

Research Note

First report of mermithid parasitism (Nematoda: Mermithidae) in mosquitoes (Diptera: Culicidae) from Lao PDR

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Abstract. Unidentified mermithid nematodes were found in the abdominal cavity of three species of *Anopheles* mosquitoes from LAO PDR. This is a first record of mermithid nematodes in adult mosquitoes from Lao PDR. Two worms were found in each adult host and the infection was more prevalent in the northern region compared to the south.

Considerable effort has been made in the control of mosquitoes by using mermithid nematodes as biological agents over the years (Petersen, 1985). Currently about 25 species of mermithid nematodes are known to parasitize mosquitoes and have been frequently recorded from many parts of the world in larvae (Blackmore, 1994), but less is known about the occurrence of mermithids that mature in adult mosquitoes. Infections in adult mosquitoes are predominant in the *Aedes* / *Ochlerotatus* species (Daoust, 1983). There have been reports of adult mosquitoes of *Ochlerotatus* being parasitized by mermithids in Sweden (Blackmore, 1994) and in Denmark (Nielsen, 2004), in *Aedes vexans* (Meigen) (Blackmore *et al.*, 1993, Ewing *et al.*, 1989), in *Ae. sierrensis* (Ludlow) (Washburn *et al.*, 1986), in *Ae. canadensis* (Theobald), *Ae. cinereus* Meigen, *Ae. diantaeus* Howard, Dayar and Knab, *Ae. punctor* (Kirby), *Anopheles punctipennis* (Say) and *Coquillettidia perturbans* (Walker) (Blackmore *et al.*, 1993) from USA and from Malaysia in *An.*

letifer Sandosham and *Ae. albopictus* (Skuse) (Cheong & Ramachandran, 1963). In some laboratory studies the mermithids have been carried over into the abdominal cavity and thorax of adult mosquitoes (Kurihara & Maeda, 1980; Lee & Cheong, 1988; Singh, 1978). However, nothing is known about this parasite and host relationship in the Mekong Delta.

During the course of our entomological investigations on malaria transmission in Lao PDR we found three species of adult *Anopheles* parasitized by mermithid nematode. This is the first observation of mosquitoes parasitized by mermithids in Lao PDR.

In 2004 we carried out mosquito collections in four villages in Attapeu province in the southern most region of Lao PDR and in two villages in the northern province of Luang Namtha to determine the malaria vectors. Human landing catches were carried out from 18:00 hours to 06:00 hours. All mosquitoes were identified and *Anopheles* mosquitoes were dissected to extract the ovaries for

parity determination and the guts were examined for oocysts. Heads and thoraxes were pooled to enable us to carry out ELISA for detection of circumsporozoite antigen. In September 2004, while dissecting the mosquitoes in Phouhom we found two mermithids (14 mm length, 0.36mm width) in the abdominal hemocoel of *An. donaldi* Reid. In Piergeo we found similar mermithid (21mm length, 0.27 mm width) in *An. sawadwongporni* Rattanarithikul and Green. In the northern region in Nammadmai village (Namtha district) we found 1 *An. hyrcanus* sp Reid to be positive and in Nammai village (Sing District) 5 *An. hyrcanus* were positive with the similar mermithid worm (length varied from 5mm to 20mm and width 0.18-0.36 mm) (Table 1). In Piergeo *An. sawadwongporni* was the predominant species and in Nammadmai it was *An. hyrcanus*. Mermithids preserved for taxonomic determination were in the advanced parasitic stage thus precluding a proper identification.

In general mermithids do not prevent female mosquitoes from blood feeding but they can cause biological castration, preventing the mosquitoes from reproducing (Trips *et al.*, 1968; Petersen *et al.*, 1967). Blackmore *et al.* (1993) reported that many of their infected females were scored as parous, though it is possible that the nematodes, not egg development, had altered the ovarioles. Most of the mosquitoes in which the worms were present in this study were nulliparous but the *An. sawadwongporni* and one *An. hyrcanus* were parous.

Although we have been working in the southern region of Lao PDR since 2000 this is the first time that we have come across mosquitoes infected with mermithid. However, this was our first trip to the north and we found the infected mosquitoes. In the northern region of Lao PDR this mermithid has been previously observed (Sidavong, personal communication) in mosquitoes. It looks like this mermithid is more prevalent in the northern region and survives well in *An. hyrcanus* sp. These are only accidental observations and special surveys in this direction may possibly lead to the collection of more parasitized mosquitoes. More work needs to be carried out in order to determine this mermithid's potential as a bio-control agent.

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Table 1. Incidence of unidentified mermithid species in mosquitoes

Name of village	Region	Species	Number examined	Number with mermithid
Phouhom	South	<i>An. donaldi</i>	3	1
Piergeo	South	<i>An. sawadwongporni</i>	47	1
Namadami	North	<i>An. hyrcanus</i> sp	20	1
Nammai	North	<i>An. hyrcanus</i> sp	79	5

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