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**Research Notes**

# First Report of *Liposcelis bostrychophila* Badonnel (Psocoptera: Liposcelidae) as a Museum Insect Pest in Malaysia

(Laporan Pertama *Liposcelis bostrychophila* Badonnel (Psocoptera: Liposcelidae) sebagai Serangga Perosak Muzium di Malaysia)

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ABSTRACT

*This paper reports the infestation of psocid,* Liposcelis bostrychophila *Badonnel (Psocoptera: Liposcelidae) in the insect museum at Medical Entomology Unit, Institute for Medical Research, Kuala Lumpur. These tiny organisms were recognised as museum insect pest and found frequently in the insect boxes containing mosquitoes, flies, cockroaches and butterflies. They feed on dead insect specimens and cause severe physical damages to the valuable reference specimens collected in the early 20th century. Hence, it is important to control their population immediately to prevent them from causing further deterioration to the museum collection.*

*Keywords: Insect pest; Liposcelis bostrychophila; Malaysia; museum*

ABSTRAK

*Kertas ini melaporkan infestasi oleh sejenis serangga perosak,* Liposcelis bostrychophila *Badonnel (Psocoptera: Liposcelidae) di Muzium Serangga, Unit Entomologi Perubatan, Institut Penyelidikan Perubatan, Kuala Lumpur. Serangga perosak yang bersaiz kecil ini selalu dijumpai di dalam kotak penyimpan serangga yang mengandungi spesimen seperti nyamuk, lalat, lipas dan rama-rama. Serangga perosak ini akan memakan dan merosakkan keadaan fizikal spesimen-spesimen yang bernilai tinggi memandangkan spesimen ini telah dikutip dan disimpan pada awal abad ke-20. Oleh sebab itu, adalah penting sekali untuk mengawal populasi serangga perosak ini untuk mengelakkan kerosakan spesimen rujukan terjadi selanjutnya.*

*Kata kunci: Liposcelis bostrychophila; Malaysia; muzium; serangga perosak*

## INTRODUCTION

Members of the insect order, Psocoptera, are known as psocids (commonly called booklice or bark lice). They are small, soft-bodied insects, most of which are less than 6 mm long. The metamorphosis is simple. Some psocid feed on algae and lichens, while others feed on moulds, cereals, pollen, fragments of dead insects and other organic materials (Charles & Norman 2005).

Psocids are widely distributed and have been reported infesting domestic premises, raw material stores, manufacturing factories, and also museum. *Liposcelis bostrychophila* Badonnel has become a rather important pest in houses and warehouses in Europe, Australia and parts of North America (Charles & Norman 2005). It is also a primarily nuisance pest and is widespread in the UK with 30% estimation of household contained this species. Large population of *L. bostrychophila* can taint foodstuffs with its waste products and can physically damage grains such as rice (Turner 1998).

Psocid may transmit pathogens since microorganisms and their spores will survive passage through the psocid gut and may be carried on the surface of their body (Obr 1978; Turner 1986). Even though there is no evidence that psocids are vectors of diseases, they may ingest tapeworm ova and harbor their larvae so they could act as intermediate hosts for the parasites (Turner 1994). In addition, they may elicit allergic reactions in sensitized person. Turner & Ali (1996) were able to identify the dominant antigen from *L. bostrychophila*. Antibodies to psocid antigens were identified through Elisa plate tests in 11% of the normal population.

This present paper reports on the occurrence of *L. bostrychophila* as a museum insect pest in Malaysia for the first time. In March 2009, an inventory was conducted in the insect museum, Medical Entomology Unit, Institute for Medical Research of insect reference specimens maintained thereat. There were about 350 insect boxes kept in the insect museum which contained a variety of medical important insects species such as mosquitoes, flies and cockroaches from Malaysia and other countries. These specimens were collected since 1904 with the mosquito specimens being the main collection in the museum.

Inventory was conducted by opening the insect boxes and examining every single specimen by recording the species identification, date of collection, location of collection, name of collector, name of taxonomist and finally to photograph the specimen as digital record in a computer system. The entire insect boxes were labeled with the reference number to enable rapid access to the specimens.

Naphthalene ball was placed inside the insect boxes to prevent insect pests such as ants from eating the insect specimens. However, most of the naphthalene balls were found evaporated in the insect boxes and we found many tiny insects wandering inside the boxes when the boxes were opened for examination.

The tiny insects were then collected by using a soft forceps and preserved in 70% alcohol. We later transfer it into lactol-phenol for several minutes and finally placed it on a glass slide and mounted with a drop of Hoyer medium. The insects were then examined under a compound microscope for species identification by using a taxonomy key provided in Mockford (1993).

Result showed that the insects were *L. bostrychophila* Badonnel (Psocoptera: Liposcelidae) (Figure 1). The taxonomy features as follows: the abdominal tergites 3-4 with a posterior membranous band. Sclerotized areas of body pale to medium brown; head and thorax darker than abdomen. The shoulder bristle (S1) is short and not much longer than other setae of edge of lateral lobe of pronotum. It has a lateral pair of prosternal bristles located posterior to the middle of prosternum; the compound eye consisted of 7 ommatidium. Areoles of vertex are arched forward, separated by narrow lines of thin cuticle and have relatively large nodules. Abdominal areoles are similar to areoles of the vertex except they are more transverse oriented (Figure 2).

We estimated about 5% of the total insect boxes in the museum were infested by *L. bostrychophila*. The occurrence of *L. bostrychophila* may cause physical damages to the specimens due to its feeding activity on the dead insects. This definitely will destroy the taxonomy features of the valuable insect specimens for study and reference purposes and also destroy the biodiversity record of the country. Particular problems may be experienced where psocids infest valuable articles, books and furs.

*Liposcelis bostrychophila* exhibits partenogenensis in behavior, because all the offspring are female, the rate of population increase is exponential and infestation could arise from a small indigenous population when favorable conditions occur (Turner 1986).

A survey of the prevalence of *L. bostrychophila* in domestic kitchen in the UK indicated that they are present in up to 20% of household and concluded that psocids were randomly distributed and their dispersal mechanism likely depends heavily on human activities (Turner & Maude-Roxby 1989).

Endang et al. (1992; 2002) studied the distribution of psocid in several places of Indonesia, including Bali, Lombok, Java and eastern islands. Recently, Endang & New (2005) discovered 13 new species of psocids in Sumatera, Indonesia. In Japan, Yoshizawa (2008) provided the complete checklist of Japanese psocoptera consisting of 21 families, 52 genera and 137 species and subspecies. Lienhard and Smithers (2002) compiled the world catalogue of psocoptera, for the regions of America, Africa, Asia, Australia and islands from Pacific Ocean, Indian Ocean and Atlantic Ocean. In Malaysia, 22 families and 47 genera were recorded from the study (Lienhard & Smithers 2002). However, no record of *Liposceles bostrychophila* was found in the world catalogue with special reference to Malaysia. Thus, it is important to update the checklist of the world catalogue of psocoptera and enrich our knowledge of psocid biodiversity in this country.

*Liposcelis bostrychophila* is an extremely difficult insect to control. Its small size enables it to hide in crevices

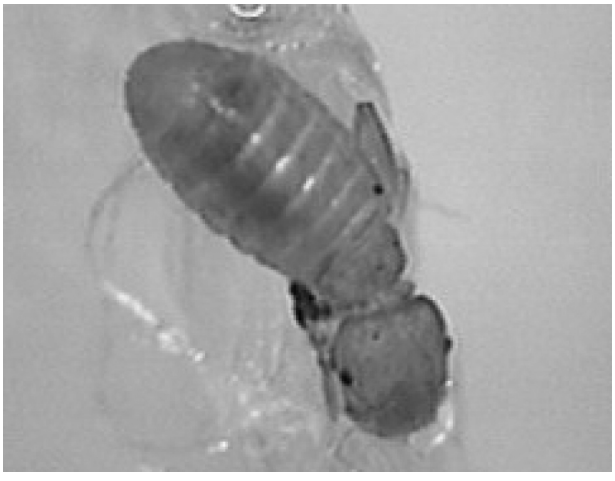

FIGURE 1. The psocid, *Liposcelis bostrychophila* Badonnel (Psocoptera: Liposcelidae) recovered from the insect box in entomology museum, IMR. (x40)

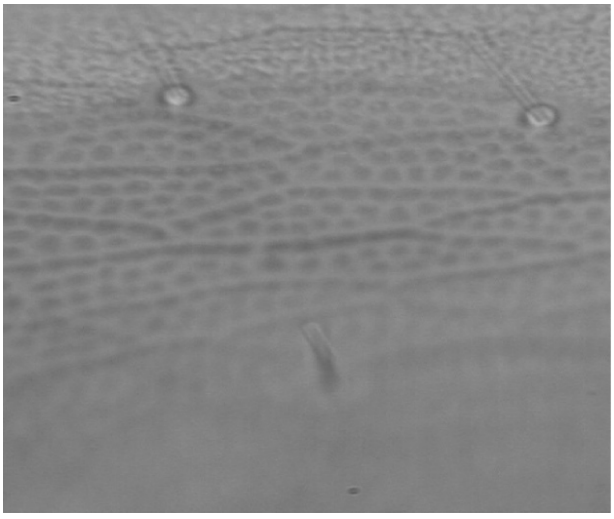

FIGURE 2. Abdominal areoles are transversely spread by narrow line; the abdominal surface is covered with large nodules. (x100)

and cracks, avoiding contact by many standard types of treatment. They are able to survive without food for a considerable period of time (Turner & Maude-Roxby 1989). It has been known that the amount of rickettsial bacteria, *Wolbachia* sp., is related to the variability of egg production in *L. bostrychophila* (Yusuf et al. 2000). Some reports found *L. bostrychophila* is tolerant to pyrethroid and carbamate insecticides; however, this pyrethroid tolerance can be overcome by using synergists. A mixture of piperonyl butoxide and permethrin (5:1 or 10:1) is highly effective at killing even the tolerant populations (Turner et al. 1991).

In this case, placing naphthalene balls in the insect boxes and replacing them every six months should be recommended to prevent the infestation of psocid in the insect boxes. In addition, insect museum should be fumigated regularly and effective monitoring measures should be employed to minimise the threat of museum insect pest to the valuable insect specimens.

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