First case report of gastrointestinal infection in an infant caused by the larvae of *Lasioderma serricorne* (Coleoptera: Anobiidae)

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First case report of gastrointestinal infection in an infant caused by the larvae of *Lasioderma serricorne* (Coleoptera: Anobiidae)

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ABSTRACT We report an unusual cause of gastrointestinal infection occurring in a one-
year-old infant patient who was brought to a public hospital in Kuala Lumpur, Malaysia.
Larvae passed out in the patient’s faeces were confirmed as belonging to Lasioderma
serricorne by DNA barcoding. We postulate the larvae of L. serricorne were acquired from
contaminated food and were responsible for gastrointestinal symptoms in the patient. To our
knowledge, this report is the first on human gastrointestinal infection caused by L. serricorne
larvae.

KEY WORDS Lasioderma serricorne, DNA barcoding, gastrointestinal infections,
paediatric, Malaysia
Infection of the gastrointestinal tract is common in infancy (Purssell 2009), in which viruses (rotavirus, norovirus and enteric adenoviruses) account for the majority of cases (Iturriza-Gómara et al. 2008). Bacterial infections (including *Salmonella* and *Campylobacter* spp. infections) are significantly less common (Davies et al. 2001). Occasionally, insects of the order Diptera have been reported to cause gastrointestinal infections (referred to as intestinal myiasis; due to infestation of dipteran larvae) in children (Kandi et al. 2013, Francesconoi and Lupi 2012). Occurrence of gastrointestinal disorders associated with *Lasioderma serricorne* has never been reported. *L. serricorne*, known as the cigarette beetle, is a cosmopolitan pest of stored tobacco (Ashworth 1993). *L. serricorne* also infests a wide range of other stored commodities such as grains, rice, pasta and beans and is of considerable economic importance (Blanc et al. 2006).

**Case Report**

A one-year-old baby girl was brought to the Paediatric Emergency Department in November 2015, with a 3 day history of fever and one episode of passing multiple larvae in her stool (Fig. 1). In the last 2 days she also had frequent bowel movements of 4 to 5 times a day. The stool consistency was normal and it was not associated with blood or mucous. Her oral intake was good and she had no vomiting. However, she was slightly irritable and the parents were unsure why the child was crying on and off, especially at night. There was no history of respiratory or urinary tract infections.

Upon examination, the child weighed 9.0 kg and was febrile with a body temperature of 39.6 °C. Blood pressure and heart rate were 86/60 mmHg and 130/min, respectively. General physical and systemic examinations were unremarkable. Since larvae were found in the patient’s stool, the child thus was given a single dose of syrup albendazole 200 mg as a treatment for parasitic infection, to be repeated in two weeks; and syrup paracetamol 125 mg four times a day to treat fever. At the one-week follow up appointment, it was reported the
child continued to pass larvae until Day 4 of illness. Her fever subsided by Day 5 and she recovered without further complications.

**Materials and Methods**

The collected larvae were sent to the Department of Parasitology, Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia, for identification. Four larval specimens were examined under a stereomicroscope (Leica Microsystems), revealing approximately 3.5 mm yellowish-white, hairy, full grown larvae, with visible legs and light brown coloured head (Fig. 2).

DNA barcoding (Ratnasingham and Hebert 2013) was employed to obtain species identification for the specimen. DNA was extracted from the whole larva specimen using the NucleoSpin® Tissue (Macherey-Nagel, Germany) and a fragment of cytochrome c oxidase subunit 1 (COI) mitochondrial DNA (mtDNA) gene was amplified using the “Lep” primer combinations via polymerase chain reaction (PCR) (Wilson 2012). Cycle sequencing was performed bi-directionally using the PCR primers. The DNA barcode from the specimen demonstrated 99.85% similarity to the closest matching DNA barcode in BOLD (BOLD: ACG7582) and nested within other DNA barcodes named *L. serricorne* on a BOLD identification tree (Fig. 3). Therefore, using a strict tree-based assignment model (Wilson et al. 2011), we concluded that this specimen is the larval stage of *L. serricorne*.

The University of Malaya Medical Centre Ethics Committee (MEC Ref. No. 201312-0608) approved our research protocols involving human subjects. The parents provided written consent for this study.

**Results and Discussion**

Gastrointestinal infection in infants is usually self-limiting and treatable. However, severe complications can occasionally arise, particularly when the infection manifests as acute infectious enteritis, which can be fatal in children (Thapar and Sanderson 2004). In
developing countries, cases of gastrointestinal infection remains high with an estimated 1.8 billion episodes of childhood diarrhoea and is an important clinical problem in children despite improvements in public health and economic status (Casburn-Jones and Farthing 2004).

The life cycle of *L. serricorne* is completed in 45-70 days (Retief and Nicholas 1988). Females oviposit as many as 100 eggs singly onto dried food materials and the eggs hatch in 6-8 days. The larvae undergo 4 to 6 instar stages before they transform into inactive pupae and emerge into fully developed adult beetles in about 7 to 18 days, depending on the environmental temperature and humidity (Retief and Nicholas 1988, Reed and Vinzant 1942). The adult is small, stout, oval and brownish red in colour and lives for 2 to 4 weeks. When fully grown, both adults and larvae are 2-3 mm long.

The present case is noteworthy as this is the first report of gastrointestinal infection associated with the larvae of *L. serricorne*, which is not known to be medically important. This patient was a full-term baby weighing 3.0 kg at birth. Her developmental milestones were appropriate and she received up-to-date immunizations. The family lives in a healthy and hygienic environment with a domestic helper taking care of the baby. The working parents are well-educated and they have another healthy and asymptomatic 3-year-old daughter.

At the time of infection, the baby was no longer breast-feeding and had started eating solid food. The larvae passed out in the patient’s faeces may have developed in the intestine after the baby ingested eggs from contaminated food; prepared from ingredients that do not involve cooking such as cereals and biscuits infested with cigarette beetles. The baby might also have become infected by drinking contaminated infant formula. A similar case of intestinal disorder in a newborn due to consumption of milk powder contaminated with eggs and larvae of *Musca domestica* has been reported in India (Shekhawat et al. 1993). Babies by
nature have the habit of putting things into their mouth; as reported by the parents in the present case. It is also plausible that the baby picked up contaminated materials (food or non-food substances infested with eggs or larvae) off the floor that leads to the infection. Two dogs also reside in the house, and the source of infection could be pet food; pet food is one of the commonly infested items by *L. serricorne* at home (Choe 2013). However, sources of the infection were not further investigated.

The risk of gastrointestinal infections in infancy can be reduced through good hygiene practices by the parents and carers. Cigarette beetle infestations in food products can be prevented and controlled by locating and eliminating the source of infestation. Infested items can be cold-treated (16 days at 2 °C, 7 days at -4 °C or 0 °C for 4 to 7 days) or heat-treated (88 °C for an hour, 49 °C for 16 to 24 hours) to eliminate the infestation of all stages of *L. serricorne* (Cabrera 2014). Healthcare professionals can raise awareness and provide advice on proper treatment for the underlying cause of gastrointestinal infections particularly when the symptoms signify serious complications. To our knowledge, this report is the first on human gastrointestinal infection caused by *L. serricorne* larvae.

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References Cited


Choe, D.H. 2013. Pantry pests. In M.L. Fayard (eds.), Pest Notes. UC ANR, Oakland, CA.


Ratnasingham, S., and P.D.N. Hebert. 2013. A DNA-based registry for all animal species: The barcode index number (BIN) system. PLOS ONE. 8: e66213.


**Figure Legends**

**Fig. 1.** Macroscopic examination of the stool sample showing multiple white coloured, scarab-like shaped larvae.

**Fig. 2.** Stereomicroscope examination of cigarette beetle larva, *L. serricorne* (A, lateral view and B, ventral view) which revealed a C-shaped, yellowish-white larva, thinly covered with fine brown hairs with visible legs. The light brown coloured head is evenly rounded dorsally.

**Fig. 3.** BOLD identification tree. This tree is produced by a full database sequence identification request in BOLD for the larval specimen. The sequence (designated as unknown specimen) groups closely with those from Egypt, France, Cambodia, China, and Brazil; and the species is nested within a cluster of *Lasioderma serricorne*. 
Macroscopic examination of the stool sample showing multiple white coloured, scarab-like shaped larvae.
1151x863mm (72 x 72 DPI)
Stereomicroscope examination of cigarette beetle larva, *L. serricorne* (A, lateral view and B, ventral view) which revealed a C-shaped, yellowish-white larva, thinly covered with fine brown hairs with visible legs. The light brown coloured head is evenly rounded dorsally.

236x88mm (150 x 150 DPI)