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Biodiversity Record: Terrestrial ribbon worms (genus *Geonemertes*) predation on arthropods

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Subjects: Ribbon worm, unidentified *Geonemertes* species (Nemertea: Enopla: Hoplonemertea: Prosorhochmidae);
Ribbon worm, *Geonemertes pelaensis* (Nemertea: Enopla: Hoplonemertea: Prosorhochmidae);
Orange sharpshooter planthopper, *Bothrogonia addita* (Insecta: Hemiptera: Cicadellidae);
Lynx spider, unidentified *Oxyopes* species. (Arachnida: Araneae: Oxyopidae);
Wasp, unidentified genus and species (Insecta: Hymenoptera: possibly Eucharitidae).

Subjects identified by: Rene Ong and Yap Eehean.

Location, date and time: Four separate incidents recorded at three locations on Singapore Island —
1) Jalan Bahar area near CleanTech One; 28 Sept 2022, around 0804 hrs.
2) Windsor Nature Park; 26 Nov 2022, around 0730 hrs and 9 December 2022, around 1030 hrs.
3) Ulu Sembawang Park Connector; 18 December 2022, around 0920 hrs

Habitat: Urban parkland (Jalan Bahar) and edge of secondary forest (Windsor Nature Park and Ulu Sembawang).

Observers: Chuah Tuang Heok, Andrew Seah, Adeline Goh and Soh Kam Yung.

Observations: Four separate observations herein recorded —

Figs. 1–4. Ribbon worm preying on *Bothrogonia addita* near CleanTech One. (Photographs by: Chuah Tuang Heok)

1) A *Geonemertes* sp. was photographed by Chuah Tuang Heok at the Jalan Bahar area near CleanTech One on 28 September 2022. It was on a fern and coiled around an orange sharpshooter planthopper (*Bothrogonia addita*) on which the worm was presumably feeding (Figs. 1–4). The prey was about 1 cm in body length. It was not possible to estimate the length of the ribbon worm as it was coiled up.

Figs. 5–6. Ribbon worm wrapping a lynx spider at Windsor Nature Park on 26 November 2022. (Photographs by: Andrew Seah)

2) A ribbon worm with its body wrapped around a lynx spider (of unknown species and genus) suspended in mid-air off a blade of grass by a slimy thread (Figs. 5 & 6) was photographed by Andrew Seah on 26 November 2022 at Windsor Nature Park. The fine silk thread is likely to have been produced by the spider when it was attacked. It was not possible to estimate the length of the ribbon worm as it was coiled up.

Fig. 7. Ribbon worm sucking dry a wasp on a leaf at Windsor Nature Park on 9 December 2022. Fig. 8. Ribbon worm leaving its prey having presumably ingested its fill. Fig. 9. Remains of the wasp left behind by the ribbon worm. (Photographs by: Adeline Goh)

3) Adeline Goh photographed a ribbon worm predating on a wasp under a leaf at Windsor Nature Park on 9 December 2022 (Fig. 7). The ribbon worm, about 6–8 cm in length, was observed at the time when it had just finished its meal. It slithered away, leaving the remains of its prey on the leaf (Figs. 8 & 9).

Figs. 10–11. *Geonemertes pelaensis* ingesting a lynx spider, along the Ulu Sembawang Park Connector on 18 December 2022. Fig. 12. View of part of the worm on underside of leaf. (Photographs by: Soh Kam Yung)

4) At the Ulu Sembawang Park Connector on 18 December 2022, Soh Kam Yung found and photographed a *Geonemertes pelaensis* on a leaf with its body wrapped around a lynx spider with body length of about 1 cm (Figs. 10–12). The spider was not moving, so it was probably already dead and the worm was ingesting its meal. The worm stayed with the spider in the same position for a few minutes.

Remarks: This article illustrates four rarely seen incidents of the predatory habits of terrestrial ribbon worms. In all four instances where the prey animals are capable of fast movements, it seems likely that they were not deliberately hunted, but obtained by chance when they ventured within striking distance of the worms' proboscis, which is equipped with a stylet to pierce and inject toxin into the prey, or they came into direct contact with the worm. The thick and sticky mucus exuded by the worm could immediately ensnare small animals, making escape difficult or impossible. In all featured incidents, the worms coiled or wrapped their bodies around their prey (Figs. 1–7, 10 & 11), possibly to further prevent them from escaping. Thick sticky mucus may also act as a safety line that prevents the worms and their prey from falling great heights off the surfaces where the confrontation occurred, as is shown in the second incident (Figs. 5 & 6). Ingestion of the prey is accomplished by the worm's proboscis, which, when inserted into the prey, acts like a drinking straw to suck out the internal fluids, soft tissues and organs. This form of prey consumption is regarded as suctorial feeding (McDermott & Roe, 1985). Their exoskeletons are left intact and abandoned, as shown in the third incident (Figs. 8 & 9).

Very little is known about the terrestrial ribbon worms in Singapore, and this may even be the first record of the genus *Geonemertes* in the country (see Chou et al., 1994; Moore et al., 2001; Wang & Woo, 2011). The specific identities of the ribbon worms featured in the first three incidents are unknown. The subject of the fourth incident is tentatively identified as *Geonemertes pelaensis* in having only one narrow brown stripe on its dorsum (see Morffe et al., 2020). The other three are distinguished by having 3 thicker and darker brownish grey stripes down their backs. *Geonemertes pelaensis* is a known predator of small terrestrial snails (Gerlach, 1998) as well as terrestrial arthropods such as isopods, amphipods, insects and spiders (Shinobe et al., 2017).

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