

***Abaristophora* and *Puliciphora* (Diptera: Phoridae) from Dominican amber
and revisionary notes on modern species**

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**Taxonomy, Phoridae, new species, fossils, Oligocene, *Abaristophora domicambersae* sp. n.,
A. nepalensis sp. n., *Puliciphora rontaleri* sp. n., Dominican Republic, Nepal**

Abstract. The generic assignments of 84 fossil Phoridae preserved in Oligocene amber from the Dominican Republic are summarised. The fossil species *Abaristophora domicambersae* Disney sp. n. is described. *Antipodiphora* Schmitz is returned to the status of being a subgenus of *Abaristophora* Schmitz. A modern species *A. nepalensis* Disney sp. n. is described from Nepal. The fossil species *Puliciphora rontaleri* Disney sp. n. is described. Critical features of the type species of this genus, *P. lucifera* Dahl, are figured. The recognition of *P. tokyoensis* Kinoshita is clarified.

INTRODUCTION

Following the acquisition of numerous fossil insects in Dominican amber, which is believed to be Oligocene in age (Poinar, 1992), AJR sorted the fossil Phoridae and passed them to RHL for generic determinations. Four phorids from the same source, from the collections in the care of Dr G.O. Poinar at Berkeley (California), have been described previously (Disney, 1987). In addition RHL has a collection of 24 phorids in Dominican amber in his collection in the Zoology Museum of Cambridge University. The collection from the Natural History Museum brings the total to 84. Their generic identities are as follows:

Genus	Number of specimens	%
<i>Abaristophora</i> Schmitz	3	3.6
<i>Dohniphora</i> Dahl (several species)	11	13.1
<i>Megaselia</i> Rondani (several species)	52	61.9
<i>Puliciphora</i> Dahl	18	21.4
Total	84	100.0

There is little merit in formally describing every species represented, when such descriptions are to a greater or lesser extent flawed by the inability to observe critical characters in most specimens. Therefore a few general comments are given below and we single out two species, which are representative of genera previously undescribed from the Oligocene, for formal designation. Brown (1992) reported both genera from Dominican amber, but gave no details. In addition some modern species are covered, where these are relevant to our understanding of the fossil material.

Genus *Abaristophora* Schmitz, 1927

Abaristophora Schmitz, 1927: 21.

Antipodiphora Schmitz, 1939: 55. Reduced to subgenus.

The fossil specimens assigned to *Abaristophora* require comment. They comprise an incomplete male that is largely obscured by a surface fracture when viewed from one side and by a plethora of bubbles when viewed from the other side. However, these deficiencies are more than made up for by the other two specimens. These comprise a male and female lying together and which were almost certainly trapped in the fresh resin while still in copula, but which separated as they died. The male runs out as *Antipodiphora* Schmitz and the female as *Abaristophora* + *Antipodiphora*, in the keys to world genera of modern Phoridae (Disney, 1994). The New Zealand genus *Antipodiphora*, however, was originally treated as a subgenus of *Abaristophora* (Schmitz, 1939). Borgmeier (1963) somewhat arbitrarily elevated this subgenus to the generic level, but without adding anything to Schmitz's original diagnosis of *Antipodiphora*. Brown (1988) described the first female for the genus *Abaristophora*, in Borgmeier's restricted sense. He concluded that it was unlikely that the generic status of *Antipodiphora* could be justified. The female of a new species from Nepal is described below. It seems to be somewhat intermediate between the two genera. Furthermore, its lack of an isolated bristle in the basal half of the hind tibia links it to the Oligocene species. In the females I have failed to find any convincing distinction between the two genera. In the males the only consistent difference is the presence of an arista in *Antipodiphora* and its absence in *Abaristophora* along with a more sinuous vein 6 in *Abaristophora*. It seems probable that the arista-like development of the apex of the third antennal segment in the males of these flies has rendered an arista largely redundant. To base one genus primarily upon the loss of the arista and the other on its plesiomorphic retention would seem somewhat indefensible. Therefore, Borgmeier's elevation of *Antipodiphora* to generic status is herewith formally rejected. All the New Zealand species are returned to *Abaristophora*. The new species from Nepal is described below, along with a characterization of the species from Oligocene amber.

Abaristophora domicamberae Disney, sp. n.

MALE. Fig. 7 (right). Length about 1.40 mm. The dark brownish grey third antennal segment with long apical extension (longer than swollen basal part) bearing long hairs on its lower edge, the terminal arista having shorter hairs. It thus resembles *Antipodiphora tonnoiri* Schmitz (see Abb. 2 in Schmitz, 1939). Palps pale dusky yellow with usual bristles. Thoracic dorsum and abdominal tergites dark brown. Abdominal venter grey to yellowish grey. Hypopygium brown, with short pale grey anal tube. Former appears more like that of *Antipodiphora* (see Abb. 5 in Schmitz, 1939) than that of *Abaristophora* (see Figs 2–3 in Michailovskaya, 1988). Brown (1992) figures hypopygia of two unnamed species, one attributed to each genus, which more closely resemble each other. Legs essentially yellow, but tinged grey. There are no isolated bristles in the upper three quarters of the hind tibia. Of the two longitudinal hair palisades, the anterior one progressively diverges towards midline of anterior face and extends only about two-thirds of length. Wing with costal section 2 clearly shorter than section 1, and resembling that of *Antipodiphora brevicornis*

Schmitz (see Abb. 9 in Schmitz, 1939), but with shorter costal cilia. Vein 6 only slightly sinuous.

FEMALE. Fig. 7 (left). Length about 1.45 mm. Similar to male but with a short conical to pyriform third antennal segment. Proboscis long and geniculate, the basiproboscis being shorter than distiproboscis, but it is more than two-thirds the length of latter. Eyes seemingly more like those of *Abaristophora diversipennis* Borgmeier (see Fig. 130 in Brown, 1988) than the protuberant eyes of *Antipodiphora tonnoiri* (see Abb. 4 in Schmitz, 1939).

TYPE LOCALITY. Dominican Republic (Oligocene amber).

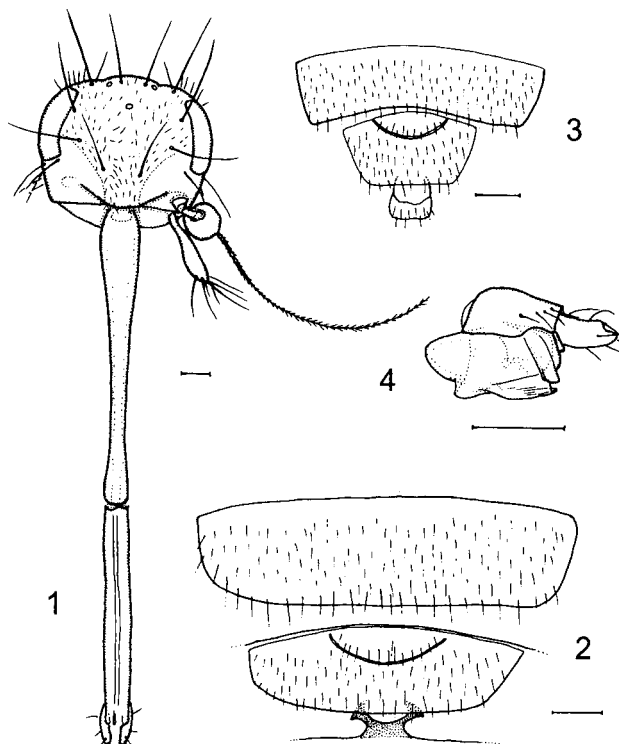
TYPE MATERIAL: Holotype ♂, Dominican republic: Oligocene amber (deposited in Natural History Museum, London – Department of Palaeontology II. 214). Paratype ♀, alongside holotype in same piece of amber.

ETYMOLOGY. The name refers to the preservation of the specimens in Dominican amber.

AFFINITIES. The presence of an arista in the male and the only slightly sinuous vein 6 place this species in the subgenus *Antipodiphora*. The lack of an isolated bristle in the upper two-thirds of the hind tibia is unknown in this subgenus, unless the species described below belongs to this subgenus. The female of the fossil species is distinguished from the modern species below. The male runs to *A. nana* Schmitz in the key to the males of modern *Antipodiphora* (Schmitz, 1939), but differs in lacking an isolated bristle in the basal half of the hind tibia.

Abaristophora nepalensis Disney, sp. n.

FEMALE. Head as in Fig. 1. The frons brown and with fine but dense microtrichia, which are absent from median band of forward projection. Third antennal segment pale yellowish brown. Arista a little paler. Palps pale yellowish brown. Proboscis reddish brown, the distiproboscis being paler and shorter than basiproboscis. Thorax orange brown, but darker on top. Mesopleuron with about six hairs close to the upper margin. Each side of scutum with a humeral bristle, three notopleurals (but the most posterior is weaker than the other two), a pre-alar, an intra-alar to post-alar, and a pre-scutellar dorsocentral. Scutellum with a posterior pair of bristles and an anterior pair of hairs. Abdomen with orange to greyish brown tergites 1–6 bearing sparse fine hairs, the longest being at the rear of 1 and 6. Tergite 1 is interrupted in middle. It and 2 are the widest, 3 is about two-thirds width of 2, and 4–6 are successively a little narrower. Tergite 6 is longer than broad. Venter brownish grey, with a circle of hairs at rear of 6. Segment 7 encircled by hairs, but without sclerites. Segment 8 also encircled by hairs, but with a well developed brown rectangular tergite. Tergite 10 well developed, being broader than long. The small semicircular epiproct with a pair of long, slightly sinuous, bristles. The pale brown cerci each with five hairs and a long, terminal, slightly sinuous bristle. Abdomen internally with four rectal papillae. Legs brownish yellow to yellowish brown, the front pair being palest and the hind femur darkest. Front tarsus with longitudinal hair palisade on metatarsus only. Segment 5 is a little tapered. Front tibia with an antero-dorsal row of 15–16 short spines. Mid tibia with dorsal longitudinal hair palisade extending about three-quarters of length. Just beyond tip of palisade the tibia is suddenly narrowed by emargination of the dorsal edge. On anterior face, one below the other, are four transverse combs extending from dorsal edge, the first being just below middle and the fourth at start of last quarter. Hairs below basal third of hind femur shorter than those of antero-ventral row of outer half. Hind tibia without isolated



Figs 1–4. 1 – *Abaristophora nepalensis* Disney, sp. n., female, frontal view of head, with right palp and antenna omitted; 2 – *Puliciphora lucifera*, female, abdominal tergites 4 and 5 plus anterior apodemes of 6; 3 – *P. tokyoensis*, female, abdominal tergites 4–6; 4 – *P. tokyoensis*, male, left face of hypopygium. Scale bars = 0.1 mm.

bristles but with two closely approximated, near-dorsal, longitudinal hair palisades, both extending to tip of tibia. Spines of apical combs of posterior face all simple. Wing length 1.85 mm. Costal index 0.49–0.50. Costal ratios 0.75 : 1. Costal cilia 0.10 mm long. Thick veins pale yellowish brown. Veins 4–6 paler and more yellowish grey. Vein Sc reduced to basal rudiment. Vein 6 only moderately sinuous and its tip clearly not reaching wing margin. Vein 7 absent. No hair at base of vein 3. Axillary ridge with two bristles, which are as long as costal cilia in middle of section 2. Membrane only very lightly tinged brownish grey. Haltere with largely brown knob.

TYPE LOCALITY. Nepal: Ilam District, Mai Pokhari.

TYPE MATERIAL: Holotype ♀. Nepal: Ilam District, Mai Pokhari, 2,150–2,250 m altitude, 23.–25.viii.1983 (J. Martens – No. 254a) (deposited in Cambridge University Museum of Zoology, UK).

ETYMOLOGY. The name refers to the type locality.

AFFINITIES. The only slightly sinuous vein 6 would place this species in the subgenus *Antipodiphora*, and thus make it the first modern record for this subgenus outside New Zealand. The absence of vein 7 is reminiscent of *Abaristophora* s. str., in which this vein ends well before the wing margin.

The female attributed to *A. brevicornis* Schmitz is not recognisable from its description, but it was said to closely resemble that of *A. tonnoiri* Schmitz. The latter is immediately distinguished from *A. diversipennis* Borgmeier, *A. nepalensis* and *A. domicambersae* by its inflated, protuberant eyes (Abb. 4 in Schmitz, 1939). In *A. nepalensis* the basiproboscis is clearly longer than the distiproboscis (Fig. 1). In *A. diversipennis* (Fig. 130 in Brown, 1988) and *A. domicambersae* the basiproboscis is clearly shorter than the distiproboscis. *A. nepalensis* differs from all modern species of *Abaristophora* by lacking any isolated bristles on the upper three-quarters of the hind tibia. Only the fossil *A. domicambersae* shares this feature. The abbreviated and divergent anterior hair palisade of the hind tibia of the latter contrasts with the full-length anterior palisade closely approximated to the dorsal one in *A. nepalensis*. The lack of vein 7 in *A. nepalensis* is peculiar to this species among the modern members of the genus *Abaristophora*.

Genus *Puliciphora* Dahl, 1897

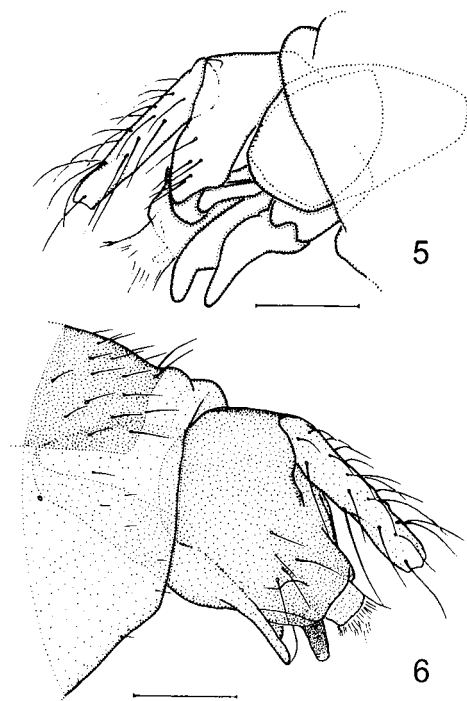
Puliciphora Dahl, 1897: 418.

The specimens from Dominican amber that are being assigned to *Puliciphora* comprise 16 males and 2 females. Their generic assignment calls for comment. The taxonomically significant abdominal tergite 5 of the female is very similar to that of the tramp species *P. borinquenensis* Wheeler. The frontal chaetotaxy of both sexes is not sufficiently visible to be completely certain of the precise details. However, the ocellar bristles and supra-antennals are clearly developed in both sexes. Other frontal bristles are present in the males at least, but the full complement is lacking. However, it is not possible to be certain as to precisely which bristles are absent. From what can be discerned there is nothing to contradict an assignment to *Puliciphora*. The difficulties with regard to being completely confident mainly derive from deficiencies in neontological taxonomy. Through historical accident the recognition of modern species is currently based on the female sex in the first instance. The separation from closely related genera is based on somewhat trivial distinctions (Disney, 1994). The boundaries of the genus are by no means clear, especially in the males. However, even a cursory glance at the male hypopygia of *Puliciphora* and related genera suggest that a detailed study of the males is likely to lead to revision of the current generic boundaries. In Figs 2 and 5–6 the female abdominal tergites 4–6 and male hypopygium of the type species, *Puliciphora lucifera* Dahl, are illustrated for reference. The hypopygia of the fossil species suggest that they are congeneric. A single female is characterised and named. A poorly known modern species is better characterised than it has been hitherto.

The keys required for identifying the females of modern species are cited by Disney (1994), but need supplementing by Yang & Wang (1993) for China, by Michailovskaya (1995) for the far east of Russia and by Disney (1995) for Trinidad.

Puliciphora rontaleri Disney, sp. n.

FEMALE. Fig. 8. Approximate length 1.5 mm. A generally dark, almost black, species with a grey abdominal venter and pale yellowish grey palps and greyish yellow legs. Two pairs of supra-antennal bristles well developed. Three ocelli distinct and a pair of ocellar bristles readily observed. At least one bristle postero-laterally on each side of frons. Other



Figs 5–6: *Puliciphora lucifera* male hypopygium. 5 – right face; 6 – left face. Scale bars = 0.1 mm.

ocellus. However, *P. omnivora* is distinctly smaller than *P. rontaleri* and its abdominal tergites 5 and 6 are distinctly paler than 1–4. Of the two species described by Yang & Wang (1993), one is readily distinguished by having six bristles on the frons between the anterior ocellus and the supra-antennals. However, *P. rontaleri* closely resembles their *P. qianana*, but with a relatively longer abdominal tergite 2 and a generally darker colour.

Puliciphora lucifera Dahl, 1897

This is the type species of the genus. The critical features of the female abdominal tergites 4–6 are depicted in Fig. 2 and the male hypopygium in Figs 5–6.

Puliciphora tokyoensis Kinoshita, 1918

Hitherto the separation of this species from the cosmopolitan *P. borinquenensis* Wheeler has not been very satisfactory (Disney, 1988, 1990). Kinoshita (1918) illustrated the head and thorax of both the male and female and the wing of the male. Schmitz (1958) provided a photograph of the male wing, having previously illustrated the female in side view (Schmitz, 1938). I have now been able to slide mount a male and three females from the spirit collections in the Museum Koenig, Bonn. This allows illustration of the taxonomically critical female abdominal tergites 4–6 (Fig. 3) and the male hypopygium (Fig.

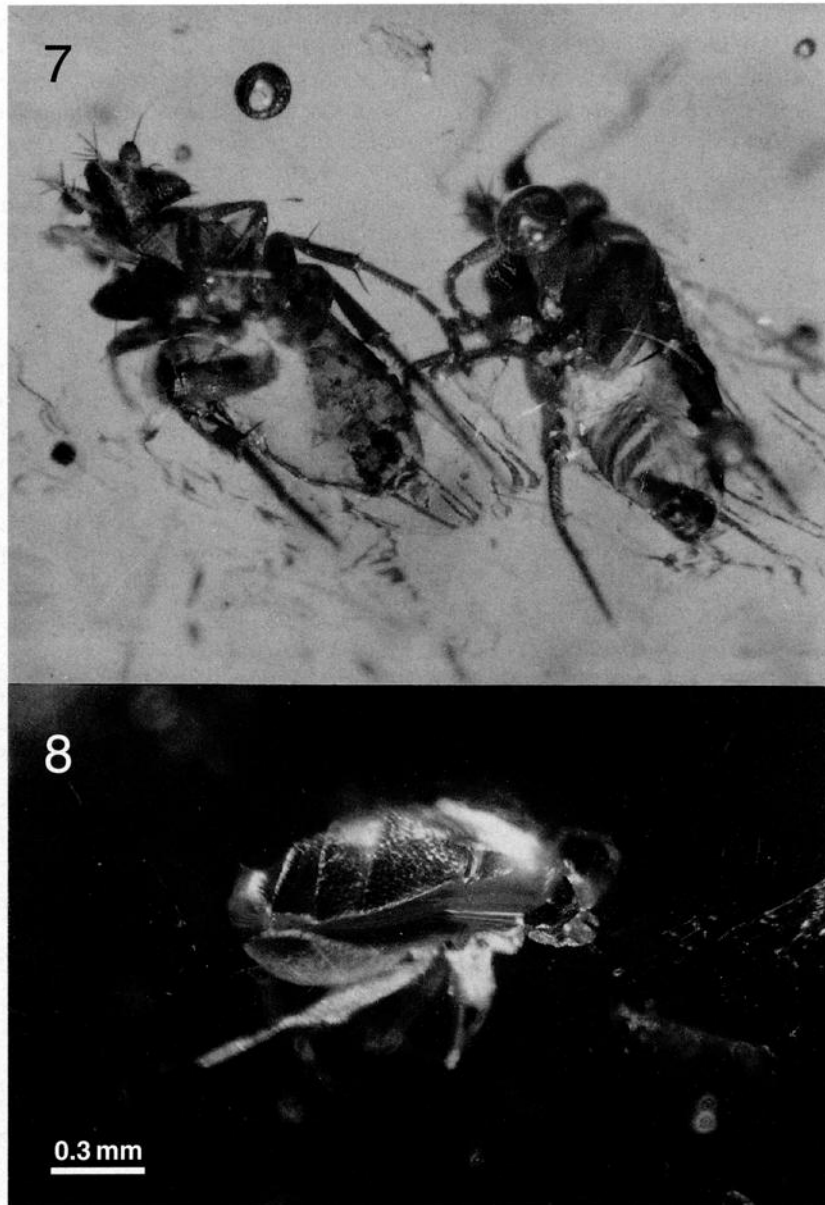
bristles not apparent on frons. Third antennal segment greyish brown, including arista. At least four bristles at rear margin of thorax (the outermost being long), an alar bristle near this outer postero-lateral bristle, and further forward a long bristle on each side. The short abdominal tergite 1 is not fused to 2, which is clearly longer than 3, which is likewise longer and broader than 4. Tergite 5 has a semi-circular flap similar to *P. tokyoensis* (Fig. 3). Tergite 6 not evident.

TYPE LOCALITY. Dominican Republic (Oligocene amber).

TYPE MATERIAL: Holotype ♀. Dominican Republic: Oligocene amber (deposited in Natural History Museum, London – Department of Palaeontology II. 536). There are three *Puliciphora* males in the same piece of amber.

ETYMOLOGY. The name honours Bob Rontaler (Goldmajor Ltd), who supplied the Natural History Museum with the holotype and other specimens of insects preserved in Dominican amber.

AFFINITIES. This species also resembles *P. omnivora* Michailovskaya, 1995, whose female resembles that of *P. tokyoensis* but with only one pair of bristles between the supra-antennals and anterior



Figs 7-8: Fossil Phoridae. 7 – *Abaristophora domicambersae* Disney, sp. n., male (right) and female (left); 8 – *Puliciphora rontaleri* Disney, sp. n., female.

4). It is clear that the female can be immediately distinguished from *P. borinquensis* by the concave hind margin of tergite 4, the contrasting paler colour of tergites 5 and 6 compared with the darker more anterior tergites, the semi-circular anterior flap of tergite 5 extending less than half length of tergite, and the much longer antero-lateral apodemes of tergite 6. The male hypopygium is strikingly different from that of *P. lucifera* (Figs 5–6), *P. borinquensis* (Fig. 129 in Disney, 1983), or *P. rufipes* Silva Figueroa (Fig. 8.75b in Disney, 1994) in that the left side of the epandrium is not extended postero-ventrally below the anal tube, which is much shorter relative to the length of the epandrium. If *P. tokyoensis* is correctly assigned to the same genus as *P. lucifera*, there can be no case for not assigning the males from the Oligocene amber to the same genus.

DISCUSSION

The presence of *Abaristophora*, subgenus *Antipodiphora*, in Oligocene amber of the Dominican Republic confirms Brown's (1992) report that this subgenus was much more widespread in the past than appears to be the case today. The specimen from Nepal suggests that this subgenus may not be restricted to New Zealand today. The subgenus *Abaristophora* was reported, but not described, from Venezuela by Brown (1992). The other three genera are common in present-day Neotropical forests, as well as in tropical forests worldwide. *Megaselia* is the dominant genus of phorids throughout the world today, as the data presented above suggest was the case in the Oligocene.

ACKNOWLEDGEMENTS. We are grateful to H. Ulrich for allowing RHL to slide-mount specimens from the Museum Koenig, Bonn. We thank P.V. York (Photographic Unit, the Natural History Museum, London) for help with the photography. RHL's work on Phoridae is currently funded by a grant from the Leverhulme Trust (London) made to W.A. Foster (University Department of Zoology, Cambridge) for a Research Associate, and a grant from the Isaac Newton Trust (Trinity College, Cambridge). AJR's work was funded by the NERC Ancient Biomolecules Initiative.

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Received November 15, 1995; accepted March 7, 1996