

A new genus and species of gall midge (Diptera, Cecidomyiidae) associated with *Parkia pendula* (Fabaceae, Mimosoideae)

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ABSTRACT. A new genus and species of gall midge (Diptera, Cecidomyiidae) associated with *Parkia pendula* (Fabaceae, Mimosoideae). *Parkiamyia paraensis*, a new genus and species of Cecidomyiidae that induces galls on *Parkia pendula* is described (larva, pupa, male, female and gall) based on material from Pará (Brazil).

KEY WORDS. Cecidomyiidae; Diptera; gall; *Parkiamyia paraensis*; taxonomy.

RESUMO. Um novo gênero e espécie de mosquito galhador (Diptera: Cecidomyiidae) associado com *Parkia pendula* (Fabaceae, Mimosoideae). *Parkiamyia paraensis*, um novo gênero e espécie de Cecidomyiidae é descrita (larva, pupa, macho e fêmea) com base em material do Pará (Brasil).

PALAVRAS-CHAVE. Cecidomyiidae; Diptera; galha; *Parkiamyia paraensis*; taxonomia.

The need to develop programs for the propagation of wild native species for land rehabilitation in the tropics has encouraged the study of many plant species and indirectly augmented the knowledge on the associated herbivores that feed on such species. In various cases galling insects are the most common herbivores of such plant species [e.g., *Baccharis* (Asteraceae) Fernandes *et al.* (1996), *Bauhinia* (Leguminosae) (Cornelissen & Fernandes (2001)]. For instance, species of *Chlorophora* are severely impacted by galling psyllids of the genus *Phytolyma* (Homoptera: Psyllidae) in the forests of Ghana (Wagner *et al.* 1991). Perhaps another example in the tropical rain forest in the Amazon basin in Brazil is the key-stone species *Parkia pendula* (Willd.) Benth. ex Walp. (Fabaceae).

Parkia pendula is a common plant of the Amazonian rain forest. This species has been intensely propagated and used in a pioneer land rehabilitation program of the plateaus of Porto Trombetas, Pará State, north Brazil. A survey of insect galls on stands of planted native species and adjacent primary forest indicated the occurrence of large numbers of insect galls on the compound leaflets of *P. pendula*.

MATERIAL AND METHODS

Parkia pendula, popularly known as “fava-de-bolota”, occurs in the “terra firme” forest of the Amazonian rain forest, and in the Atlantic rain forest of Bahia and Espírito Santo states in Brazil. Individuals of *P. pendula* are evergreen, range from 20 to 30m in height, and flower from August to October. Inflorescences and fruits hang from the branches giving it an ornamental aspect, therefore allowing its use as an ornamental species. Its wood can be used for civil construction, and furniture, among other uses (Lorenzi 2002). This species is widely used by fauna as their flowers, fruits, gum, and leaves

are readily used by birds, mammals (Peres-Carlos 2000) and insects.

Samples of galls were taken from plantations of native species in the Plateau Papagaio (01°36' 58.2 S and 56°24' 14.4W), and additional laboratory observations made at the nursery of the Mineração Rio do Norte SA, Porto Trombetas, Pará State, Brazil both in November 2003 and April 2004. The native forest plantation was 14 months old (initiated in September 2002) when we conducted the first field observations on the galls. Plants were grown from seeds collected in the primary forest early in August 2002.

We collected attacked leaves for rearing of immature and adults of the galling species, and parasitoids from 50 different individuals of *P. pendula*. The material was taken to the laboratory for rearing of insects. Sampled material was maintained at constant room temperature and humidity.

The adults obtained were first preserved in 70% ethanol and then mounted on slides following the methodology of Gagné (1994). All specimens (including the types) were incorporated in the Diptera collection of Museu Nacional, Rio de Janeiro. It was adopted the terminology of Gagné (1994).

The field and laboratory work was done by Geraldo W. Fernandes, while the taxonomy and descriptions of the new genus and species were made by Valéria Cid Maia.

RESULTS

Galls (Fig. 1a) are green, formed by the union of two compound leaflets that assume the aspect of a pea. Galled compound leaflets become entirely transformed into the gall tissue. When the attack is intense, galls may become coascent, stacking upon each other. Only one larva is found in the one-chambered, glabrous galls, that have a sweet taste. When mature, galls dehiscence due to the opening of the gall



Figs. 1A-B. Galls of *Parkiamyia paraensis* **sp. nov.** A. Galls, general aspect; B. Aspect of the galled plant.

equatorial plan. Afterward, they become yellowish and then brown, and later fall off the plant. Generally, the galling insect emerges from the gall before dehiscence and leaves its exuvia attached to the gall wall at its equatorial plane.

Attacked plants in the field are readily found due to their prostrated architecture (Fig. 1b). When the abundance of galls is very high, attacked individuals curve down, and may even have their terminal stems killed. Out of 86 attacked *P. pendula* plants, approximately 72% had their terminal parts killed by galling in April 2004. In most cases, the death of terminal parts induced the growth of an adjacent lateral shoot.

An average of 86% of the *P. pendula* individuals observed by us were attacked by galling insect in the field (range of 75.86% to 92.86%). Casual observation indicated that the gall

is spreading into the reforested areas. Spreading of galls is an interesting aspect to be further studied, as cecidomyiids are frequently said to be bad fliers and possess high fidelity to their host individual plants.

As in the field, galls were also very common on *P. pendula* under nursery conditions. Under nursery condition, attacked plants were two fold taller and heavier than healthy plants. Otherwise, most of the biomass of attacked plants was of galled tissue.

Parkiamyia gen. nov.

Diagnosis. Occipital process present; male flagellomeres binodal and bicircumfilar; tarsal claws simple; empodium well

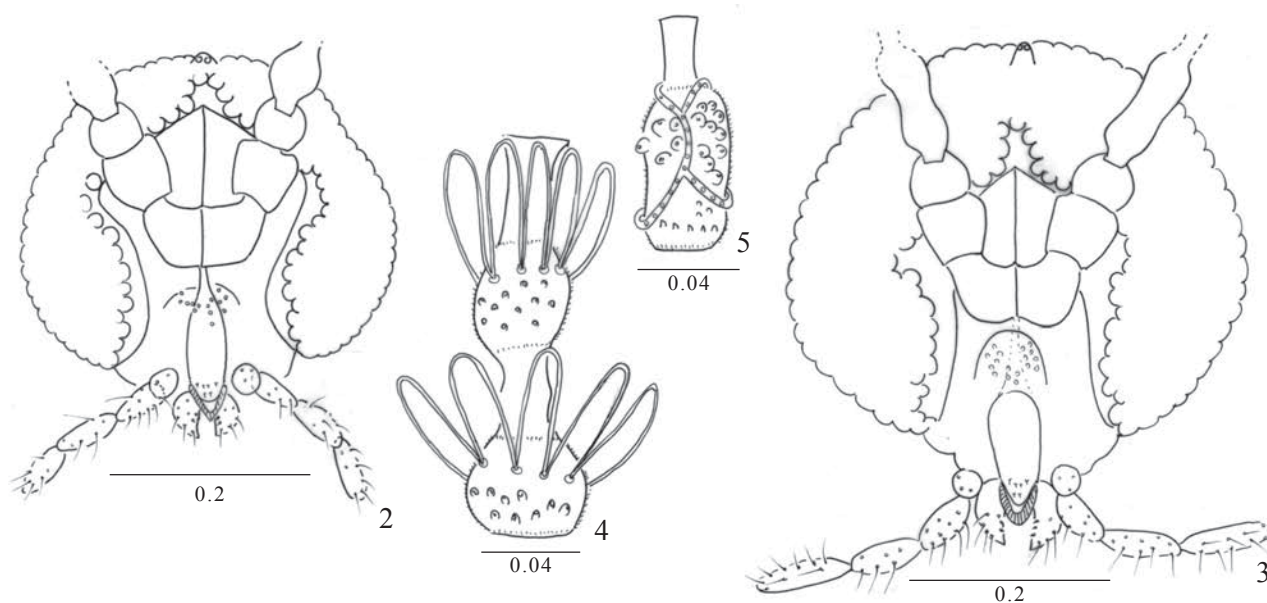
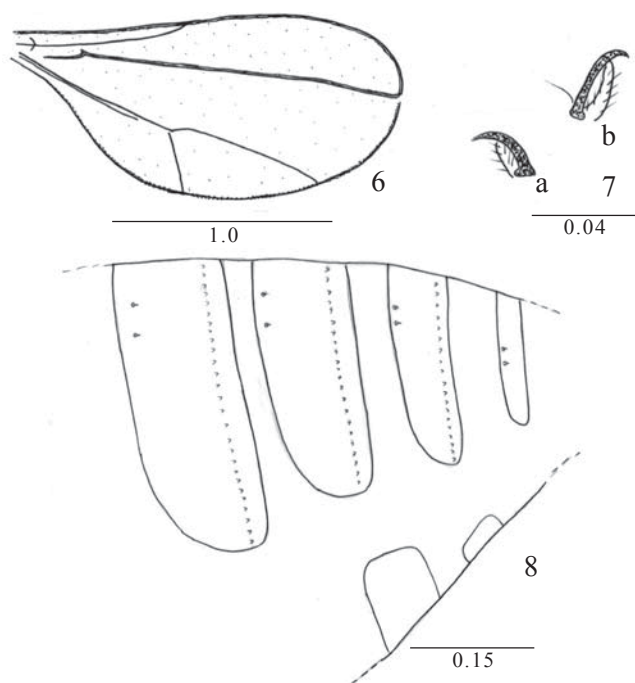


Fig. 2-5. *Parkiamyia paraensis* **sp. nov.** 2. Male, head, frontal view; 3. Female, head, frontal view; 4. Male, flagellomere 4; 5. Female, flagellomere 3. Scales in mm.



Figs. 6-8. *Parkiamyia paraensis* sp. nov. 6. Male, wing; 7a. Female, hindleg, tarsal claw and empodium; 7b. Male, foreleg, tarsal claw and empodium; 8. Male, abdominal segments 5 to 8, dorsolateral view; Scales in mm.

developed; ovipositor very protrusible; female cerci separate and setose. Pupal abdominal tergites without spines. Spatula with a single tooth; full complement of lateral papillae; four pairs of terminal papillae (one pair corniform, the others setose).

Adult. Head: Occipital process present; eyes facets circular; palpus with four segments; male flagellomeres binodal and bicircumfilar; flagellomere necks bare. Thorax: Wing: R5 approximately as long as wing and joining C near wing apex; Rs weaker anteriorly; M3 fold absent; CuP present. First tarsomeres without spur; tarsal claws simple and bent near two-thirds length; empodium as long as bend in claws. Gonocoxites wide and not splayed; gonostylus elongate; cercus rounded; hypoproct bilobed; parameres absent; aedeagus much longer than hypoproct. Ovipositor very protrusible; female cerci separate.

Pupa. Antennal horn rudimentary; apical seta well developed; two pairs of lower facial papillae; three pairs of lateral facial papillae; prothoracic spiracle well developed; abdominal tergites without spines.

Larva. Ovoid shaped. Spatula with a single tooth. Six lateral papillae in two groups of three per side. Four pairs of terminal papillae (one pair corniform, the others setose).

Remarks. The number and shape of the flagellomeres place this genus among the Cecidomyiini. It belongs to the Cecidomyiini by the makeup of the larval terminal papillae (three pairs setose and one pair corniform), tarsal claws (simple) and parameres absent. *Parkiamyia* gen nov. will not run past couplet 74 in Gagné (1994), because of the shape and chaetotaxy of the female cerci. It resembles *Contarinia* Rondani 1860 in having occipital process; palpus four-segmented; male

flagellomeres binodal and bicircumfilar; elongate, tapered ovipositor; hypoproct bilobed and the makeup of the terminal papillae. But differs mainly in the shape of spatula (with one anterior teeth in *Parkiamyia* and two in *Contarinia*) and in the shape and chaetotaxy of the female cerci (not closely appressed as in *Contarinia* and with many several setae laterally).

Type species. *Parkiamyia paraensis* sp. nov.

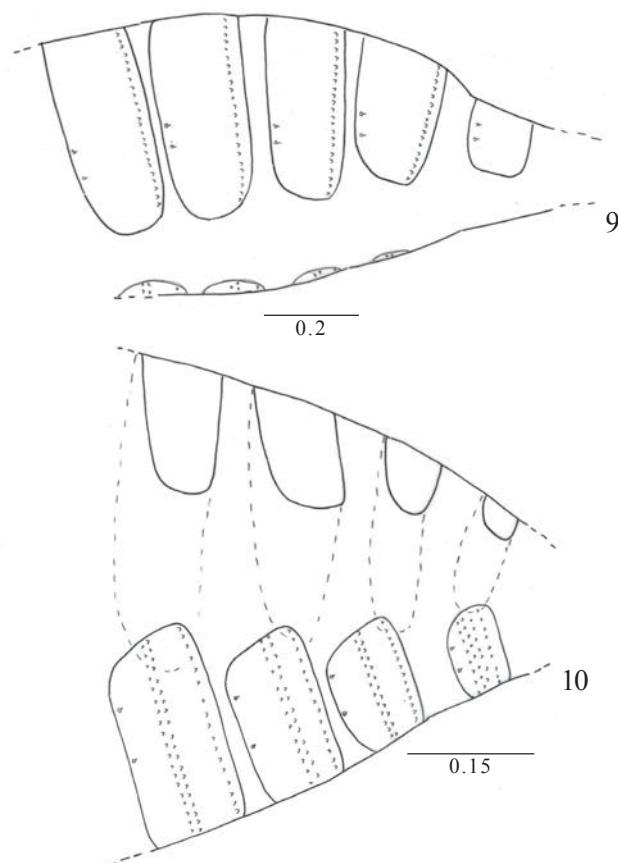
Etymology. The generic name is composed of *Parkia* (the generic name of the host plant) + *myia*.

Parkiamyia paraensis sp. nov.

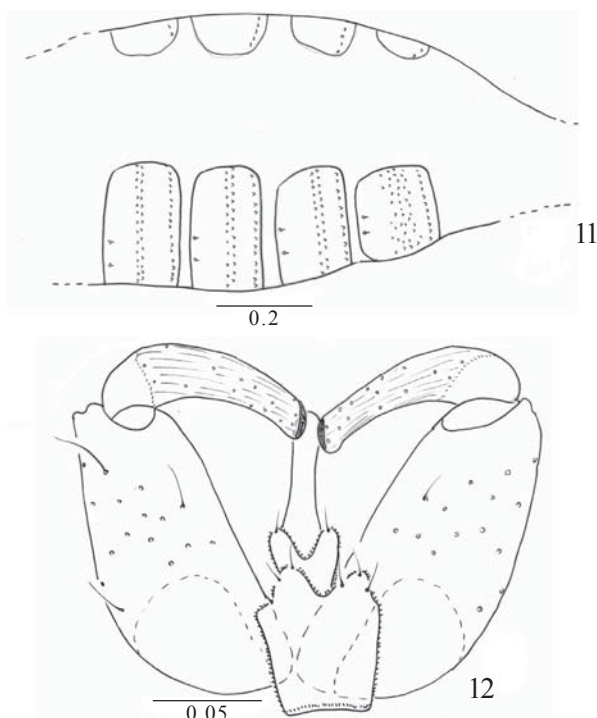
Figs 2-19

Adult. Body length: 1.8-2.4 mm in male (n=5); 3.6-3.8 in female (from vertex to ovipositor completely protracted, n=2). Head (Figs. 2 and 3): Eyes facets circular, closely approximated. Antenna with scape squarish setose, pedicel globose, male flagellomeres with circumfilar loops regular in length (Fig. 4); female flagellomeres cylindrical, slightly constricted near midlength and with interconnected circumfilar (Fig. 5). Flagellomeres 1 and 2 connate. Flagellomere 12 with apical process.

Frontoclypeus with 14-17 setae. Labrum long-attenuate with three pairs of ventral sensory setae. Hypopharynx of the



Figs. 9-10. *Parkiamyia paraensis* sp. nov. 9. Female, abdominal segment 4 to 8, dorsolateral view, 10. Male, abdominal segment 5 to 8, ventrolateral view. Scales in mm.



Figs. 11-12. *Parkiamyia paraensis* sp. nov. 11. Female, abdominal segment 5 to 7, ventrolateral view; 12. Male terminalia, dorsal view. Scales in mm.

same shape as labrum, with long, anteriorly directed lateral setulae. Labellae elongate-convex, each with several lateral setae and three short mesal sensory setae. Palpus with four setose crescent segments: segment one spheroid, segments 2, 3 and 4 cylindrical.

Thorax: Anepimeron setose, other pleural sclerites asetose. Wing (Fig. 6) length: 1.25-1.30 mm in male (n=5); 1.70-1.75 mm

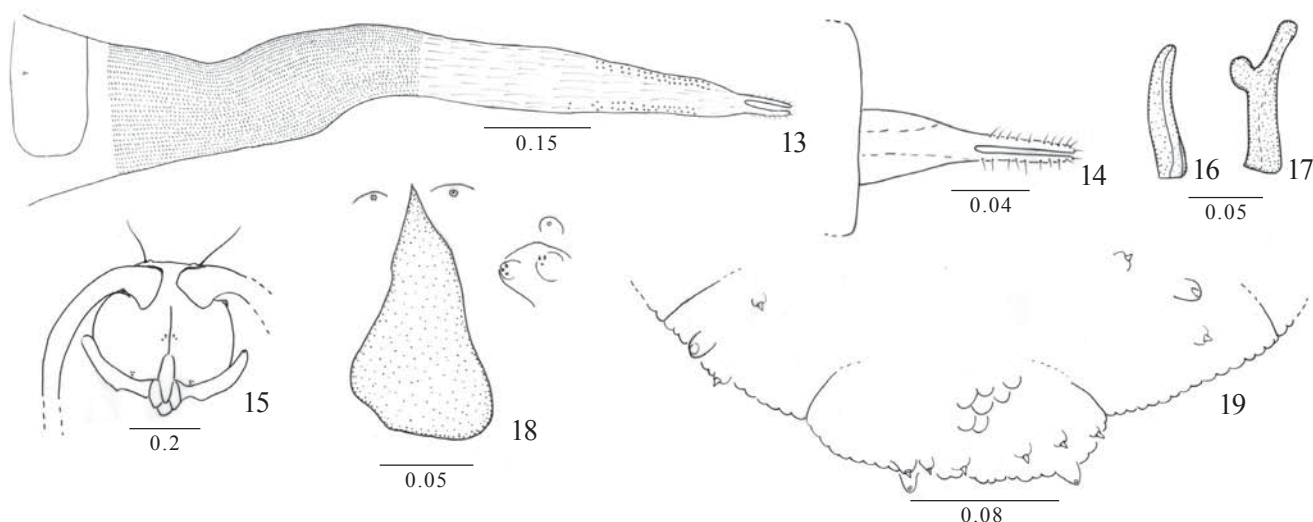
in female (n=5); R5 straight reaching C at wing apex, Rs weakly anteriorly, R1 reaching costal margin before wing midlength, M3 fold absent, CuA forked, CuP present. Tarsal claws simple, empodium well developed (Fig. 7).

Abdomen. Male (Figs. 8 and 10): tergites 1-7 rectangular with rounded margins, a complete row of caudal setae, two basal trichoid sensilla and elsewhere with scattered scales. Tergite 8 linear with two trichoid sensilla. Sternites 1-7 rectangular with rounded margins, setae more abundant mesally, a complete row of caudal setae and two basal trichoid sensilla; sternite 8 squarish, setae more abundant mesally, a complete row of caudal setae and two basal trichoid sensilla. Female (Figs. 9 and 11): tergites 1-7 similar to the male ones. Tergite 8 sclerotized with two trichoid sensilla. Sternite 1 not sclerotized. Sternites 2-6 similar to the male ones. Sternite 8 not sclerotized.

Male terminalia (Fig. 12): gonocoxites wide and not splayed; gonostylus elongate; cercus rounded, setose and wider than hypoproct; hypoproct with two triangular setose lobes, longer than cercus; parameres absent; aedeagus much longer than hypoproct and tapering gradually to apex.

Ovipositor (Fig. 13) very protrusible, tapering to apex, striate at $\frac{1}{2}$ basal, with longitudinal ridges at $\frac{1}{2}$ distal and with lateral setae at $\frac{1}{3}$ distal. Female cerci separate, elongate-cylindrical and with many lateral setae (Fig. 14).

Pupa. Length: 2.2-2.4 mm (n=5). Cephalic region (Fig. 15): antennal horn rudimentary; cephalic seta with 0.16-0.17 mm of length (n=5); frontal horns absent; two pairs of setose lower facial papillae (one pair with seta and the other bare); three pairs of lateral facial papillae (one pair setose and the other two without seta). Upper cephalic margin thickened laterally. Thorax: prothoracic spiracle setiform (Fig. 16) with 0.10-0.11 mm of length (n=5) (spiracle bilobed in one specimen, Fig. 17). Abdomen: tergites without spines, but with dorsal spinules.



Figs. 13-19. *Parkiamyia paraensis* sp. nov. 13. Ovipositor, dorsal view; 14. Cerci, dorsal view; 15. Pupa, cephalic region, frontal view; 16. Pupa, prothoracic spiracle; 17. Pupa, prothoracic spiracle; 18. Larva, spatula and lateral papillae, ventral view; 19. Larva, posterior segments, dorsal view. Scales in mm.

Larva. Body ovoid. Length: 1.5-2.0 mm (n=3). Integument rough. Spatula with one anterior teeth; three pairs of lateral papillae in 2 groups of three (two pairs setose) on each side (Fig. 18). Abdominal segment 8 as in Figure 19. Terminal segment short, convex, with four pairs of terminal papillae (one pair corniform and the others setose) (Fig. 19).

Material. Holotype male. Brazil, *Pará*: Porto Trombetas, 15.IV.2004, G. W. Fernandes leg., MNRJ. Paratypes: same locality, date and collector - 3 males, 6 females, 10 pupae, 5 larvae. Same locality and collector - 19.VII.2003: 6 males and 6 females.

Etymology. The specific name refers to the state where the material was collected.

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