



RESEARCH ARTICLE

***Haemaphysalis wellingtoni* (Acari: Ixodidae) from the spotted wood owl (*Strix seloputo*) (Aves: Strigiformes): a new tick-host record in Peninsular Malaysia**Tan, L.P.¹, Roslan, N.S.², Kazim, A.R.^{3*}, Che Wan Zalati, C.W.S.¹, Hassan, H.¹, Heo, C.H.^{3,4}¹Faculty of Veterinary Medicine, Universiti Malaysia Kelantan Pengkalan Chepa, 16100 Kota Bharu, Kelantan, Malaysia²Veterinary Teaching Hospital, Universiti Malaysia Kelantan, 16310 Bachok, Kelantan, Malaysia³Department of Medical Microbiology and Parasitology, Faculty of Medicine, Universiti Teknologi MARA, Sungai Buloh Campus, Jalan Hospital, 47000 Sungai Buloh, Selangor, Malaysia⁴Cardiovascular Advancement and Research Excellence Institute, Universiti Teknologi MARA, 47000 Sungai Buloh, Selangor, Malaysia*Corresponding author: abdrahmankazim@gmail.com

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ABSTRACT

Multiple engorged tick nymphs (n= 6) were collected from an injured spotted wood owl (*Strix seloputo*) in Kelantan, Peninsular Malaysia. Morphological identification of the nymphs revealed that the ticks were *Haemaphysalis wellingtoni*, based on several distinctive features: (1) internal edge of palpal article III extending far beyond the internal edge of palpal article II; and (2) four feathery and close-spaced infrainternal setae. Subsequent molecular analysis of a randomly selected nymph targeting the mitochondrial 16S gene corroborated with the species identity of the tick. To date, this is first report of the infestation of *H. wellingtoni* on *S. seloputo*. Future studies are needed to determine whether native or endemic birds may serve as disseminators of ticks and tick-borne diseases.

Keywords: Ticks; owl-tick association; host ecology; Malaysia.

INTRODUCTION

The genus *Haemaphysalis*, comprising 167 recognized species, is widely distributed throughout the Oriental and Australasian regions, including Malaysia (Guglielmone *et al.*, 2023). Recent data indicate that 49 tick species have been recorded in Malaysia, with *Haemaphysalis* being the most prevalent genus, accounting for 21 species (Kazim *et al.*, 2022; Apanaskevich, 2023). Members of this genus infest a wide range of wild and domestic animals – including mammals, birds, and reptiles – and are recognized vectors of numerous tick borne pathogens (Service, 2012; Guglielmone *et al.*, 2014). Their significance has become increasingly apparent with rising habitat disturbance and closer interactions between wildlife and humans (Filipe Dantas-Torres, 2015).

Among these species, *Haemaphysalis wellingtoni* is commonly found in the forested regions of Peninsular Malaysia and Malaysian Borneo (Kohls, 1957; Kazim *et al.*, 2022). It parasitizes both mammals and birds and has occasionally been reported on humans (Guglielmone & Robbins, 2018). Recent studies emphasize its strong association with avian hosts, particularly ground dwelling Galliformes such as the red jungle fowl (*Gallus gallus*) (Guglielmone & Nava, 2017). In Singapore, *H. wellingtoni* is the most frequently recorded tick on birds, with *G. gallus* identified as its primary host (Kwak *et al.*, 2024). Human infestations have also been reported in Singapore and Thailand, highlighting its zoonotic potential (Parola *et al.*, 2003; Kwak & Ng, 2022).

The spotted wood owl (*Strix seloputo*) is a large, nocturnal raptor widely distributed across Southeast Asia, including Malaysia (Lepage,

2022). Currently, this species is listed as ‘Least Concern’ according to the International Union for Conservation of Nature (IUCN) Red List (BirdLife International, 2016). It inhabits lowland forests, swampy areas, and urban edges (Jeyarajasingam, 2012). Despite its broad range, there is limited information on the ectoparasites affecting this species. While owls are known to host various ectoparasites such as mites and lice (Sáez-Ventura *et al.*, 2022), reports of tick infestations in *S. seloputo* are extremely scarce. Until now, there have been no documented cases of *H. wellingtoni* parasitizing this owl species in Malaysia or elsewhere.

This study presents the first confirmed record of *H. wellingtoni* infesting *S. seloputo* in Peninsular Malaysia. This finding contributes to the growing understanding of tick-host dynamics in Malaysian avifauna and highlights the value of integrating wildlife clinical care with tick surveillance to detect emerging host-parasite relationships.

MATERIALS AND METHODS

On May 18th, 2025, a spotted wood owl (*Strix seloputo*) of undetermined sex was discovered by a civilian along a roadside in Bachok, Kelantan. The owl was kept at the individual’s home for three days before being brought to the Veterinary Medicine Teaching Hospital at Universiti Malaysia Kelantan (UMK) with a complaint of a wing injury. The civilian subsequently surrendered the bird to the hospital. Upon physical examination, the owl was diagnosed with a compound, oblique fracture of the right humerus. It was admitted for hospitalization and later underwent open reduction surgery to stabilize the fracture. During the initial assessment, multiple

engorged ticks were observed attached to both lower eyelids (Figure 1). All visible ticks were carefully removed using fine-tipped forceps, preserved individually in 70% ethanol, and submitted to the Parasitology Laboratory at the Faculty of Veterinary Medicine, UMK, for species identification.

Ticks were examined under an Olympus SZ61 zoom stereomicroscope (Olympus, Tokyo, Japan). Morphological identification was performed based on established taxonomic keys (Kohls, 1957; Tanskul & Inlao, 1989), with further identification of nymphal stages using the key provided by Trapido *et al.* (1964). Diagnostic features used for species confirmation included the shape of the scutum, structure of the basis capituli, segmentation of the palps, and the position of the anal groove. Identified specimens were deposited in the Parasitology Laboratory, Faculty of Veterinary Medicine, Universiti Malaysia Kelantan, under accession number T26.

To support morphological findings, molecular identification was conducted using polymerase chain reaction (PCR) targeting the mitochondrial 16S rRNA gene. Genomic DNA was extracted from internal tick tissues using the Genomic DNA Mini Kit (Geneaid, Taiwan). The PCR protocol followed that of Lv *et al.* (2014), employing the primers 16S-F (5'-TTA AAT TGC TGT ATT-3') and 16S-R1 (5'-CCG GTC TGA ACT CAS AWC-3'). PCR products were aligned using ClustalW, and a consensus sequence was generated through the Bioinformatics.org website. The resulting sequence was compared to reference sequences in GenBank using the Basic Local Alignment Search Tool (BLAST) at the National Center for Biotechnology Information (NCBI) website. A representative sequence was subsequently submitted to the GenBank database.

A brief literature review was conducted to compile two lists: Southeast Asian tick species reported on owls and endemic bird species in Malaysia sampled for tick infestations. Searches were performed using Google Scholar, employing specific keyword combinations (e.g., "ticks" + "owls" + "Southeast Asia") to refine the results. Articles that did not meet the inclusion criteria (e.g., Southeast Asian ticks, Malaysian owl species, endemic birds in Malaysia, or confirmed occurrences within Malaysia) were excluded. The review covered literature published from the 1950s onward, a period marked by heightened tick research activity (Kazim *et al.*,

2025). For publications not accessible online, copies were requested directly from authors, journal editors, or institutional libraries via email.

RESULTS AND DISCUSSIONS

All tick nymphs (n= 6) were morphologically identified as *Haemaphysalis wellingtoni*, based on several key features: (1) internal edge of palpal article III extending far beyond the internal edge of palpal article II; and (2) four feathery and close-spaced infrainternal setae (Figure 2). The DNA extracted from the selected tick yielded a PCR product of approximately 455 bp. BLAST analysis revealed 100% sequence nucleotide similarity with *Haemaphysalis wellingtoni* isolate HwF1 from Malaysia (PP301461). The sequence was submitted to the GenBank database under the accession code PV998995.

Haemaphysalis wellingtoni is commonly recognized as a frequent parasite of birds, particularly ground-dwelling species such as the domestic chicken (*Gallus gallus*) from the order Galliformes (Guglielmone *et al.*, 2014). However, this tick species has also been reported on a variety of mammalian hosts, including rodents, shrews, and cattle (Geevarghese & Mishra, 2011). Rajagopalan *et al.* (1972) listed numerous bird hosts across multiple avian orders for *H. wellingtoni*, with most infestations involving immature tick stages. In the present study, six nymphs were collected from *S. seloputo*, suggesting that this owl species may serve as a secondary or incidental host. Given that *S. seloputo* primarily preys on rodents (Mikkola, 2019), it is plausible that the ticks were acquired through trophic transmission from infected prey. Although this species typically roosts in tall trees, it is also known to inhabit man-made environments such as oil palm plantations and wooded suburban gardens (Jeyarajasingam, 2012), increasing the potential for human-tick encounters. These findings underscore the importance of further research into the host ecology and tick associations of Malaysian owls to better understand their role in the transmission of tick-borne diseases (TBDs).

A Google Scholar search on Southeast Asian ticks infesting owls, using the keywords "ticks" + "owls" + "Southeast Asia," yielded 386 research articles. Of these, 381 were excluded due to redundancy

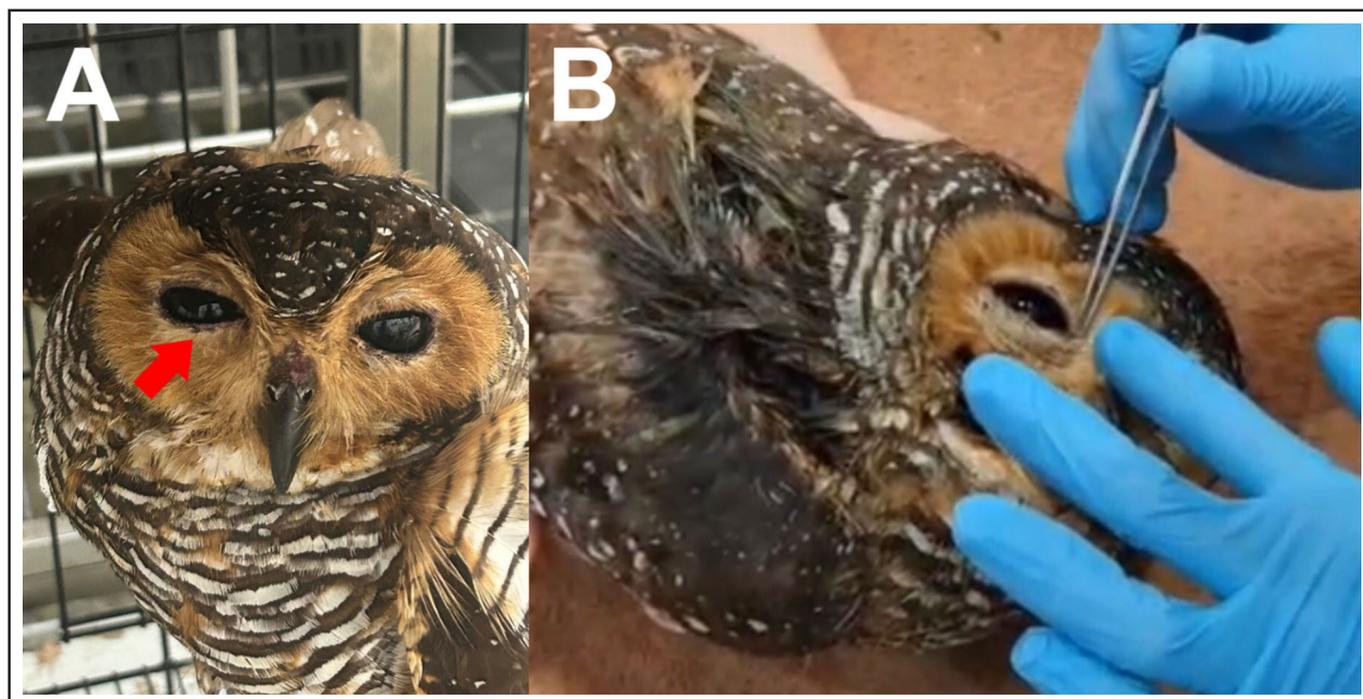


Figure 1. Tick infestation on the spotted wood owl (*Strix seloputo*). **A.** Red arrow shows multiple engorged ticks attached to the lower eyelids. **B.** Ticks were carefully detached from the owl using fine tweezers.

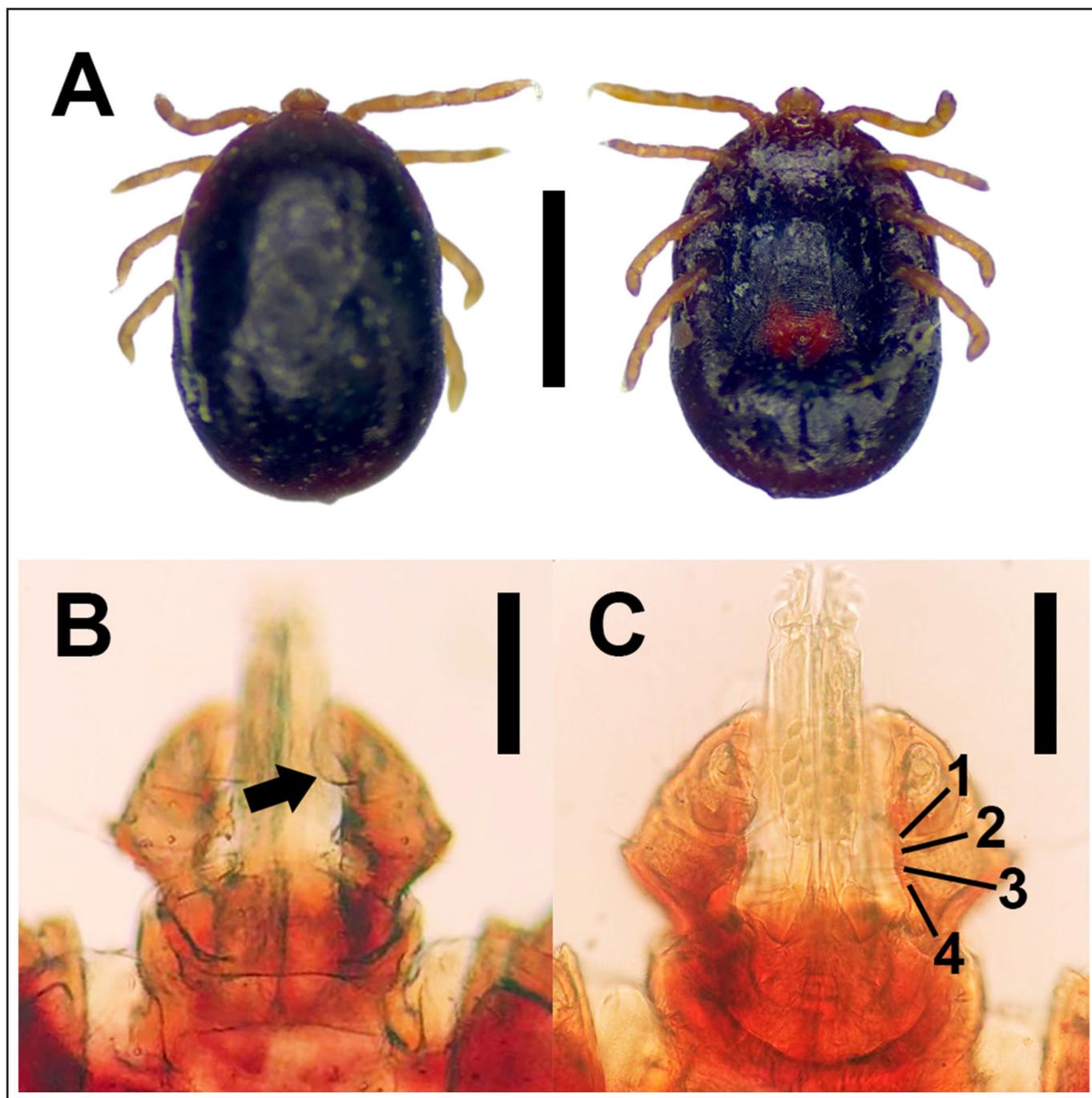


Figure 2. Morphological identification of a *Haemaphysalis wellingtoni* nymph. **A.** Dorsal and ventral views of the nymph idiosoma. Scale bar measurement is 1 mm. **B.** Dorsal view of the nymph gnathosoma. Black arrow shows the inner margin of the third palpal segment protruding internally. Scale bar measurement is 100 µm. **C.** Ventral view of the nymph gnathosoma. Numbers indicate the closely set feathery infrainternal setae at the inner margin of palpal segment II. Scale bar measurement is 100 µm.

or irrelevance to the topic. The remaining five articles met the inclusion criteria and were selected for analysis. For the compilation of endemic bird species in Malaysia sampled for tick infestations, a separate search using the keywords “ticks” + “avifauna” + “Malaysia” returned 204 papers. Of these, 197 were excluded, and the remaining seven relevant articles were used to generate the list.

Reports of tick parasitism in owls are extremely scarce, particularly in Malaysia and in other countries in Southeast Asia. Despite the region’s high tick diversity, only a few species have been documented infesting endemic owls (Table 1). Previous studies in Malaysia have attempted to collect ticks from various owl species, with mixed results. For example, Audy *et al.* (1960) reported several unidentified *Haemaphysalis* nymphs and larvae on the Sunda scops owl (*Otus lempiji*) and the Eurasian scops owl (*Otus scops*)

in Peninsular Malaysia. In contrast, Mariana *et al.* (2008) found no ticks on the Indian scops owl (*Otus bakkamoena*) during a scientific expedition in the Ulu Muda Forest Reserve, Kedah. Similarly, Kwak *et al.* (2024) examined a *S. seloputo* in Singapore but did not detect any ticks. To the best of our knowledge, the present study represents the first report of *H. wellingtoni* infesting *S. seloputo*. Notably, some of the owl species sampled in previous studies are migratory, suggesting that owls may serve as vectors or disseminators of exotic ticks and tick-borne pathogens. This highlights the need for increased tick surveillance on both migratory and resident owl species to better understand and mitigate the spread of TBDs.

Table 2 presents a list of resident bird species in Malaysia that have been sampled for ticks. Notably, most of these records originate from studies conducted by foreign researchers, with relatively few

Table 1. List of Southeast Asian tick species infesting owls. Migratory bird species are marked with asterisks

Tick species	Bird species	Bird vernacular name	Country of occurrence	References
<i>Argas robertsi</i>	<i>Athene brama</i>	Spotted owlet	Thailand	Tanskul <i>et al.</i> (1983)
	<i>Otus bakkamoena</i> *	Indian scops owl	Thailand	Tanskul <i>et al.</i> (1983)
<i>Haemaphysalis bispinosa</i>	<i>Strix leptogrammica</i>	Brown wood owl	Nepal	Mitchell & Dick (1977)
<i>Haemaphysalis doenitzi</i>	<i>Ketupa zeylonensis</i>	Brown fish owl	Nepal	Hoogstraal & Wassef (1973); Mitchell & Dick (1977)
<i>Haemaphysalis wellingtoni</i>	<i>Glaucidium cuculoides</i> *	Asian barred owlet	Thailand	Tanskul <i>et al.</i> (1983)
	<i>Strix seloputo</i>	Spotted wood owl	Malaysia	This study
<i>Haemaphysalis</i> spp.	<i>Ketupa zeylonensis</i>	Brown fish owl	Nepal	Mitchell & Dick (1977)
	<i>Otus lempiji</i> *	Sunda scops owl	Malaysia	Audy <i>et al.</i> (1960)
	<i>Otus scops</i> *	Eurasian scops owl	Malaysia	Audy <i>et al.</i> (1960)

Table 2. List of endemic bird species sampled in Malaysia, along with their associated ticks. Domesticated species such as *Gallus gallus* and other related birds from the orders Anseriformes and Galliformes were excluded in this list. Migratory bird species are marked with asterisks

Bird species	Bird vernacular name	Tick species	Locality	References
<i>Acrocephalus arundinaceus</i> *	Great reed warbler	<i>Haemaphysalis doenitzi</i>	“Jalan Kayu”	Hoogstraal & Wassef (1973)
<i>Anthracoceros malayanus</i>	Black hornbill	<i>Amblyomma</i> spp.	Gunung Benom, Pahang	Hoogstraal <i>et al.</i> (1972)
<i>Anthreptes malacensis</i>	Brown-throated sunbird	<i>Haemaphysalis doenitzi</i>	Rantau Panjang, Selangor	Hoogstraal & Wassef (1973)
<i>Argasianus argus</i>	Argus pheasant	<i>Haemaphysalis doenitzi</i>	Gombak, Selangor	Hoogstraal & Wassef (1973)
	Argus pheasant	<i>Haemaphysalis wellingtoni</i>	Gunung Benom, Pahang	Hoogstraal <i>et al.</i> (1972)
<i>Centropus bengalensis</i>	Lesser coucal	<i>Haemaphysalis doenitzi</i>	Sabah	Kohls (1957)
	Lesser coucal	<i>Haemaphysalis doenitzi</i>	Sungai Wei, Selangor	Kohls (1949); Hoogstraal & Wassef (1973)
<i>Centropus sinensis</i>	Lesser coucal	<i>Haemaphysalis doenitzi</i>	Kuala Lumpur	Kohls (1949)
	Lesser coucal	<i>Haemaphysalis doenitzi</i>	Selangor	Kohls (1957)
	Lesser coucal	<i>Haemaphysalis doenitzi</i>	Peninsular Malaysia	Audy <i>et al.</i> (1960)
	Lesser coucal	<i>Haemaphysalis doenitzi</i>	Subang, Selangor	Hoogstraal & Wassef (1973)
	Lesser coucal	<i>Haemaphysalis</i> spp.	Peninsular Malaysia	Audy <i>et al.</i> (1960)
	Greater coucal	<i>Amblyomma geoemydae</i>	Gunung Benom, Pahang	Hoogstraal <i>et al.</i> (1972)
<i>Centropus sp.</i>	Greater coucal	<i>Amblyomma</i> spp.	Gunung Benom, Pahang	Hoogstraal <i>et al.</i> (1972)
	Greater coucal	<i>Haemaphysalis doenitzi</i>	Gunung Benom, Pahang	Hoogstraal <i>et al.</i> (1972)
	Greater coucal	<i>Haemaphysalis doenitzi</i>	Peninsular Malaysia	Audy <i>et al.</i> (1960)
	Greater coucal	<i>Haemaphysalis doenitzi</i>	Krau Game Reserve, Pahang	Hoogstraal & Wassef (1973)
	Greater coucal	<i>Haemaphysalis doenitzi</i>	Subang, Selangor	Hoogstraal & Wassef (1973)
	Greater coucal	<i>Haemaphysalis</i> spp.	Sabah	Kohls (1957)
	Coucal	<i>Haemaphysalis doenitzi</i>	Sabah	Kohls (1957); Hoogstraal & Wassef (1973)
<i>Cissa jeffreyi</i>	Coucal	<i>Haemaphysalis doenitzi</i>	Bukit Punggar, Melaka	Hoogstraal & Wassef (1973)
	Bornean green magpie	<i>Ixodes</i> spp.	Sabah	Kohls (1957)
<i>Erythropitta granatina</i>	Garnet pitta	<i>Haemaphysalis</i> spp.	Gunung Jerai Forest Reserve, Kedah	Mariana <i>et al.</i> (2008)
<i>Excalfactoria chinensis</i>	King quail	<i>Haemaphysalis doenitzi</i>	Puchong, Selangor	Hoogstraal & Wassef (1973)
	King quail	<i>Haemaphysalis doenitzi</i>	Sungai Wei, Selangor	Hoogstraal & Wassef (1973)
	King quail	<i>Haemaphysalis</i> spp.	Peninsular Malaysia	Kohls (1957); Audy <i>et al.</i> (1960)
<i>Lewinia striata</i>	Slaty-breasted Rail	<i>Amblyomma</i> spp.	Peninsular Malaysia	Audy <i>et al.</i> (1960)
	Slaty-breasted Rail	<i>Haemaphysalis doenitzi</i>	Subang, Selangor	Hoogstraal & Wassef (1973)
	Slaty-breasted Rail	<i>Haemaphysalis</i> spp.	Peninsular Malaysia	Audy <i>et al.</i> (1960)
<i>Lonchura atricapilla</i>	Chestnut munia	<i>Haemaphysalis</i> spp.	Kuap Village, Samarahan, Sarawak	Asrif <i>et al.</i> (2018)
<i>Lophura erythrophthalma</i>	Crestless fireback	<i>Haemaphysalis wellingtoni</i>	Gunung Benom, Pahang	Hoogstraal <i>et al.</i> (1972)
	Sunda scops owl	<i>Haemaphysalis</i> spp.	Peninsular Malaysia	Audy <i>et al.</i> (1960)
<i>Otus scops</i> *	Eurasian scops owl	<i>Haemaphysalis</i> spp.	Peninsular Malaysia	Audy <i>et al.</i> (1960)
<i>Pellorneum malaccense</i>	Mourning babbler	<i>Haemaphysalis doenitzi</i>	Gombak, Selangor	Hoogstraal & Wassef (1973)
<i>Pitta moluccensis</i> *	Blue-winged pitta	<i>Haemaphysalis doenitzi</i>	Fraser’s Hill, Pahang	Hoogstraal & Wassef (1973)
<i>Pycnonotus brunneus</i>	Asian red-eyed bulbul	<i>Haemaphysalis</i> spp.	Sabah	Kohls (1957)
<i>Rollulus rouloul</i>	Crested partridge	<i>Amblyomma</i> spp.	Peninsular Malaysia	Audy <i>et al.</i> (1960)
<i>Strix seloputo</i>	Spotted wood owl	<i>Haemaphysalis wellingtoni</i>	Bachok, Kelantan	This study
<i>Terpsiphone paradise</i> *	Indian paradise flycatcher	<i>Dermacentor</i> spp.	Gunung Jerai Forest Reserve, Kedah	Mariana <i>et al.</i> (2008)
<i>Tropicoperdix graydoni</i>	Sabah partridge	<i>Haemaphysalis</i> spp.	Sabah	Kohls (1957)
<i>Yungipicus moluccensis</i>	Sunda pygmy woodpecker	<i>Haemaphysalis doenitzi</i>	Gunung Benom, Pahang	Hoogstraal <i>et al.</i> (1972)
	“Quail”	<i>Haemaphysalis doenitzi</i>	Selangor	Kohls (1957)
	“Bird”	<i>Haemaphysalis doenitzi</i>	“Syer’s Road”	Hoogstraal & Wassef (1973)
		<i>Amblyomma</i> spp.	Sabah	Kohls (1957)
		<i>Ixodes granulatus</i>	Sabah	Kohls (1957)
		<i>Haemaphysalis</i> spp.	Peninsular Malaysia	Audy <i>et al.</i> (1960)

contributions from local scientists. This suggests an underreported recent surveillance effort targeting ticks on resident bird species in Malaysia. Among the 22 bird species listed, only three are owls, indicating that records of tick infestations in owls are likely incidental or opportunistic (Penteriani & Delgado, 2019). According to Sándor et al. (2021), owls are rarely studied as tick hosts due to their elusive nature, nocturnal behavior, and the inaccessibility of their nesting sites. Existing studies are often limited to nest material surveys or occasional findings from injured birds admitted to rehabilitation centers (Fain et al., 1993; Krištofik et al., 2003). Nonetheless, the medical and veterinary significance of ticks warrants more targeted surveillance on owls, as such efforts could enhance our understanding of the potential zoonotic risks posed by tick-borne pathogens in these understudied avian hosts.

A major limitation of the current study is the absence of pathogen screening in the *H. wellingtoni* ticks collected from the owl. Furthermore, as no blood sample was taken from the owl, pathogen screening of the host was also not performed. As a result, it remains unknown whether the ticks in this study carry pathogens of zoonotic or veterinary significance. *Haemaphysalis wellingtoni* is a known vector of the Kyasanur Forest disease virus (KFDV), which is associated with high human fatality rates in India (Bhat & Naik, 1978). Currently, KFDV has been reported only in India, with no known cases documented in Malaysia (Mourya & Yadav, 2016). Several other pathogens other than KFDV have been detected in *H. wellingtoni*, namely the Nairobi sheep disease orthonairovirus (NSDOV), Kaisodi virus, *Anaplasma bovis*, *Anaplasma phagocytophilum*, *Bartonella* spp., *Ehrlichia* spp., and *Rickettsia* spp. (Rajagopalan et al., 1970; Sreenivasan et al., 1973; Dandawate et al., 1981; Khoo et al., 2016; Koh, 2018; Wattanamethanont et al., 2018). Although several zoonotic and medically important pathogens have been reported in *H. wellingtoni*, this tick species is rarely a human parasite (Guglielmone & Robbins, 2018). To date, human infestations involving *H. wellingtoni* have only been documented in Thailand and Singapore (Parola et al., 2003; Kwak & Ng, 2022), with no such cases reported in Malaysia.

In conclusion, this study represents the first documented case of *H. wellingtoni* infesting *S. seloputo*, and to the best of our knowledge, the first report of tick infestation in this owl species globally. Although owls remain an understudied avian group in parasitological research, increased surveillance and further studies are essential not only to safeguard the health and conservation of Malaysian owl populations, but also to assess their potential role in the dissemination of ticks and TBDs.

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