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Two new species of *Megaselia* Rondani (Diptera: Phoridae) attracted to bracket fungi (Polyporaceae) in Spain

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Abstract

18 scuttle flies (Diptera: Phoridae) of the genus *Megaselia* Rondani were trapped at bracket fungi, *Fomes fomentarius*, on the trunk of an old beech tree (*Fagus sylvatica*) in northern Spain. These represented 15 species, including *M. lobatafurcae* Disney **sp. n.** and *M. parspallida* Disney **sp. n.**, four additions to the list of species recorded from peninsular Spain, and four species represented by females only and which cannot be named until linked to their males.

Key words: Phoridae, *Megaselia*, new species, Spain, *Fomes*, Polyporaceae.

Resumen

Dos nuevas especies de *Megaselia* Rondani (Diptera: Phoridae) atraídas a hongos yesqueros (Polyporaceae) en España

Se han capturado 18 fóridos (Diptera: Phoridae) del género *Megaselia* Rondani en hongos yesqueros *Fomes fomentarius*, sobre el tronco de una vieja haya (*Fagus sylvatica*) en el norte de España. Son representantes de 15 especies, incluyendo *M. lobatafurcae* Disney **sp. n.** y *M. parspallida* Disney **sp. n.**, así como cuatro adiciones a la lista de especies de España peninsular y cuatro especies representadas sólo por hembras y que no podrán determinarse hasta ser asociadas con sus respectivos machos.

Palabras clave: Phoridae, *Megaselia*, nuevas especies, España, *Fomes*, Polyporaceae.

Laburpena

Megaseliaren Rondani (Diptera: Phoridae) bi espezie berri Espainian, ardagaietara (Polyporaceae) erakarriak

Megaselia Rondani generoko 18 forido (Diptera: Phoridae) harrapatu dira Espainiaren iparraldean, pago zahar baten (*Fagus sylvatica*) enborreko *Fomes fomentarius* ardagaietan. 15 espezietaoak dira, besteak beste *M. lobatafurcae* Disney **sp. n.** eta *M. parspallida* Disney **sp. n.**, Espainia penintsularreko espezie-zerrendari gaineratzen zaizkion lau espezie eta emeak besterik aurkitu ez direneko beste lau espezie, hauek beren arrekin lotu arte izen espezi-fikorik gabe jarraituko dutenak.

Gako-hitzak: Phoridae, *Megaselia*, espezie berriak, Espainia, *Fomes*, Polyporaceae.

Introduction

The insect fauna of the Basque Country has been little studied. To remedy this SP-C has participated

in a study of beech and oak forests in the province of Gipuzkoa in northern Spain. During the course of this study Kaila (Kaila, 1993) and multifunnel traps were placed around bracket fungi, *Fomes fomentarius*



FIGURE 1. Kaila traps attached to the bracket fungi on the trunk of the beech tree in Oieleku forest.

(L.) J. J. Kickx (Polyporaceae) on the trunk of an old beech tree, *Fagus sylvatica* L. (Fagaceae) (Fig. 1). Among the material collected and preserved in alcohol were 18 scuttle flies (Phoridae) that were sent to RHLD, who mounted them on slides (Disney, 2001) prior to their identification.

The locality for the records reported below was Oiartzun: Oieleku beech forest (Aiako Harria P. N.), 500 m altitude, 30TWN9689, whose habitat is characterised by the monospecificity of the beech forest, being one of the most emblematic forests in the province. In fact, apart from some isolated trees of *Quercus robur* L. (Fagaceae) and *Taxus baccata* L. (Taxaceae), the 200 hectares of Oieleku consist solely of very old pollarded beeches which are very rich in microhabitats for saproxylic organisms (concerning insects, see, for example, Pagola-Carte *et al.*, 2007, 2008; Viñolas *et al.*, 2007; Carles-Tolrá, 2008, 2009). The area is of temperate climate, biogeographically belongs to the Eurosiberian Region, and is under high levels of humidity and rainfall (about 2300 mm per year) due to its location at the easternmost part of the Bay of Biscay.

Systematics

The specimens all belonged to the giant genus *Megaselia* Rondani in which the recognition of the species is primarily based on males in the first instance. Currently many females cannot be named until they are linked with their males. These are given code numbers only and are briefly characterised below. Species marked with an asterisk are additions to the list of species reported from peninsular Spain (García Romera and Báez, 2002).

The specimens, including the types, have been deposited in the University of Cambridge Museum of Zoology.

Megaselia coetanea Schmitz, 1929

This species belongs to a section of the genus for which there is no key covering the females of the Palaearctic species as yet. However, it also occurs in Arabia, whose females of *Megaselia* have been keyed (Disney, 2009a). The species has been reared from the sporophores of the fungus *Amanita volvata* (Peck) Martin (Amanitaceae) (Disney and Bayram, 1999).

Material examined: 1 ♀, v.2007.

Megaselia giraudii (Egger, 1862)

In the keys of Schmitz and Delage (1981) this will run to this species or to *M. rubida* Schmitz. However, in the key to the females of this complex (Buck and Disney, 2001) it unequivocally runs down to *M. giraudii*. The larvae of this species feed on a range of decaying organic materials, especially dead insects and small vertebrate carrion (*e.g.* Disney, 1994). They have also been reported from fungal sporophores, especially when they have started to decay (*e.g.* Disney and Sevcik, 2008).

Material examined: 1 ♀, v.2007.

Megaselia lobatafurcae Disney sp. n. (Fig. 2)

Male: Head. Frons brown, broader than long, with 70-78 hairs and very dense but very fine microsetae. Supra-antennal bristles (SAs) with lower pair only a fraction shorter than the upper pair. The antials lower on frons than anterolaterals (but that of left side failed to develop), and further from upper SAs as either is from an AL bristle. Pre-ocellars slightly further apart than either is from a mediolateral bristle, which is higher on frons, but not as far apart as

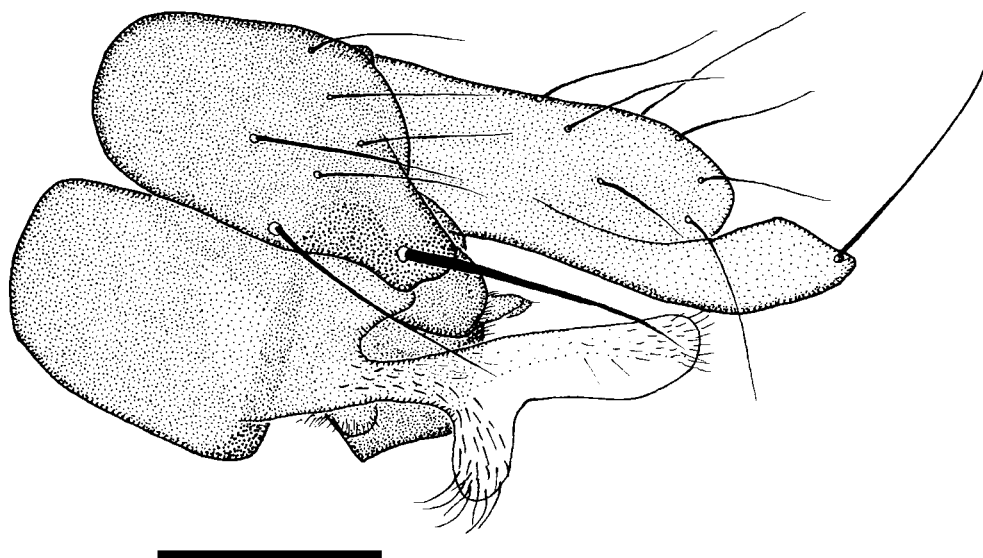


FIGURE 2. *Megaselia lobatafurcae* sp. n.: Left face of male hypopygium (Scale bar = 0.1 mm).

upper SAs. Cheek with two bristles and jowl with two stronger ones. The subglobose postpedicels dark brown, without SPS vesicles, and with a brownish yellow arista. Palps straw yellow, about a third as broad as postpedicel but a little longer than breadth of latter, tapering from around the midpoint onwards with 6 bristles and as many hairs. The apical bristle is a little shorter than the lower SAs. Labrum straw yellow and about 1.7x as wide as a palp. Labella mainly paler than palps and with only a few short spinules below.

Thorax. Thorax brown. Three notopleural bristles and no cleft in front of these. Mesopleuron with 14 hairs and a bristle near hind margin. Scutellum with an anterior pair of hairs (about as strong as those on scutum) and a posterior pair of bristles.

Wings. 1.7 mm long. Costal index 0.49–0.50. Costal ratios 4.2 : 2.6 : 1. Costal cilia (of section 3) 0.08–0.09 mm long. No hair at base of vein 3. With 2 axillary bristles, the outer being longer than costal cilia. Sc not reaching R1. Thick veins yellowish grey, thin veins grey but 7 paler. Membrane tinged grey (but only just evident to naked eye when viewed against a white background). Haltere brown.

Legs. Legs brown to yellowish brown, the front pair being the palest. Fore tarsus with posterodorsal hair

palisade on segments 1-4 and 5 a little shorter than 4. Dorsal hair palisade of mid tibia extends almost two thirds of its length. Hairs below basal half of hind femur longer than those of anteroventral row of outer half. Hind tibia with about 15 differentiated posterodorsal hairs and spinules of apical combs simple.

Abdomen. Abdominal tergites brown with several hairs, which are longest at the rear margins, especially on T4 to T6. Venter brownish grey, and with hairs on segments 3-6. Hypopygium brown, with a lighter brown anal tube, the left lobe of hypandrium a pale whitish yellow, and as Fig. 2. The right side of the hypandrium with a very short brown lobe.

Type material: Holotype ♂: Spain: Gipuzkoa Province, Oiartzun: Oieleku beech forest (Aiako Harria P. N.), 500 m altitude, 30TWN9689, vii.2007.

Recognition: In the keys to males of British species (Disney, 1989) this will run to couplet 48, where neither lead applies. In the keys of Schmitz (1957) it will run to couplet 11, where neither lead applies, but lead 1 clearly does not fit as *M. pseudociliata* (Strobl) has a different hypopygium. Taking lead 2 one proceeds to couplet 13, where the first option fails and the second option fails at couplet 14. The

forked left lobe of the hypandrium is highly distinctive within this huge genus.

Etymology: Named after forked left lobe of the hypandrium.

Megaselia major* (Wood, 1912)

Adults have been reared from spider egg sacs (Weber *et al.*, 2007).

Material examined: 1 ♀, vi.2007.

Megaselia meigeni* (Becker, 1901)

Material examined: 1 ♂, v.2006.

***Megaselia nasoni* (Malloch, 1914)**

The larvae of this species prey upon spider eggs (Disney, 1994).

Material examined: 1 ♀, vii.2007.

***Megaselia parspallida* Disney sp. n. (Figs. 3a-b)**

Male: Head. Frons brown, clearly broader than long, with 42-46 hairs and very dense but very fine microsetae. Supra-antennal bristles (SAs) with lower pair about 0.7x as long as upper pair, which are a little higher on frons than antials, which are closer to anterolaterals than to upper SAs. Pre-ocellars a little further apart than upper SAs, but closer together than either is from a mediolateral bristle, which is at about the same level on frons. Cheek with 5 bristles and jowl with 3 longer ones. The subglobose postpedicels brown and without SPS vesicles. Palps dusky yellow, 0.4x as broad as postpedicel but not quite as long as breadth of latter, with 6 bristles and as many hairs. The longest bristles about as long as lower SAs. Labrum yellowish brown and 1.7–1.8x as wide as a palp but only about 0.7x as wide as postpedicel. Labella pale but each with a brown band above, and their combined breadth about twice the breadth of postpedicel, and with numerous short spinules below and along apical margins.

Thorax. Thorax brown. Three notopleural bristles and no cleft in front of these. Mesopleuron with 8-12 hairs, of which 2-3 at rear margin are a little stronger. Scutellum with an anterior pair of hairs (about as strong as those in middle of scutum) and a posterior pair of bristles.

Wings. 1.8–1.9 mm long. Costal index 0.49. Costal ratios 3.5 : 2.2 : 1. Costal cilia (of section 3) 0.16–0.17 mm long. Hair at base of vein 3 small. With 5 axillary bristles, the outer being shorter than costal cilia. Sc not reaching R1. Thick veins yellowish grey, thin veins grey with 7 paler. Membrane tinged grey (just evident to naked eye when viewed against a white background). Haltere knob yellow.

Legs. Legs brown, but not dark, except for a straw yellow stripe in the lower halves of the outer two thirds of the front femora. Also towards the tips of the front coxae tend to be yellowish. Fore tarsus with posterodorsal hair palisade on segments 1-5 and 5 a little darker and longer than 4. Dorsal hair palisade of mid tibia extends about 0.8x its length. Hairs below basal half of hind femur about equal to or slightly shorter those of anteroventral row of outer half. Hind tibia with 11 differentiated posterodorsal hairs, of which the first 3 and last 3 are fine, and spinules of apical combs simple.

Abdomen. Abdominal tergites brown, but T3-T6 with yellowish anterior margins, and with numerous hairs. The later are longer at the hind margins on T2-T6, with those at the rear of T6 longest (being about twice as long as the long hair at the lower left margin of the epandrium: Fig. 3b). Venter brownish grey, and with hairs on segments 3-6. Hypopygium brown, with pale brown cerci and a pale proctiger, and as Fig. 3b. With 4 rectal papillae.

Female: Head similar to male, but the labrum brown and at least as wide as the diameter of postpedicel and about 3.7x as wide as a palp; and spinules on lower faces of labella far fewer and spaced out. Otherwise head similar to male. Thorax as male, except mesopleuron with up to 21 hairs. Abdominal tergites coloured as male and T5-T7 as Fig. 3a. Venter greyish brown, and with hairs below segments 3-6. Sternite 7 narrow, tapering from the broader hind margin to a narrow point, with 2-3 longer hairs at rear margin and 1-4 smaller hairs further forward. Posterolateral lobes at rear of sternum 8 short, with almost straight hind margins that are inclined forwards laterally, and with 3 longer hairs at hind margin and 3-4 shorter ones further forward. Cerci light brown and about 3.6x as long as broad. With 2 or 4 rectal papillae, the smallest specimen only having 2. Furca not evident. Dufour's crop mechanism at least 3x as long as greatest breadth and the posterior half almost parallel sided before the rounded end. Legs similar to male but the hairs below the base of hind femur distinctly finer and a little shorter than those of

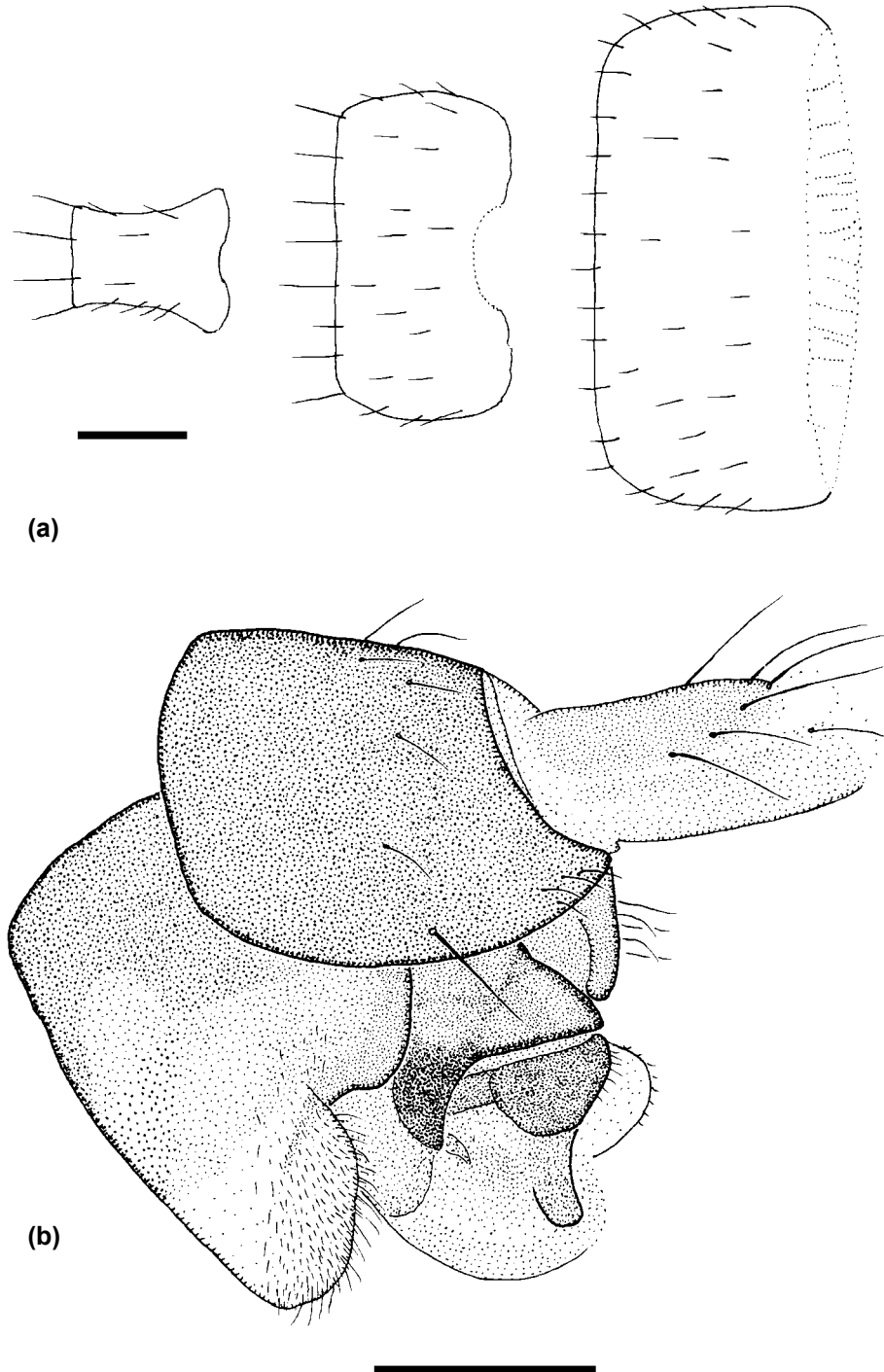


FIGURE 3. *Megaselia parspallida* sp. n.: (a) Female, abdominal tergites 5-7; (b) Left face of male hypopygium (Scale bars = 0.1 mm).

the anteroventral row in outer half. Wing as male except 1.8–2.3 mm long. Costal index 0.47–0.50. Costal ratios 3.5–4.7 : 2.4–2.8 : 1. Costal cilia 0.17–0.21 mm long. Otherwise it and haltere as male.

Type material: Holotype ♂: Spain: Gipuzkoa Province, Oiartzun: Oieleku beech forest (Aiako Harria P. N.), 500 m altitude, 30TWN9689, v.2007. Paratypes 3 ♀♀, same data as holotype except dates were vii & viii.2007.

Recognition: In the key to males of the British species (Disney, 1989) this will run to couplet 105. The first option proceeds to couplet 106 where lead 1 returns one to couplet 33, which leads to couplet 66, where neither lead applies. The second lead from couplet 105 runs to a similar conclusion at couplet 107. In the keys of Schmitz and Beyer (1965) the male runs to couplet 61. The first option takes one to *M. chaetopyga* (Lundbeck) at couplet 62, but is distinguished by its hypopygium. The second option leads to couplet 78, where neither lead applies; but it comes closest to *M. conseliger* (Schmitz), from which it differs by the weaker hairs on the epandrium and proctiger and less extensive fields of spinules on the lower faces of the labella. As 2-3 hairs at the rear of the mesopleuron are slightly longer than the rest one might take this to couplet 25 on page 432 of the keys of Schmitz (1957), where the details of the hypopygium will distinguish it from the species of this couplet.

Etymology: Named after the pale streak on part of the front femur, which allows recognition of both sexes at low magnification.

***Megaselia plurispinulosa* (Zetterstedt, 1860)**

The larvae of this species have been reared from the sporophores of the fungi *Boletus edulis*, *B. pinophilus* (= *pinicola*) (Yakovlev, 1986, 1994) (Boletaceae) and *Pleurotus cornucopiae* (Chandler, 1973) (Lentinaceae).

Material examined: 1 ♀, v.2007.

***Megaselia pseudogiraudii* (Schmitz, 1920)**

The specimen reported below is anomalous in that the anterodorsal bristles of the mid and hind tibiae are not differentiated from the adjacent hairs. The result is that it runs to couplet 152 in the key to the males of the British species (Disney, 1989), where neither lead applies and neither of the options in the added note suggesting one tries couplet 153 in such

a case. If one returns to couplet 148 then the hypopygium clearly agrees with that of *M. pseudogiraudii* (Fig. 391 in this key). In the key of Schmitz and Delage (1981) it will run to *M. pseudogiraudii*, but their Fig. 452 of the hypopygium is so inaccurate that one would be inclined to discount this identification.

The digger wasps *Crossocerus* sp. (Crabronidae) have been reported to be parasitized by this species (Dr Merz of Zurich – S. Prescher and G. Weber, *in litt.*).

Material examined: 1 ♂, v.2007.

Megaselia quadriseta* (Schmitz, 1918)

The recognition of this species, which was originally described from the female only, was clarified by Buck and Disney (2001). Prior reports of it being reared from fungi require confirmation of the identity of the fly. Three males have been reared from the carcass of a sheep (Disney and Marianne Drolshammer, new data).

Material examined: 1 ♀, vii.2007.

Megaselia wigtownensis* Disney, 2009b

This species was previously only known from the holotype from Scotland, but it belongs to a complex of species that have long caused problems of identification.

Material examined: 1 ♂, vi.2007. The specimen had a mass of pine (*Pinus*) pollen adhering to the proboscis and adjacent areas. Pine pollen is notoriously variable in size for many species. However, these pollen grains most probably correspond to *P. nigra* Arnold. The nearest tree of this species to the point of capture was 1.4 km, which thus provides a minimum estimate of the distance flown by this fly.

The following species cannot be named until associated with their males, which may or may not be already described.

***Megaselia* species 1**

In the keys of Schmitz and Delage (1974) this fails to run down, partly because too many couplets are based on male characters only.

Critical features: Lower supra-antennal bristles shorter than upper pair. Subglobose postpedicels brown but not dark and lacking SPS vesicles. Palps yellow. Mesopleuron with hairs. Three bristles on notopleuron. Scutellum with an anterior pair of hairs and a posterior pair of bristles. Wings 1.37–1.38 mm long.

Costal index 0.41. Costal ratios 4.4 : 1.5–1.6 : 1. Costal cilia 0.06–0.07 mm long, 2 axillary bristles, the outer one being longer than costal cilia. Sc runs to vein 1. With a hair at base of vein 3. Haltere knob brown. Legs straw yellow but apical third of hind femur light brown. Front tarsus with a posterodorsal hair palisade on segments 1-4 and 5 longer than 4. Dorsal hair palisade of mid tibia about two thirds of length. Hairs below basal half of hind femur about as long as the anteroventral hairs of outer half.

Material examined: 1 ♀, v.2006.

***Megaselia* species 2**

In the keys of Schmitz and Delage (1981) this runs to couplet 38, on page 675, to *M. giraudii* (Egger). However, it is not this species, which belongs to a phenetic complex of species that resemble it. In a subsequent key to the females of this complex (Buck and Disney, 2001) it runs to couplet 25, but it fits neither lead as it has more than 20 but less than 40 spinules on each of the labella; its furca (vaginal sclerite) fits neither option but more closely resembles that of *M. nigrescens* (Wood); and likewise with the lobes at the rear of sternum 8, which more closely resemble those of *M. breviseta* (Wood).

Critical features: Lower supra-antennal bristles shorter than upper pair. Subglobose postpedicels brown and with numerous small SPS vesicles. Palps yellow. Mesopleuron bare. Two bristles on notopleuron. Scutellum with four bristles, but the anterior pair at most only 0.8x as long as those behind. Wings 2.4 mm long. Costal index 0.49–0.50. Costal ratios 4.0 : 2 : 1. Costal cilia 0.12 mm long, 5 axillary bristles, the outermost ones being longer than costal cilia. Sc does not reach vein 1. With no hair at base of vein 3. Haltere knob yellow. Legs yellow apart from brown tip of hind femur. Front tarsus with a posterodorsal hair palisade on segments 1-5 and 5 longer than 4. Dorsal hair palisade of mid tibia about three quarters of length. Hairs below basal half of hind femur longer than the anteroventral hairs of outer half.

Material examined: 1 ♀, vi.2007.

***Megaselia* species 3**

In the keys of Schmitz (1957) this will run to couplet 16, lead 2, on page 432, but will not fit this option.

Critical features: Supra-antennal bristles with the lower pair shorter than the upper. Subglobose postpedicels brown and lacking SPS vesicles. Palps yellow.

Mesopleuron with hairs and a bristle. Notopleuron with three bristles. Scutellum with an anterior pair of hairs and a posterior pair of bristles. Wings 1.7–1.8 mm long. Costal index 0.45. Costal ratios 3.8 : 2.2 : 1. Costal cilia 0.17 mm long. Sc not reaching vein 1. A small hair at base of vein 3. 5 axillary bristles, the outermost being shorter than costal cilia. Haltere knob yellow. Front tarsus with a posterodorsal hair palisade on segments 1-4 and 5 longer than 4. Dorsal hair palisade of mid tibia extends about two thirds of length. Hind femur brown with fine hairs below basal half that are subequal in length to those of anteroventral row of outer half.

Material examined: 1 ♀, vi.2007.

***Megaselia* species 4**

In the keys of Schmitz (1956) this will run to couplet 9, lead 1, on page 406, but will not fit this option.

Critical features: Upper supra-antennal bristles clearly longer than lower pair. Subglobose postpedicels brown and lacking SPS vesicles. Palps yellow, Mesopleuron with hairs and a bristle. Notopleuron with 3 bristles. Scutellum with four bristles. Wings 2.4 mm long. Costal index 3.5–3.6 : 1.9 : 1. Costal cilia 0.10 mm long. Sc not reaching vein 1. No hair at base of vein 3. 6 bristles on axillary ridge, the outermost exceeding length of costal cilia. Haltere knob brown. Front tarsus with a posterodorsal hair palisade on all five segments. Mid tibia with dorsal hair palisade extending about three quarters of length. Hind femur brown and the hairs below basal half longer than those of the anteroventral row of outer half.

Material examined: 1 ♀, v.2007.

Discussion

Previously *Megaselia virilis* (Schmitz) has been reared from un-named species of *Fomes* (Yakovlev, 1994) and un-named species of *Megaselia* have been reared from *Fomes fomentarius* (Robinson, 1971; Jonsell *et al.*, 1999). The species reported above were trapped while visiting this fungus species, and as indicated the larvae of some are known not to be feeders on fungi. Those whose larval habits remain unknown may include species that develop in this fungus species.

Many scuttle flies visit flowers in order to ingest nectar (Disney, 1994). The presence of a mass of pine pollen

on the proboscis of *M. wigtownensis* invites comment as the male cones of pines are not sources of nectar. Pollen has not been recorded in the crop or stomach of any phorid caught visiting a flower, in contrast to the regular ingestion of whole pollen grains by many Syrphidae and Calyptrata (e.g. Kearns, 1992). There remains the possibility that some phorids may pierce pollen grains and ingest the contents or discharge saliva onto the grains and then ingest the saliva plus any leachate from the pollen. Although phorids have not been observed ingesting pollen grains as a result of visiting flowers, *Dobrniphora trigonae* Disney females ingest pollen grains from the pollen stores of its host bee (*Trigona carbonaria* (Smith)) and likewise pollen has been reported in the guts of *Pseudohypocera kerteszi* (Enderlein) females invading the nests of a number of bee species (Disney and Bartareau, 1995). While a female pine cone scale exudes a drop of sugary fluid from the tip of the micropyle, there is no obvious lure produced by male cones.

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