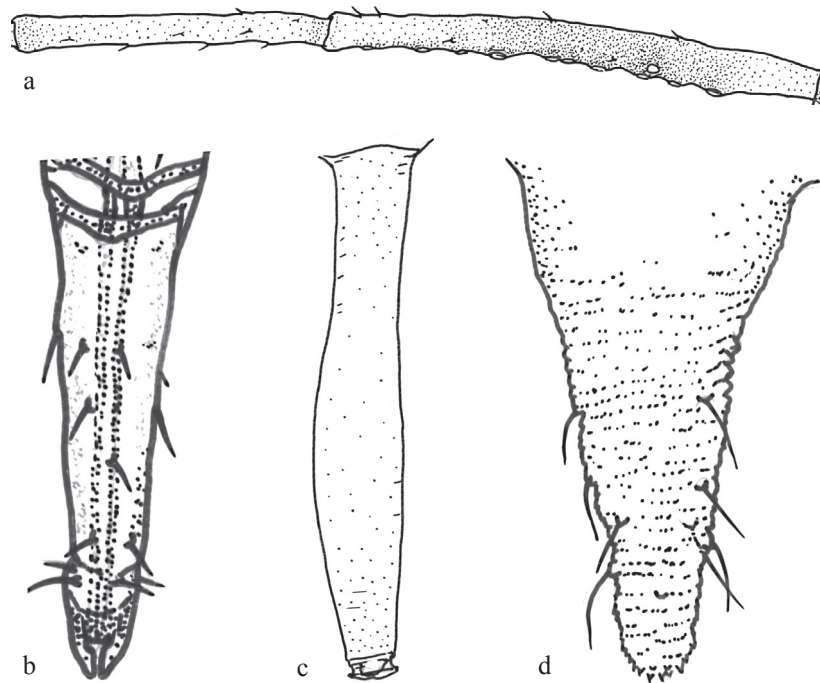
Fig 2 *Hyperomyzus (Neonasonovia) pullatus* n.sp. a) Antennal segments III & IV; b) Rostral segments IV+V; c) Siphunculus; d) Cauda.

Table 2 Comparison of *Hyperomyzus* (*Neonasonovia*) *pullatus* n.sp. with *H. (N.) nigra*.

Character	<i>H. (N.) pullatus</i>	<i>H. (N.) nigra</i>
Maximum diameter of siphunculi	0.05-0.07	0.10-0.11
Length of siphunculi	0.32-0.35	0.33-0.36
No. 2° rhinaria, segments III, IV of antenna	10-13, 0	16-26, 0-6
Length of segments IV+V of rostrum	0.13-0.14	0.09-0.13
Length of cauda	0.19-0.21	0.18-0.20
Length of body	1.36-1.61	1.31-1.55

**Life cycle.** most likely anholocyclic in Jamaica as are other species.

**Distribution.** JAMAICA: St. Andrew: five apterous viviparae, Blue Mountain Peak Trail, February 11, 1983.

**Diagnosis.** *Hyperomyzus (N.) pullatus* is similar in appearance to *H. (N.) nigra* (Baker) but can be distinguished by having narrower, paler siphunculi, less secondary rhinaria on segment II of antennae and none on segment IV, longer rostral apex (Table 2). *Hyperomyzus (N.) nigra* is not recorded from Jamaica.

*Hyperomyzus (N.) pullatus* can be differentiated from other *Hyperomyzus* species in Jamaica, *Hyperomyzus (Hyperomyzus) lactucae* (L.) and *H. (H.) carduelli* (Theobald) by its dark, sclerotised dorsum.

**Etymology.** Named *pullatus* (clothed in dark garment) because of its sclerotised, dark coloured body with paler appendages.

## Discussion

The genus *Hyperomyzus* Börner (Aphidinae: Macrosiphini) includes aphids that have a rounded head; smooth, diverging antennal tubercles with median tubercles; large central sclerotic and pigmented sclerite on the abdomen; swollen, un-reticulated siphunculi and a pale cauda (Hille Ris Lambers 1949). Apterous forms have secondary rhinaria on segment III (sometimes IV and V) of the antenna. Alate forms have secondary rhinaria on segments III, IV (and usually V) of the antenna and a more strongly developed sclerite on the abdomen.

*Neonasonovia* includes the species with three hairs on first tarsal segments, pigmented abdomen with the hairs on pale spots; roundish, wide open spiracles; swollen siphunculi with an annular incision immediately below the flange. They are also described as having dorsal hairs on segment III of antenna approximately as long as basal diameter of the segment and long stiff dorsal abdominal hairs. *Hyperomyzus (N.) pullatus* was placed in this subgenus although the hairs on antennal segment III and on the dorsum are not long; but, neither are the hairs of *H. (N.) nigra*, and there are other *Neonasonovia* species which are borderline for this

requirement (Hille Ris Lambers 1974). *Hyperomyzus (N.) pullatus* has other morphological features of *Hyperomyzus (Neonasonovia)*. The species from Costa Rica with which *H. (N.) pullatus* was compared are generally larger. Although there is an overlap in their body length, the Costa Rican specimens had longer antenna, siphunculi and cauda.

Species in the subgenus *Neonasonovia* utilize plants in the family Asteraceae as their only host or as secondary host. The Asteraceae is a cosmopolitan family with 950 genera and over 20,000 species worldwide. In Jamaica, there are 60 genera and the genus *Eupatorium* has 26 species, 15 of which are endemic (Adams 1972). The species from which *H. (N.) pullatus* was collected is still unidentified. The *Neonasonovia* are most likely of American origin, but their distribution also includes Europe (Blackman & Eastop 2000).

Only five specimens of *H. (N.) pullatus* were collected from a single site (2000 m altitude) on the slopes of the Blue Mountain Peak. The eastern part of Jamaica is mountainous and there are extensive areas (approximately 180 km<sup>2</sup>) over 1000 m altitude in the Blue and Port Royal Mountains (Tanner 1986) with the highest point, Blue Mountain Peak, reaching an altitude of 2256 m (Iremonger 2002). The bedrock is mostly composed of shale with a mixture of mudstones, sandstones, limestones and black shales (Iremonger 2002). In the Blue Mountains, the mean monthly temperatures under forest canopy at 1550 m altitude is 18.5- 20.5°C, absolute maxima 21.5-24.5°C and extreme minima 8.5-10°C (Tanner 1986).

The relative humidity is generally above 90% and there is very regular fog and cloud cover (Tanner 1986). The average annual rainfall is 2500 mm with a distinct dry season from January to April, and July. The impact of the dry season on the vegetation is reduced by the high humidity, but forest show seasonality in leaf production and leaf fall (Tanner 1986). A significant portion of the forest over 1000 m altitude is natural with the canopy reaching 5-7 m and has been the subject of extensive studies (Grubb & Tanner 1976, Tanner 1977, 1980, 1986). According to these authors the forest is diverse, 55 trees, four tree ferns, 42 shrubs and herbs, 10 climbers, 18 epiphytes and three hemiparasites. There is a relatively high level of endemism (41%) and many of these endemics are common.

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