Leech (Annelida: Hirudinea) Infestations on Canadian Turtles, Including the First Canadian Record of *Helobdella modesta* from Freshwater Turtles

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We collected leeches from freshwater turtles at two sites in southwestern Ontario. Five leech species (*Placobdella parasitica, P. ornata, Helobdella modesta, Erpobdella punctata* and *Alboglossiphonia heteroclita*) were collected from five turtle species (*Chrysemys picta, Chelydra serpentina, Clemmys guttata, Emydoidea blandingii* and *Sternotherus odoratus*). We report a new leech record (*P. ornata*) for *C. guttata*. The unexpectedly high frequency of *H. modesta* on freshwater turtles is discussed.

Key Words: leech parasitism, *Chrysemys picta,* Painted Turtle, *Clemmys guttata,* Spotted Turtle, *Emydoidea blandingii,* Blandings Turtle, *Sternotherus odoratus,* Stinkpot, *Placobdella parasitica, Placobdella ornata, Helobdella modesta, Erpobdella punctata, Alboglossiphonia heteroclita,* Ontario.

Leeches (Class Hirundinea) are common ectoparasites of freshwater turtles in North America, but the details of leech-turtle interactions are still being unravelled. In Canada, only two species are known to parasitize turtles: *Placobdella parasitica,* the Smooth Turtle Leech, and *Placobdella ornata,* the Ornate Turtle Leech (Brooks et al. 1990; Galois and Ouellet 2007). However, relatively few studies have been dedicated to leech-turtle interactions, so new records are still common. Turtle leeches can transmit pathogens. For example, both *P. parasitica* and *P. ornata* can transmit the blood parasite *Trypanosoma chrysemydis* between turtles (Siddall and Desser 1992; Woo 1969), and *P. ornata* can transmit the parasite *Haemogregarina balli* to Snapping Turtles (*Chelydra serpentina)* and Painted Turtles (*Chrysemys picta*).

Both *P. parasitica* and *P. ornata* are reported from Blandings Turtles (*Emydoidea blandingii),* Northern Map Turtles, Snapping Turtles and Wood Turtles in Ontario and Quebec (Samure 1990; Samure and Livingstone 1994; Samure and Bider 1996). Brooks et al. (1990) report *P. parasitica* and *P. ornata* from *C. serpentina* in Algonquin Park but found no other species. Brown et al. (1994) also report only *P. parasitica* and *P. ornata* from *C. serpentina*. MacCulloch (1981) and Ricciardi and Lewis (1991) both found *P. parasitica* attached to *C. picta* in Saskatchewan and Quebec, respectively.

Ernst (1976, 1986) reports *P. parasitica* from 12.1% of 207 Spotted Turtles (*Clemmys guttata*), and 38.6% of 204 Stinkpots (*Sternotherus odoratus)*; he recorded no other species. *Placobdella parasitica* and *Placobdella ornata* have also been collected from hibernating Northern Map Turtles in Vermont (Graham et al. 1997). Numerous *P. parasitica* and *P. multilineata* have been collected from Bog Turtles (*Glyptemys muhlenbergii*) in North Carolina and Virginia (Samure and Carter 1998).

In North Carolina ponds, McCoy et al. (2007) observed *P. parasitica* on 4 turtle species (*C. picta, C. serpentina, Kinosternon rubrum* and *Trachemys scripta*) living in ponds. However, the authors' statement that *P. parasitica* was the only parasitic leech found implies that other leeches not known to be parasitic may have been collected and subsequently discounted. Readel et al. (2008) collected leeches from five species of turtle from ponds in Illinois, including *C. picta, C. serpentina, Apalone spinifera, Sternotherus odoratus* and *Trachemys scripta* (n = approximately 518). They identified the leeches *P. parasitica, P. multilineata, P. ornata, P. papillifera,* and *Helobdella papillata*. Because leeches in the genus *Helobdella* are known to be predatory and feed on invertebrates (Sawyer 1972, 1986), the authors assumed *H. papillata* was not feeding on turtle blood and excluded it from their analysis.

Turtle biologists may often ignore leeches, due partly to the difficulty identifying them to species without a microscope, key and some degree of expertise, as well as the assumption that only two species of leech (*P. ornata* and *P. parasitica*) attach to turtles in Canada. The purpose of this exploratory study was to investigate the diversity and prevalence of leeches on turtles in south-western Ontario and determine whether *P. ornata* and *P. parasitica* were truly the only leeches parasitizing Ontario turtles.

Methods

We collected leeches from turtles from May–August 2008 during an ongoing population study. Turtles were captured by hand, dip net or hoop trap at two sites in south-western Ontario: a wetland on the shores of Lake Erie, Chatham-Kent County, and a spring-fed channel near Lake Huron, Lambton County. Each turtle was identified and checked for leeches. Leeches were removed and placed in 70% ethanol until further examination was possible. We later identified leeches to species using a key modified from Sawyer (1986) by M. Siddall (American Museum of Natural History), available online at http://research.amnh.org/users/siddall/PEET/sawyer/namerica.html.

Results

We captured *C. picta, C. serpentina, E. blandingii, C. guttata* and *S. odoratus,* totalling 364 turtle captures representing 296 individuals (some captures were recaptures). Leeches were present on 86 captures (24%). Eleven percent of recaptured Snapping Turtles and 33% of recaptured Painted Turtles had new leeches on them.

We collected five leech species: *Placobdella parasitica* and *P. ornata,* which are common on turtles, and *Helobdella modesta, Erpobdella punctata* and *Alboglossiphonia heteroclita,* which are not. Table 1 summarizes the turtle species on which each leech species was found, as well as the maximum and minimum number of leeches found on leech-carrying turtles.

We found only one *E. punctata* and one *A. heteroclita.* Considering only the three more common species, 43% percent of leech-carrying turtles were carrying more than one leech, and 9% were carrying more than one species of leech. Leech loads ranged from one to more than 25. Unfortunately, we were occasionally unable to accurately count clusters of very small individuals, for logistical reasons, and it was not always possible to remove every leech from the neck and head of larger *C. serpentina*. It was therefore not possible to collect all observed leeches, but >90% were collected, and all observed leeches were included in estimates of leech loads per individual. Sixteen of the collected leeches were too small or poorly preserved for accurate identification.

Most of the leeches we found were attached to the soft tissue of the legs, neck, and tail base, and this was true for *P. parasitica, P. ornata* and *H. modesta*. We did occasionally find leeches on the plastron and carapace, which is not surprising since they are able to feed on the bony tissues of turtles (Siddall and Gaffney 2004). Twenty-two of 25 collected *H. modesta* were carrying either eggs or young.

Discussion

To our knowledge, this is the first published record of *P. ornata* from *C. guttata,* (but see also Samure 1995, unpublished). This is also the first published Canadian record of *Helobdella* species collected from

TABLE 1: Number of turtles carrying one or more of the three observed species of leech at two sites in south-western Ontario. n indicates the number of individual turtles captured; N= total number of captures (including recaptures) of species for which recaptures occurred. Numbers by species indicate the number of turtles carrying that species of leech, with number of that leech species collected in parentheses. Where leeches were carrying eggs or young, the young were not counted separately.

	Turtles with leeches	Leeches on turtles (and max-min number found per leech-carrying turtle)	*Placobdella parasitica* (n=126)	*Placobdella ornata* (n=91)	*Helobdella modesta* (n=25)	Other (n=2)	*Leech sp.* (n=16)
Chrysemys picta (N = 204 n=263)	31	102 (1-25)	27 (56)	14 (48)	2 (2)	1 *Alboglossiphonia heteroclita*	7 (7)
Chelydra serpentina (N=78, n=87)	49	121 (1-13)	21 (67)	18 (22)	7 (23)	1 *Erpobdella punctata*	8 (9)
Clemmys guttata (N=4)	2	2 (2)	0	2 (2)	0	–	–
Emydoidea blandingii (N=7)	5	20 (1-15)	1 (1)	4 (19)	0	–	–
Sternotherus odoratus (N=3)	1	1 (1)	1 (1)	0	0	–	–

turtles, and the first record of *H. modesta* (= *H. stagnalis;* see Siddall et al. 2005) collected from turtles on either side of the US-Canada border (but see also Samure 1995*, unpublished).

Although this also appears to be the first Canadian field record of *P. parasitica* from *Sternotherus odoratus* (Stinkpot), this is likely the unidentified species collected from Stinkpots by Edmond and Brooks (1996). We suspect these leeches have all been observed on these turtle species numerous times, and have simply not been identified to species.

We find the repeated occurrence of *Helobdella modesta* on *C. picta* and *C. serpentina* to be of particular interest. *Helobdella papillata* has been recorded from turtles (Readel et al. 2008), but these leeches were excluded from that study's analyses based on the assumption that they do not feed on turtle blood. As members of the genus *Helobdella* are predators of invertebrates (Sawyer 1986), this was a reasonable assumption. However, we also found *Helobdella* on turtles. While it is impossible to say whether they were blood-feeding at this time (a confirmation study is in progress), their presence does not appear to be a random or accidental record. In any case, we consider it unlikely that a leech would repeatedly attach itself to a turtle (or any other substrate) purely accidentally. Leeches have keen chemosensory abilities, and most species are fully capable of free-swimming to reach their preferred destination (Sawyer 1986). An exception may be *H. modesta* which is not a strong swimmer, so dispersal cannot be ruled out as a benefit of attaching to turtles.

The relationship between freshwater turtles and leeches of the genus *Helobdella* requires further close investigation. Although *Helobdella* may in fact be parasitizing these species of turtles, their recurring presence may also be due to several additional factors. *Helobdella* species may gain some non-nutritional benefit from attaching to turtles. For example, Sawyer (1972) suggests that attachment to larger hosts could provide leeches with a mechanism for fast dispersal with minimum energy expenditure. Attaching to turtles might also provide access to *H. modesta's* invertebrate prey, including other leeches.

We also considered the possibility that attachment to a turtle might provide protection from predation – but Krawchuck et al. (1997) documented a potential cleaning symbiosis in which a *C. picta* ate leeches from the skin of *C. serpentina*, and a similar relationship was documented once between Map Turtles and Grackles (Vogt 1979). These observations suggest that hitchhiking could be a risky behaviour for a leech, unless some strong benefit outweighed the risk.

Lastly, we know of no biological reason why *Helobdella* should be unable to feed on turtles. Analyses of the gut contents of *Helobdella* collected from turtles (in progress) will hopefully confirm or discount this possibility. Whether they are feeding on turtle blood or are merely hitching a ride, we suspect that there is more to their behaviour than random chance. Even though *P. parasitica* and *P. ornata* are clearly the most common parasites of turtles in Ontario (and possibly in eastern North America), the behaviour of other leech species (especially *Helobdella* spp.) deserves more investigation before their potential role as turtle parasites can be discounted.

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