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A Newly Recorded Species, *Chonocephalus depressus* Meijere, 1921 (Diptera: Phoridae), whose Larvae Attacking Oyster Mushroom in China

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ABSTRACT

The scuttle fly *Chonocephalus depressus* Meijere, 1921 (Diptera: Phoridae) is recorded for the first time from China. Its larva attacks the oyster mushrooms *Pleurotus ostreatus* (Jacq.) Kumm, 1871 and *Pleurotus pulmonarius* (Fr.) Quél, 1872. *Chonocephalus depressus* is redescribed and illustrated, and its biological characteristics are briefly outlined.

Key words: Phoridae, taxonomy, new record, China, oyster mushroom.

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INTRODUCTION

The cultivated oyster mushrooms are suffered from a range of pests, which include some species of scuttle flies (Diptera, Phoridae). These include mainly larvae of phorids belonging to the genus *Megaselia* Rondani (Diptera: Phoridae) in the Palaearctic (Disney and Evans 1979), Oriental (Mohan *et al*. 1996) and Nearctic Region (Brown and Marshall 1984). Damage to mushrooms is caused through the consumption of mycelium and sporophore (Disney 1994; Disney and Durska 1999). In addition to *Megaselia*, a minor pest, *Chonocephalus rostamani* was reported feeding on oyster mushrooms (Rostaman and Disney 2004).

In this study, the species *Chonocephalus depressus* Meijere, 1912, feeding on the mycelium and fruiting body of *Pleurotus ostreatus* (Jacq.) Kumm, 1871 and *Pleurotus pulmonarius* (Fr.) Quél, 1872, is recorded for the first time from China. The species is redescribed and illustrated, and its biological characteristics are briefly outlined.

MATERIALS AND METHODS

The adults of *Chonocephalus depressus* were collected from infested mushrooms, *Pleurotus pulmonarius*, in Nanning, Guangxi, on 24 December 2014 (ZLL). The specimens were preserved in ethanol (75%). For biological observation, thirty alive males and females were placed in three rearing boxes (Ø =30 mm, h=70 mm), 5 paires in each box, feeding with fruiting body of oyster mushroom under room conditions (27±1°C). Their habit and developmental process were observed and recorded daily. All stages of the specimens were sent to one of the authors (GCL) for identification. The specimens were mounted on slides according to the methods of Disney (1994). Species is illustrated using microscope Leica M205A and Leica DM5500B with CCD 450 multi-focus imaging system. The specimens observed are deposited in Shenyang University Museum of Natural History (SUMN), Shenyang, China and College of Agriculture, Guangxi University.

RESULTS AND DISCUSSIONS

Chonocephalus Wandolleck, 1898

Chonocephalus Wandolleck, 1898: 428. Type species: *C. dorsalis* Wandolleck, 1898 by monotype.

Epichonocephalus Schmitz, 1928: 104; synonymized by Disney, 2002: 4. Type species: *E. transversalis* Schmitz.

Description

Male: Frons with median furrow, most frontal bristles not differentiated. Ocelli present. Arista present and articulated with postpedicel. Mesopleuron divided, with one to three small hairs near posterior margin. Tibia without dorsal longitudinal hair palisades and pre-apical isolated bristles. Wing with costa clearly exceeding half

wing length, vein Rs unforked, base of vein M_1 missing, without axillary bristles and small hair at base of Rs. Hypopygium with short anal tube and at least one gonopod.

Female: Ocelli, wings and halteres absent. Tibia lack dorsal longitudinal hair palisades and pre-apical isolated bristles. Abdomen with well developed tergites I-VI. Sternites 8 and 9 internal, and single spermatheca lightly sclerotised.

***Chonocephalus depressus* Meijere** (Fig. 1)

Material examined. China: Guangxi, Nanning (29.65°N, 95.48°E; 2 118 m), 21 December 2014, 5♂♂, 2♀♀, Ziling LI.

Chonocephalus depressus Meijere, 1912: 151(female only); Disney 1991: 208(male).

Chonocephalus similis Collin, 1912: 105 (part) nec Brues, 1905. Misidentification.

Chonocephalus dimakae Paulian, 1958: 12. Synonymized by Disney 2005: 406.

Chonocephalus ecitophilus Borgmeier and Schmitz, 1923: 145. Synonymized by Disney 2002: 14.

Chonocephalus japonicus Schmitz, 1941: 82. Synonymized by Disney 2002: 15.

Chonocephalus pallidulus Beyer, 1964 in Hardy and Beyer, 1964: 298. Synonymized by Disney 2002:15.

Chonocephalus simiolus Beyer, 1964 in Hardy and Beyer, 1964: 300. Synonymized by Disney 2002: 15.

Description

Male: Body generally brown with a pale abdominal venter. Frons brown with a darker ocellar triangle. Only antial and anterolateral bristles clearly differentiated. Postpedicel brown and rounded. Palp strong and about 2 times as long as its greatest breadth. Thorax brownish, dark on top. Scutellum with four fine bristles. Three hairs on upper part of posterior margin of mesopleuron. Legs brown, but all tarsi paler. Front tarsus with a posterodorsal hair palisade on tarsomeres 1-4 and tarsomeres 4 and 5 almost same in length. Mid femur brown, except ventral middle darker. Mid tibia pale white at apical half. Hind leg brown, except femur darker. Wing 1.10-1.20 mm long. Costal index 0.61- 0.62. Thick veins light brown with tip of costa and vein Rs darker. Thin veins grayish brown and membrane tinged brownish gray. Vein Rs with a vesicle at tip and not extends beyond tip of costa. Haltere brown. Abdomen with tergites I-VI brown, with only a few short hairs, almost confined to posterior margins. Venter pale grayish with minute, sparse, pale hairs on segments 3-6. Abdominal tergites with fine hairs, little longer in tergites VI. Venter hairs smaller and finer. Hypopygium mainly brown, with few, short hairs. Left anterior process of epandrium with a small process toward base, right anterior process with two processes, which are with rounded apexes.

Female (Fig. 1): Body 1.00-1.19 mm long. Post pedicel yellow brown. Palps paler with a bristle-like apical hair and numerous shorter hairs. Frons with some hairs and microtrichia. Rear of each abdominal tergite with small pits, and with about 20 hairs in row at rear margin. Tergites covered with scatter hairs and microtrichia.

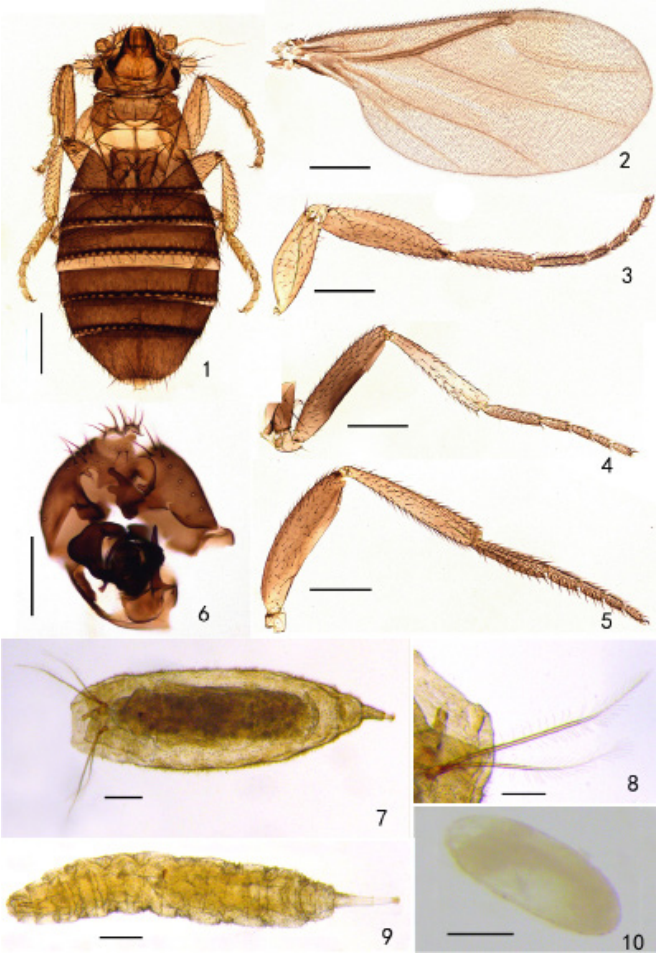

Fig. 1. *Chonocephalus depressus* Meijere. 1. Female; 2-6. Male; 2. Wing; 3. Fore leg; 4. Mid leg; 5. Hind leg; 6. Hypopygium; 7-8. Pupa; 7. Pupa, dorsal view; 8. Pupa, respiratory horns; 9. Larva, dorsal view; 10. Egg. Scale bar: 1,2,3,4,5,7,9=0.2mm; 6, 8,10=0.1mm.

Biological observations

Adults show sexual dimorphism, the male exhibiting typical phorid wing venation, while the female is wingless. The male is actively running and flying. When he finds a female, he suddenly pounces on her. Mating takes place immediately. Female adult period ranges from 3 to 6 days. She lays scattered eggs on the surface of pileus and gill. The egg takes generally 1-2 days to hatch. Larva feeds on fruiting bodies and mycelium of mushroom. The larval period is 4-5 days under 27°C covering 3 instars. Mature larva buries one half in decaying fruiting body and pupariates with the back of head exposed. A pair of breathing horns arise anteriolaterally of the postpronotum, one day after pupariation. The duration of the pupa stage is 6-7 days. The complete life cycle requires about 12-16 days at 27°C.

The larva mainly feeds on rotten pileus and stipe of oyster mushroom and also can damage the fruiting body. It usually wriggles here and there and invades from lamella into pileus, forming tiny pore canals. The larva also feeds on the mycelium of mushrooms, resulting in destruction of mycelium and fruiting body primordia. The larva infests *P. ostreatus* and *P. pulmonarius*, but no serious damage has been observed.

The genus *Chonocephalus* Wandolleck has been reported from China only recently, with a new species *C. forcipulus* Liu and Chu and a new record *C. fletcheri* Schmitz (Liu and Chu 2016).

Chonocephalus depressus is the third species of *Chonocephalus* observed in China, although this tramp species occurs on the Arabian Peninsula (Disney 2006), in Israel (Mostovski 2016), Indonesia, India, Thailand, Philippines (Disney 2016). A possible invasion route of this species to China may run from southern Asia to China. It may be listed as a quarantine species since it caused significant damages to local cultivated mushrooms.

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