

ISBN 0315-2

*Proceedings of the
Entomological Society of Manitoba*



2025

Volume 80

Cover photo: Seven-spotted ladybug (*Coccinella septempunctata* Linnaeus). Photo by J. Gibbs.

VOLUME 80

2025

ISBN 0315-2

Editor:

Jason Gibbs

Department of Entomology, University of Manitoba

jason.gibbs@umanitoba.ca

Winnipeg, Manitoba

Published: 17 November 2025

Entomological Society of Manitoba

The *Entomological Society of Manitoba* was formed in 1945 “to foster the advancement, exchange and dissemination of Entomological knowledge.” This is a professional society that invites any person interested in entomology to become a member by application in writing to the Secretary. The Society produces the Newsletter, the *Proceedings*, and hosts a variety of meetings, seminars, and social activities.

Persons interested in joining the Society should consult the website at:
<https://www.entsocmb.ca/>, or contact:

The Secretary
Entomological Society of Manitoba
entsocmanitobasecretary@gmail.com

CONTENTS

Contributions:

<i>CHLAENIUS CORDICOLLIS</i> (COLEOPTERA: CARABIDAE) IS NOT A FREQUENT FLYER IN MANITOBA, CANADA	6
ASSOCIATION BETWEEN INFESTATION PARAMETERS OF NASAL MITES (ACARI: RHINONYSSIDAE: <i>TINAMINYSSUS</i> SPP.) AND HOST BODY CONDITION IN ROCK PIGEONS (AVES: COLUMBIDAE: <i>COLUMBA LIVIA</i>) IN MANITOBA	19
DISTRIBUTION OF SPONGILLAFLIES (NEUROPTERA: SISYRIDAE) IN MANITOBA	30
FIRST RECORDS OF FAMILY EMBOLEMIDAE (HYMENOPTERA: DRYINOIDEA) IN MANITOBA	42
Scientific Program Abstracts for the 2024 Annual Meeting of the Entomological Society of Manitoba	48
Acknowledgements	61
Meeting Minutes for 80th Annual Business Meeting of the ESM	62
Appendices:	
Appendix A: Agenda of the 80 th AGM	65
Appendix B: President's Report to the Membership	67
Appendix C: Report of the Treasurer	70
Appendix D: Report of the Regional Director	72
Appendix E: Report of the <i>Proceedings</i> Editors	74
Appendix F: Report on Membership by the Secretary.....	75
Appendix G: Report of the Endowment Fund Board	76
Appendix H: Report of the Scientific Chair	77
Appendix I: Report of the ESM Newsletter Committee	87
Appendix J: Report of the Election Scutineers	88
Appendix K: Report of the Scholarship Committee	89
Appendix L: Report of the Youth Encouragement and Public Education Committee	93
Appendix M: Report of the Fundraising Committee	93
Appendix N: Report of the ESM Website/Archivist	94

Appendix O: Report of the Common Names of Insects Committee.....	94
Appendix P: Report of the Honorary Members Committee	95

***CHLAENIUS CORDICOLLIS* (COLEOPTERA: CARABIDAE) NOT A FREQUENT FLYER IN MANITOBA, CANADA**

N. J. Holliday

Department of Entomology, University of Manitoba, Winnipeg, Manitoba, Canada R3T 2N2

Neil_Holliday@UManitoba.CA

ABSTRACT

Flight of *Chlaenius cordicollis* Kirby (Coleoptera: Carabidae) was studied on beaches of the south basin of Lake Winnipeg and in the laboratory. Window traps, deployed from early May until late September 1982, caught adult beetles only within a 20-day period in late June. In dissections of beetles collected from nearby beaches in the same year, females were developing eggs by the middle of the flight period and by the time of the last catch period all females were gravid. The period of catches largely preceded oviposition, timing that conforms to expectations from a broad interpretation of the oogenesis-flight syndrome. In June, in laboratory trials using newly collected beetles, beetles did not fly at 20 °C: females flew at ≥ 23 –30 °C and males flew at 25–30 °C. At temperatures above the threshold for both sexes, 55% of females and 14% of males flew. In fall, no beetles were caught in window traps, but newly collected beetles flew in the laboratory at 25 °C and 30 °C, although their flight ability was less than in June. The discussion explores implications of the oogenesis-flight syndrome constraining migratory flight to be in June, a time when temperature thresholds for flight are infrequently exceeded in the beetles' habitat because of its proximity to the recently ice-covered lake. It is concluded that, under Manitoba conditions, migratory flight of adult *C. cordicollis* can occur on only a few days of the year, and in some years, there may be no days suitable for flight.

Key Words: oogenesis-flight syndrome, migration, flight, temperature threshold

INTRODUCTION

Insect flight may be for migration or dispersal (Kennedy 1961). Migratory flight here is used in the sense of Southwood (1962) to mean a flight that results in the insect leaving its natal habitat and is distinguished from “trivial” flight that is within a habitat. Migratory flight involves a distinct physiological state that, in female insects, is related to ovary development, a phenomenon known as the “oogenesis-flight syndrome” (Johnson 1969). The syndrome is hormonally regulated (Rankin *et al.* 1986; Dingle 2001) and is a characteristic of Insecta; in many insects migratory flight precedes reproductive maturity (Johnson 1969). Some authors (e.g. Desender 2000) consider that conformation to the syndrome requires inhibition of simultaneous development of ovaries and flight apparatus. However, Johnson (1969) provided examples of migration by gravid and sexually mature females and emphasized that there is much variation in the sequence of migration and reproductive development among insect species, but that in each there is a strong association of the two phenomena.

In carabids, trivial flight is restricted to a few genera: most flight is migratory (Southwood 1962). Based on flight-interception trapping in the Netherlands, many carabids conform to the oogenesis-flight syndrome; some species that live more than a year have a second migratory flight from summer reproductive habitat to winter habitat (Van Huizen 1977). Desender (2000) dissected ovaries and flight muscles of almost 3000 individuals of 25 European carabid species and applied a contingency table approach based on the expectation that in species conforming to the oogenesis-flight syndrome, developed ovaries would not occur concurrently with developed flight muscles. He concluded that 17 of the 25 species conformed to the oogenesis-flight syndrome. However, as many macropterous carabid species with fully-developed flight muscles have never been observed to fly (Venn 2016), it is difficult to interpret Desender's results in terms of actual flight. Migratory flight in carabids is seldom a response to overcrowding in the natal habitat, but rather is a mechanism for the colonization or recolonization of uninhabited suitable habitats (Den Boer 1971). Of 61 species caught in flight in window traps in the Netherlands, almost 80% had females that had mated; migratory flights of fertilized females have a higher chance of successful (re)colonization of a suitable habitat than do those of virgin females for which success would require a post-migratory encounter with a migrant male (Van Huizen 1990).

Chlaenius cordicollis Kirby (Coleoptera: Carabidae) is a monomorphically macropterous species, that inhabits stoney shores of lakes and large rivers (Bell 1960; Lindroth 1969; Larochelle and Larivière 2003). Its geographic range extends from Manitoba east to the Atlantic coast, and south to Arkansas and Mississippi (Bousquet 2012). Adults are mostly nocturnal and hide, often in groups, under stones during the day (Larochelle and Larivière 2003). In Manitoba, *C. cordicollis* is most common on lakeshore beaches with limestone slabs (Holliday 2025). *Chlaenius cordicollis* is a spring breeder: adults are the overwintering stage, and reproduction occurs in May–June in Quebec and Vermont (Bell 1960; Larochelle and Larivière 2003). In Manitoba, ovary development is initiated in response to photoperiods that first occur in early May, reproduction is from June to early August, and adults die after reproducing; teneral beetles of the new generation are observed in late July and August (Holliday 2025).

Bell (1960) kept adult *C. cordicollis* in finger bowls in the laboratory and noted that one individual escaped by flight. Flight was preceded by a period of metathoracic vibration and, following take-off, the beetle rose at about 30° to the horizontal. Larochelle and Larivière (2003) reported flight to artificial lights in the laboratory. Erwin (1981 p. 167) after referring to Bell (1960) asserted that *C. cordicollis* “are fully winged and fly”, although it appears that in the context of the Plummer's Island study on which he was reporting, he saw no living specimens. In more than 40 years of studies of *C. cordicollis* in Manitoba, flight was never observed in the field (Holliday 2025) and there appear to be no published records of flight of *C. cordicollis* in the field. The objective of this study is to assess whether, and if so under what circumstances, *C. cordicollis* flies in the field in Manitoba.

METHODS

Field methods

On the east coast of Hecla Island, on a beach at 51.07079°N, 96.68545°W that was inhabited by a large number of *Chlaenius cordicollis*, double-sided window traps (Southwood and Henderson 2000) were erected in early May 1982. Each window trap (Figure 1) consisted of a 1 × 1 m pane of transparent polycarbonate plastic mounted in a wooden frame supported on two 10 × 10 cm vertical posts embedded in the beach so that the bottom of the pane was approximately 1 m above the beach surface. Galvanized steel troughs, 30 cm wide, were mounted below each side of the pane to collect the organisms that hit the pane and fell down. Troughs were filled with salt water with a few drops of detergent. Four traps were erected in two pairs; the pairs were about 50 m apart. One of each pair was about 1 m from the top of the beach and the other was about 4 m closer to the water's edge. All traps were oriented with the panes perpendicular to the water's edge, so that they would intercept organisms flying along the beach.

Window traps were operated from 14 May until 22 September 1982 and were serviced at approximately weekly intervals. Servicing involved scooping out organisms and debris in the troughs with a tea-strainer, transferring any carabid beetles to 70% ethanol for transport to the laboratory, and replenishing the salt solution.

As part of a multi-year assessment of seasonal patterns of *C. cordicollis* diet and physiology, (fully described in Holliday 2025), at intervals from 10 May–1 September 1982, adult *C. cordicollis* were hand collected from stoney beaches on Hecla Island. Beetles were killed and preserved in 70% ethanol and later dissected. The sex of each beetle, and the ovary development of dissected females was recorded. The sex ratio in the sample was compared with the expectation of equal numbers of males and females using a likelihood ratio χ^2 test (Sokal and Rohlf 2011).

Laboratory studies

Ability of adult *C. cordicollis* to fly was tested in two series of laboratory trials. A series in late June were conducted on beetles that had overwintered. A second series, in fall, was conducted on post-teneral new generation beetles.

Overwintered adult *C. cordicollis* for testing in the June series were hand collected from beaches on Hecla Island on 19 June 1984. Beetles were brought to the laboratory in 120 mL plastic screw-capped containers containing moistened beach gravel. In the laboratory, beetles were held in 20 × 9 × 7 cm acrylic plastic boxes (2–3 beetles per box) at 21 °C in an illuminated incubator (Precision Model 818, GCA/Precision Scientific Group, Chicago, Illinois) with a lighting regime of 16:8 h light:dark. Boxes were one quarter filled with beach gravel and supported at about 10° to the horizontal with a small amount of water at the lower end; finely-ground Tender Vittles cat food (Purina, St. Louis, Missouri) was provided as food.



Figure 1. Window trap installed on a beach on Hecla Island, Manitoba.

Flight ability trials were conducted from 20–27 June 1984 in an arena consisting of an open rectangular plastic tub, with interior basal dimensions of 53×41 cm, and walls 25 cm high (Stack and Nest Container S-10718GR, Uline Canada, Milton, Ontario, Canada). In each trial, one beetle was removed from a plastic box, its sex determined using the method of Holliday (1977), and it was then placed in the arena for 5 minutes, during which the number of flights (if any) and the time to the first flight were recorded. Trials were conducted at 20 °, 23 °, 25 ° and 30 °C; trials at 25 °C were conducted on the laboratory bench, and those at other temperatures were performed in controlled environment chambers. All trials were conducted between 9 AM and 5 PM under ambient fluorescent lighting. A minimum of 10 beetles of each sex were tested at each temperature; each individual was used in only one trial.

Flight ability trails on new generation beetles were conducted in fall 1984, on beetles collected from 8–25 September 1984. Collection methods and holding conditions were the same as for the first series of trials. Trials in the fall series were conducted 2–22 October in controlled environment chambers at 25 ° and 30 °C; 20 trials were conducted at each temperature. The sex of beetles was not determined, but in all other aspects the protocols for the second series of trials were the same as for the first.

Relationships of series, temperature, and beetle's sex with the frequency of trials in which flight occurred were analysed using log-linear modelling of contingency tables (Bishop *et al.* 2007) with probability values estimated by permutation tests where appropriate. Effects on the number of flights and time to the first flight were analysed using non-parametric statistics (Hollander and

Wolfe 1973). Statistical analyses were performed using Genstat Release 24 (VSN International 2024).

Voucher specimens from the study were deposited in the J. B. Wallis/R. E. Roughley Museum of Entomology, University of Manitoba.

RESULTS

The four window traps caught a total of seven *C. cordicollis* adults (Figure 2). Despite traps being operated from spring to fall, all catches were between 11 June and 30 June. Sex and egg-content of beetles caught in window traps were not recorded, as beetles decayed rapidly in the intervals between trap servicing.

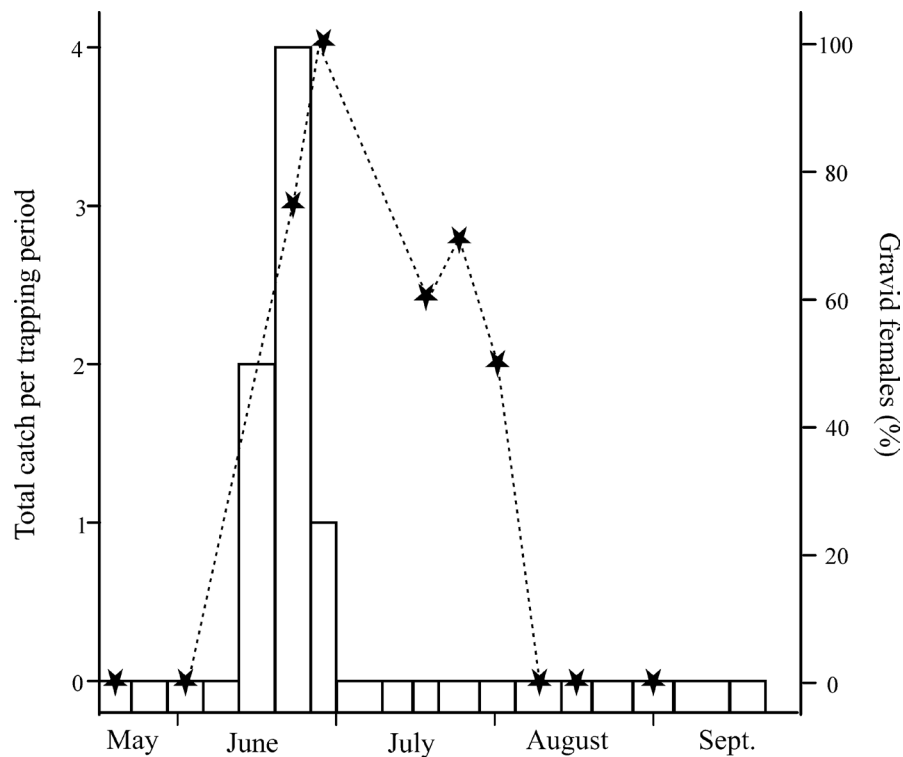


Figure 2. Total catch of *C. cordicollis* in four window traps and percentage of females with fully-developed eggs in trapping periods in 1982. The horizontal extent of bars indicates the duration of each trapping period and the height of the bar relative to the left-hand axis shows the total catch in the period. Trapping periods for which ovarian condition was assessed are indicated by stars, the height of stars relative to the right-hand axis indicates the percentage of females containing fully-developed eggs.

A total of 113 female and 97 male beetles were hand collected during the period of window trap operation and later dissected. The sex ratio in this sample did not differ from 1:1 (L.R. [Log ratio] $\chi^2 = 1.2$; d.f. = 1; $P = 0.3$). Females collected before there were catches in the window traps contained no fully-developed eggs. In the second trapping period with window trap catches, 75%

of females were gravid as were all females collected in the third period with catches. Thereafter, until early August, $\geq 50\%$ of females were gravid.

In laboratory flight ability trials, beetles that flew buzzed audibly for some time before take-off. Not all beetles that made the buzzing noise successfully took flight. Most beetles that flew ascended at a shallow angle to the horizontal, hit the wall of the tub, and fell back to the bottom.

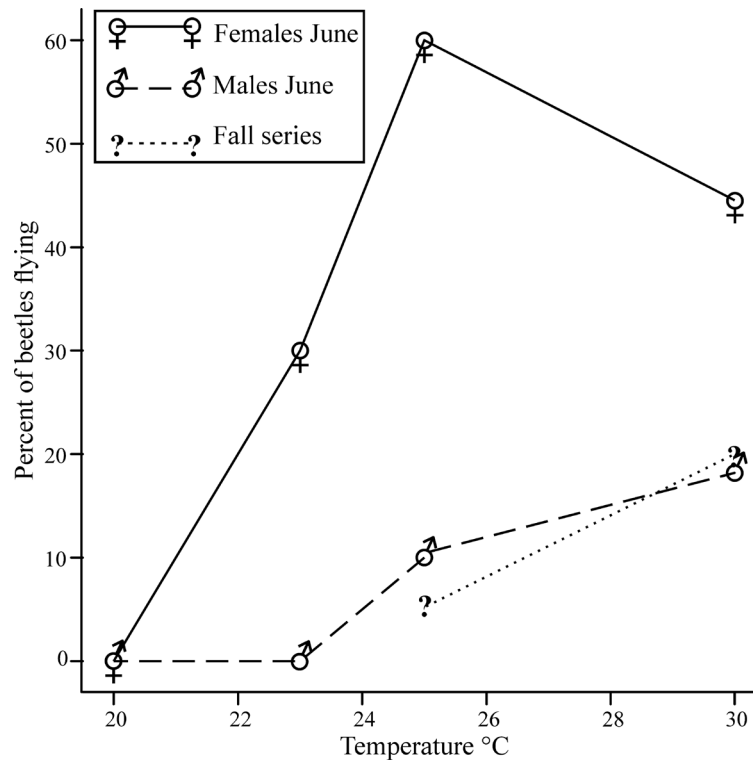


Figure 3. Percentage of *C. cordicollis* that flew in laboratory trials in relation to temperature for the June series, in which sex of beetles was determined, and the Fall series, in which sex was not determined.

In the June series of flight ability trials, the frequency of trials in which flight occurred (Figure 3) was significantly affected by temperature ($L.R.\chi^2 = 13.4$; d.f. = 3; $P = 0.01$) because no flight occurred in trials at 20 °C. There was no significant effect of temperature ($L.R.\chi^2 = 2.5$; d.f. = 2; $P = 0.3$) when the analysis was restricted to the temperatures 23 °, 25 ° and 30 °C. In this restricted analysis the frequency of trials with flight was affected by sex ($L.R.\chi^2 = 11.4$; d.f. = 2; $P = 0.002$); flight occurred in 45% of trials ($n = 31$) with females and 10% of trials with males ($n = 31$). In trials at 23 °C, females flew but males did not. Even when analysis was further restricted to 25 ° and 30 °C, temperatures at which both sexes flew, the frequency of trials with flight was significantly higher for females (55%, $n = 21$) than for males (14%, $n = 21$) ($L.R.\chi^2 = 7.2$; d.f. = 1; $P = 0.007$). The interaction of beetle sex with temperature did not significantly affect the frequency of trials in which flight occurred ($L.R.\chi^2 = 1.7$; d.f. = 2; $P = 0.4$).

In the June series, a total of 94 flights involving 21 beetles were observed, of these, 85 flights terminated when the beetle hit the end of the plastic tub and fell back to the bottom. Four beetles flew out of the tub; three did so once, and one flew out of the tub six times. The time to the first flight was 1.6 ± 0.9 minutes (mean $\pm$ SD) and was affected neither by the sex of the beetle (Mann-Whitney $U = 19.5$; $P = 1.0$) nor by the temperature of the trial (Kruskal-Wallis $H = 1.95$; d.f. = 2; $P = 0.38$). In trials where beetles flew, the number of flights was 5.5 ± 3.0 (mean $\pm$ SD) and was independent of beetle sex (Mann-Whitney $U = 20$; $P = 0.9$) and temperature (Kruskal-Wallis $H = 2.96$; d.f. = 2; $P = 0.23$). On the final date of the June series, five of the females were gravid and two of these gravid females flew, each of them making nine flights.

In the fall series with new generation beetles, sexes were not distinguished. The frequency of trials in which beetles flew was similar to that for males in the June trials (Figure 3), and there was no significant effect of temperature on this frequency ($\chi^2 = 2.06$; d.f. = 1; $P = 0.3$ [permutation test]). Comparisons of the fall series with equivalent trials in the June series (Table 1) show that, relative to beetles in June, those in October flew in a lower proportion of trials, took longer before their first flight, and made fewer flights.

Table 1. Comparison of results of flight trials in the June and Fall series. In the Fall series, sex of beetles was not determined, and trials were carried out at 25 ° and 30 °C. Tabulated data for the June series are for the same two temperatures and are pooled over males and females.

Series	Trials (n)	Trials in which flight occurred (%)	Beetles that flew (n)	Time to first flight (minutes) (mean $\pm$ SE)	Number of flights (mean $\pm$ SE)
June	42	33	14	1.7 ± 0.3	4.9 ± 0.8
Fall	40	13	5	3.6 ± 0.4	2.0 ± 0.6
Comparisons		L.R. $\chi^2 = 5.1$; d.f. = 1 $P = 0.02$		Mann-Whitney $U = 4.5$ $P = 0.003$	Mann-Whitney $U = 13$ $P = 0.04$

DISCUSSION

Window traps are effective methods of catching flying carabid beetles of many species (Den Boer 1971, 1977). Catches during 1982 clearly demonstrated a peak of flight activity in a 20-day period in late June. It had been intended that window traps be operated again in years subsequent to 1982, but the traps were destroyed by wind-driven ice during winter 1982–1983, and resources were not available for their replacement. In 1982, gravid females were first detected during the period when window traps were catching beetles, and gravid females were collected until about one month after the last catch in window traps.

Laboratory flight trials in June 1984 were conducted on dates corresponding to those in 1982 when *C. cordicollis* were collected in window traps and so are expected to characterize capabilities at the time of migratory flights. At temperatures at which flight occurred, numbers of flights and time to the first flight did not differ between males and females; however, many beetles did not fly, and the proportion of “flyers” was higher for females than males. Higher proportions of flyers in females than males also occur in the milkweed bug *Oncopeltus*

fasciatus (Dallas) (Heteroptera: Lygaeidae) (Dingle 1966) and in leaf beetles (*Trirhabda* spp. (Coleoptera: Chrysomelidae) (Messina 1982). Dingle (1966) hypothesized that, following migratory flight, male colonizers could fertilize the eggs of several colonizing females, so females have greater value as colonizers than males. If females mate before migration, (Van Huizen 1990), migrating males have even less value as colonizers, and males may be able to fertilize more females if they do not divert resources to flight. In either circumstance, there would be stronger selection for female flyers than for male flyers. Non-flyers in a population remain at a natal habitat that has proven to be favourable, and so selection may favour maintenance of two behavioural morphs: flyers and non-flyers, with higher equilibrium frequencies of flyers for females than males.

Flight trials in the fall series demonstrated that new generation *C. cordicollis* can fly, albeit all measures showed less flight ability than in June. No beetles of the new generation were caught in window traps, and it is unlikely that migratory flight would occur at this time as it is far removed from the reproductive season, and beetles can walk to the winter habitat at the top of the beaches they inhabit in summer (Holliday 2025). Absence of trap catches does not disprove the occurrence of trivial flight at heights other than the traps or at such low frequency as to be undetected. Trivial flights, possibly in response to inundation (Venn 2016; Holliday 2025) or a predator threat may occur, although the need for a warm-up period may limit flight as a response to these rapidly developing threats.

The laboratory arena may provide flight-inducing stimuli that are absent in the field. Adult *C. cordicollis* are positively thigmotactic (Holliday 2025) and, in light, hide under any available object in the laboratory (Holliday unpublished) and in the field (Laroche and Larivière 2003). Deprivation of all cover, as beetles experienced in Bell (1960) and in arenas in this study, may provide a flight-inducing stimulus that *C. cordicollis* would not encounter on the stoney beaches it normally inhabits.

The buzzing noise heard before take-off in laboratory trials is no doubt a consequence of thoracic muscle activity to warm the muscles prior to flight, as occurs in many insects (Johnson 1969; Dingle 1972). Despite this thoracic warming, low temperatures are evidently a constraint on flight of *C. cordicollis* and the timing of the flight period makes this particularly so. Lake Winnipeg is ice-covered in winter and the south basin becomes 50% ice free in late April or May (McCullough 2005). While there is ice on the lake, lakeside temperatures in spring are well below those in other areas of southern Manitoba (Segal and Kubesh 1996). A comparison of daily temperatures at the lakeside climate station at Gimli Harbour (Environment Canada 2024a) with an inland station 16 km from the lake at Arborg (Environment Canada 2024b) for the 11 years in which both stations operated showed that lakeside daily maxima averaged 2.4 ± 0.2 °C lower in May than those inland, but that there was wild variation with lakeside maxima on individual days ranging from 12.8 °C below to 8.7 °C above those at Arborg. In June, temperatures were more similar between the stations, with the lakeside maxima 1.3 ± 0.1 °C lower than inland maxima and daily lakeside maxima ranging from 6.0 °C below to 2.7 °C above those at Arborg.

Chlaenius cordicollis in Manitoba does not conform to the interpretation of the oogenesis–flight syndrome that requires nonconcurrent development of ovaries and flight apparatus. The

observation of flight in gravid females in the laboratory trials, together with the co-occurrence of catches in window traps and gravid females in hand collections demonstrate that oogenesis is not delayed until after the period of migratory flight. However, laboratory studies (Holliday 2025) suggest that, even in the presence of males, females do not begin to oviposit until a more-or less complete complement of eggs is matured. Consequently, female gravidity at the time of flight does not negate the hypothesis that migration precedes oviposition. As female gravidity persisted for about a month after the last catch in window traps, much egg laying had to occur following the period of flight. Thus, the flight can be considered a migration in that egg deposition follows flight and can result in colonization of new habitats—an identical outcome in life history strategy to that in which migration precedes oogenesis.

An expectation of the oogenesis-flight syndrome is that the timing of migration and reproduction are strongly associated (Johnson 1969), and as ovary development is in response to photoperiod cues in *C. cordicollis* (Holliday 2025), it follows that the timing of the migratory flight is also seasonally constrained. That constraint dictates that flight activity be at a time when temperatures in the beach habitats are strongly influenced by the recently ice-covered lake, and daily maxima may be below the temperature thresholds for flight. Temperatures experienced by beetles caught in window trap catches in 1982 are unknown, as the nearest meteorological records for 1982 are for Arborg. Gimli Harbour Climate Station (Environment Canada 2024a) has operated from 2000–2024 and, like the window trap sites, is within a few metres of the water's edge on the west side of the south basin of Lake Winnipeg and so are expected to have similar temperature regimes.

Observations from Gimli Harbour and temperature thresholds from the laboratory flight trials (23 °C for females and 25 °C for males) predicts the frequency of years with a given number of days within the 20-day flight period that are too cool for flight (Figure 4). For the period when window traps caught beetles in 1982 (Figure 4A), 50% of years would have 16 or more days that were too cool for male flight and 12 or more days would be too cool for female flight. In two of the 22 years used to generate the predictions, 19 of 20 days were too cool for male flight and in one year 18 of 20 days were too cool for female flight. The date when 50% of females were gravid in 1982 was 12 days later than the date predicted from laboratory studies of photoperiodic cues and the observed values from dissections in 1981 (Holliday 2025). This was probably associated with late break-up of ice in 1982 preventing beetles buried in wintering sites from receiving photoperiodic cues for oogenesis induction. Hence, flight before reproductive maturity in 1982 was probably about 12 days later than in years when beetles can perceive the critical photoperiod when it first occurs on 5 May (Holliday 2025). Figure 4B depicts predictions for number of days out of 20 that are unsuitable for flight in years when the flight period is 12 days earlier than in 1982. In 50% of such years, temperatures on 18 or more days would be too cool for male flight and 16 or more days would be too cool for female flight. Within the 18 years used for the predictions, there were three years with no days suitable for male flight and one year with no days suitable for female flight. These predictions cannot readily be fine tuned to specific years with early or late dates of ice break-up. The number of days suitable for flight may be greater than the predictions if beetles behaviourally thermoregulate by finding microhabitats that are warmer than air temperatures or by basking. Numbers of days suitable for flight may be lower

than predicted because temperatures from the weather station are daily maxima that may occur for a brief period during which factors such as high wind prevent take-off,

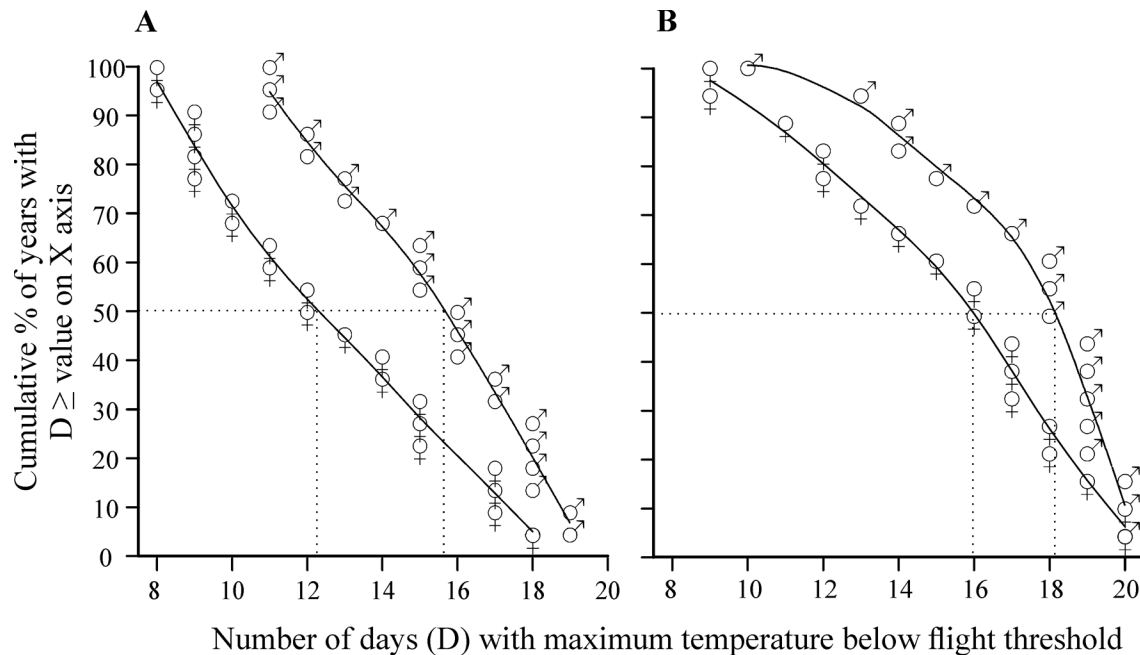


Figure 4. Predicted percentage of years in which the maximum temperature is < than the threshold for flight on a particular number of days out of a possible total of 20 days. A) Predictions based upon the observed period when beetles were caught in 1982, B) Predictions based upon the hypothesized “average” 20-day period during which pre-oogenesis flight would occur. Maximum temperature data are from 18 years of daily maxima from Gimli Harbour Climate Station (Environment Canada 2024a). See text for more details.

For flight that is constrained to be before an early summer oviposition period and to be close to a cold lake migration may be possible on few or no days (Figure 4). Further, at temperatures between the flight threshold for males and females, the migrant population will be entirely female, thereby lowering the proportion of colonizing males even further than expected from the sex-specific frequency of flyer morphs. Manitoba represents the extreme northwestern limit of the geographic range of *C. cordicollis* (Bousquet 2012). One reason for the western and northern limits on the range may be the need for deep snow to insulate overwintering sites (Holliday 2025). A second reason may be limits on the number of days on which colonization or recolonization of habitats can occur. The limitations described in this study are localized and certainly do not apply in the southern part of the insect’s range.

ACKNOWLEDGEMENTS

Technical assistance was provided by J. Richardson and S. Heuchert. Permission to erect window traps and collect beetles on Hecla Island was granted by Manitoba Environment and Climate

Change. Funds were provided by the Natural Science and Engineering Research Council of Canada.

REFERENCES

- Bell, R.T. (1960) A revision of the genus *Chlaenius* Bonelli (Coleoptera, Carabidae) in North America. *Miscellaneous Publications of the Entomological Society of America*, 1, 98–166.
- Bishop, Y.M.M., Feinberg, S.E., & Holland, P.W. (2007) *Discrete Multivariate Analysis: Theory and Practice*. Springer Science, New York, New York, USA, 557 pp.
- Bousquet, Y. (2012) Catalogue of Geadephaga (Coleoptera, Adephaga) of America, north of Mexico. *Zookeys*, 245, 1–1722. doi: 10.3897/zookeys.245.3416
- Den Boer, P.J. (1971) On the dispersal power of carabid beetles and its possible significance. *Miscellaneous papers*, 8 (1971), 119–137, Landbouwhogeschool, Wageningen, The Netherlands.
- Den Boer, P.J. (1977) Dispersal power and survival carabids in a cultivated countryside. *Miscellaneous papers* 14 (1977), 1–190, Landbouwhogeschool, Wageningen, The Netherlands.
- Desender, K. (2000) Flight muscle development and dispersal in the life cycle of carabid beetles: pattern and process. *Entomologie*, 70, 13–31.
- Dingle, H. (1966) Some factors affecting flight activity in individual milkweed bugs (*Oncopeltus*). *Journal of Experimental Biology*, 44, 335–343.
- Dingle, H. (1972) Migration strategies of insects. *Science*, 175, 1327–1335.
- Dingle, H. (2001) The evolution of migratory syndromes in insects. Insect movement: mechanisms and consequences. In: Reynolds, D.R. & Thomas, C.D. (Eds.) *Proceedings of the Royal Entomological Society's 20th Symposium, London, U.K., September 1999*. CAB International, Wallingford, UK, pp 159–181.
- Environment Canada (2024a) Daily data reports for 2000–2024 for Gimli Harbour Climate Station ID 5031041. Available from <https://climate.weather.gc.ca> (accessed 26 November 2024).
- Environment Canada (2024b) Daily data reports for 2005–2015 for Arborg Climate Station ID 5030080. Available from <https://climate.weather.gc.ca> (accessed 26 November 2024).
- Erwin, T.L. (1981) Natural history of Plummers Island, Maryland XXVI. The ground beetles of a temperate forest site (Coleoptera: Carabidae): An analysis of fauna in relation to size, habitat selection, vagility, seasonality, and extinction. *Bulletin of the Biological Society of Washington*, 5, 104–224.

- Hollander, M. & Wolfe, D.A. (1973) *Nonparametric Statistical Methods*. Wiley, New York, New York, USA, 503 pp.
- Holliday, N.J. (1977) Sex determination in living adult ground beetles (Coleoptera: Carabidae). *The Canadian Entomologist*, 109, 397–398.
- Holliday, N. J. (2025) Natural history of *Chlaenius cordicollis* Kirby (Coleoptera: Carabidae) on beaches of Lake Winnipeg, Manitoba, Canada. *The Coleopterists Bulletin*, 79, 215–231.
- Johnson, C.G. (1969) *Migration and Dispersal of Insects by Flight*. Methuen, London, UK, 763 pp.
- Kennedy, J.S. (1961) A turning point in the study of insect migration. *Nature*, 189, 785–791.
- Larochelle, A., & Larivière, M.-C. (2003) *A Natural History of the Ground-Beetles (Coleoptera: Carabidae) of America North of Mexico*. Pensoft, Sofia, Bulgaria, 583 pp.
- Lindroth, C.H. (1969) The ground-beetles of Canada and Alaska. Part 6. *Opuscula Entomologica Supplementum*, 34, 945–1192.
- McCullough, G. (2005) *Surface water temperature and break-up and freeze-up of the ice cover on Lake Winnipeg. Final Project Report*. Prepared for the Canadian Department of Fisheries and Oceans, Winnipeg, Canada, 42 pp.
- Messina, F.J. (1982) Timing of dispersal and ovarian development in goldenrod leaf beetles *Trirhabda virgata* and *T. borealis*. *Annals of the Entomological Society of America*, 74, 78–83.
- Rankin, M.A., McAnelly, M.L. & Bodenhamer, J.E. (1986) The oogenesis-flight syndrome revisited. In: Danthanarayana, W. (Ed.) *Insect Flight: Dispersal and Migration*. Springer, Berlin, Germany, pp. 27–48.
- Segal, M. & Kubesh, R. (1996) Inferring snow-breeze characteristics from frozen-lake breezes. *Journal of Applied Meteorology*, 35, 1033–1039.
- Sokal, R.R. and Rohlf, F.J. (2011) *Biometry*. Fourth Edition. W.H. Freeman and Company, New York, New York, USA, 937 pp.
- Southwood, T.R.E. (1962) Migration of terrestrial arthropods in relation to habitat. *Biological Reviews*, 37, 171–214.
- Southwood, T.R.E & Henderson, P.A. (2000) *Ecological Methods*, [Third edition]. Blackwell, Oxford, UK, 575 pp.
- Van Huizen, T.H.P. (1977) The significance of flight activity in the life cycle of *Amara plebeja* Gyll. (Coleoptera, Carabidae). *Oecologia*, 29, 27–41.
- Van Huizen, T.H.P. (1990) ‘Gone with the wind’: Flight activity of carabid beetles in relation to wind direction and to the reproductive state of females in flight. In Stork, N.E. (Ed.). *The role of ground beetles in ecological and environmental studies*. Intercept, Andover, Hampshire, UK, pp. 289–293.

- Venn, S. (2016) To fly or not to fly: factors influencing the flight capacity of carabid beetles (Coleoptera: Carabidae). *European Journal of Entomology*, 113, 587–600.
- VSN International. (2024) *Genstat for Windows*, [24th Edition]. VSN International, Hemel Hempstead, UK.

ASSOCIATION BETWEEN INFESTATION PARAMETERS OF NASAL MITES (ACARI: RHINONYSSIDAE: *TINAMINYSSUS* SPP.) AND HOST BODY CONDITION IN ROCK PIGEONS (AVES: COLUMBIDAE: *COLUMBA LIVIA*) IN MANITOBA

M. Dupuis¹, M. Krul¹, T.D. Galloway¹, W. Knee² and K. Rochon¹,

¹Department of Entomology, University of Manitoba, Winnipeg, Manitoba

R3T 2N2, Canada, dupuism6@myumanitoba.ca

²Canadian National Collection of Insects, Arachnids and Nematodes, Agriculture and Agri-Food Canada, 960 Carling Ave., K.W. Neatby Building, Ottawa, Ontario K1A 0C6.

ABSTRACT

Rock pigeons (*Columba livia* Gmelin) host a variety of parasites including nasal mites (Rhinonyssidae: *Tinaminyssus* spp.). While distribution and host association have been studied through surveys in Canada, there are knowledge gaps in the ecology of these parasites. We salvaged pigeons to determine the prevalence and mean intensity of nasal mites, as well as to examine the relationship between host body condition and infestation parameters (prevalence and mean intensity). Seventy-five pigeons salvaged from Wildlife Haven Rehabilitation Centre were given a body condition score (BCS) on a scale of 1–5, with 1 being emaciated and 5 being obese. Their respiratory turbinates were flushed using a curved 12 ml Monojet™ 412 syringe with soapy water. Samples were preserved in 95% ethanol until the mites were counted and identified. Data from pigeons salvaged from Wildlife Haven, Prairie Wildlife Rehabilitation Hospital, and Pembina Vet Hospital (2000-2011) were pooled with recent data and analyzed using Quantitative Parasitology (QPweb). Pigeons were infested with nasal mites, *Tinaminyssus melloi* (Castro) and *T. columbae* (Crossley). Prevalence and mean intensity were 52.4% and 14.9 mites per bird, respectively (n=615). Co-infestations of *T. columbae* and *T. melloi* were present in 78 (33%) infested birds (n=236). The prevalence of infestation in emaciated birds (BSC 1-2.5) was significantly greater than for birds in better condition. There were no differences in intensity based on host body condition.

KEYWORDS: pigeon parasites, respiratory mites, host-parasite ecology, body condition score, co-infestation, prevalence, mean intensity

INTRODUCTION

Birds are widely admired by citizens and scientists alike. Birds have at least 40 families (around 2500 species) of closely associated symbiotic mites (Proctor & Owens 2000). Mites have taken advantage of the diversity of habitats available over the landscape and immediate environment of

birds, including the nest, skin, feathers, and respiratory tract (Walter & Proctor 2013). Five families of mites live in the respiratory tracts of birds, a life history strategy which independently evolved three times (Fain 1994). The most diverse and widely documented are the haematophagous endoparasites of the family Rhinonyssidae (Mesostigmata), with fifty documented species in Manitoba alone (Knee & Galloway 2017). Rhinonyssids are robust, slow-moving mites, well adapted to living within the nasal passages of birds and feeding on blood from these highly vascularized tissues (Bell 1996). Nasal mites infest birds on every continent, including Antarctica. *Rhinonyssus schelli* (Fain & Hyland) infests gentoo (*Pygoscelis papua* (Forster)) and Adélie penguins (*Pygoscelis adeliae* (Hombron & Jacquinot)) (Vanstreels *et al.* 2020). Nasal mites are occasionally found in the tracheae and lungs (Porto *et al.* 2022). Direct transmission potentially occurs between birds in proximity, for example, during courtship or feeding offspring (Amerson 1967; Porter & Strandtmann 1952). Indirect transmission may occur via shared perches or communal water sources (Bell 1996). Rhinonyssids are not generally considered pathogenic; however, feeding activity can damage the nasal passages, leading to rhinonyssidosis avium disease (Dimov 2011). *Sternostoma tracheacolum* (Lawrence) can be highly pathogenic to canaries (*Serinus canaria* (Linnaeus)) and Gouldian finches (*Erythrura gouldiae* (Gould)). This species colonizes the deep respiratory passages, leading to pneumonia and sometimes death (Bassini-Silva *et al.* 2019).

Rock pigeons (*Columba livia* Gmelin) in Manitoba are infested by two species of rhinonyssids, *Tinaminyssus melloi* (Castro) and *T. columbae* (Crossley) (Grossi & Proctor 2021; Knee *et al.* 2008; Knee & Galloway 2017). In some situations, rock pigeons are considered nuisance animals and referred to by many as “rats of the sky” (Jerolmack 2008). They are synanthropic, often associated with farmsteads and ubiquitous in urban landscapes. Most Western Hemisphere populations are descended from released and escaped domestics. Domestic pigeons are kept for meat, as pets, and for entertainment, including racing and being ceremoniously released at events (Lowther & Johnston 2020). Rock pigeons are an important component of urban ecology and serve a variety of roles, including as prey for urban predators (Capoccia *et al.* 2018). As rock pigeons have become established in new environments, they have brought many of their parasites with them, including *T. melloi* and *T. columbae* (Grossi & Proctor 2021). Rock pigeons and their associated parasites have established populations in sensitive environments where they can impact the conservation biology of related species such as the laurel pigeon (*Columba junonia* Hartert) in Tenerife (Canary Islands) (Foronda *et al.* 2004). *Tinaminyssus* is known primarily from columbid hosts, with the cosmopolitan nature of rock pigeons allowing for potential transfer to novel columbid species, as was the case where one Eurasian collared dove (*Streptopelia decaocto* (Frivaldszky)) was infested with *T. columbae* (Veiga *et al.* 2021).

The habitat of *Tinaminyssus* within the nasal cavities of hosts makes observations of live mites difficult. As a result, there is a lack of knowledge on the host-parasite ecology of these cryptic organisms. Rock pigeons are common and easily obtainable for scientific study. Even so, the impacts of nasal mites on pigeons and other avian hosts have not been adequately explored. Studying the interactions between rock pigeons and their nasal mites provides an opportunity to infer the impacts of rhinonyssids on other species of rare and endangered birds. Preliminary

research on *Tinaminyssus* spp. has revealed microbial symbionts (Osuna-Mascaró *et al.* 2020, 2021), raising further questions about the potential impact of these mites on host health.

Body condition scoring (BCS) is a system used by veterinary professionals and the agricultural industry to assess animal health quickly by palpating the muscle and fatty tissue deposits and can be applied to birds (Wenker *et al.* 2022). BCS typically scales from one to five, with one being emaciated and five being obese. Populations of feral rock pigeons are variable in size, making BCS a more appropriate tool than body mass to assess health and fitness. We found that pigeons assigned a specific score (BCS 3.5, n=20) displayed weights ranging from 260.5 g to 448.2 g, with a mean of 318 g. This justifies the use of BCS for this system because each BCS class includes the range of body sizes present in rock pigeon populations.

Our preliminary objective was to establish infestation parameters for *T. melloi* and *T. columbae* infesting rock pigeons in Manitoba. This is the first attempt to extend the understanding of the host-parasite relationship of rhinonyssids and to assess potential negative health impacts on hosts based on BCS. We provide novel evidence documenting an association between the presence of nasal mites and a marker of poor host condition, as the prevalence of *Tinaminyssus* spp. was higher among emaciated rock pigeons. This information may be of particular interest to pigeon enthusiasts. Inferences may also be made on the impacts of other species of rhinonyssids on rare, endangered, or economically important species of birds.

MATERIALS AND METHODS

Rock pigeons were salvaged from Wildlife Haven Rehabilitation Centre, September 2016 to August 2022. Permits are not required to salvage pigeons in Manitoba. The birds came from Winnipeg and surrounding areas. Rock pigeons for this study were triaged on or shortly after arrival at the rehabilitation hospital, assessed as unsuitable for rehabilitation, and euthanized. The primary reasons pigeons were admitted to Wildlife Haven Rehabilitation Centre were for traumatic injuries assumed to be from window strikes or predator attacks based on the presence of obvious injuries. Postmortem, hosts were labelled with a unique case number and date of death, individually bagged, and frozen at -20°C, which subsequently killed any arthropod symbionts. Hosts were individually bagged upon death to reduce the risk of cross-contamination and loss of arthropod ectosymbionts to the environment. The pigeons remained frozen in chest freezers until the day of processing.

All hosts were weighed on a digital scale after being removed from the freezer. Serial washes were performed to remove the arthropod parasites. Rock pigeons were washed in a 12 L plastic bucket with warm water and Sunlight™ dish detergent. The typical process involved two repeated washes with soapy water, followed by a rinse with clear water to ensure that as many parasites as possible were being removed. In cases of extreme infestation, an extra wash with soap was required. Following each wash, the contents of the bucket were passed through a 90 µm sieve. The nasal passages of each bird were flushed with warm soapy water using a 12 mL Monojet® 412 curved-tip plastic syringe. Each nare was flushed once, allowing the water to run out of the mouth and onto the sieve. Following the nasal flush, the filtrate was rinsed into a

container and preserved with 95% ethanol. Labels with host information were retained with the container of preserved host filtrate. Each rock pigeon, once thawed, was palpated over the keel to assess muscle and fat deposits to assign a body condition score (BCS) (Figure 1, DeVoe & Reininger 2006). For the purposes of analysis based on BCS, hosts were sorted into two categories: BCS 1.0-2.5 (emaciated) and BCS 3.0-4.5 (healthy). Hosts sampled in this study never exceeded a BCS of 4.5. To overcome the variation in assigned scores in 2022, two people (MD and MK), each assigned a score to every host. When the scores differed, an average score was assigned to the host.

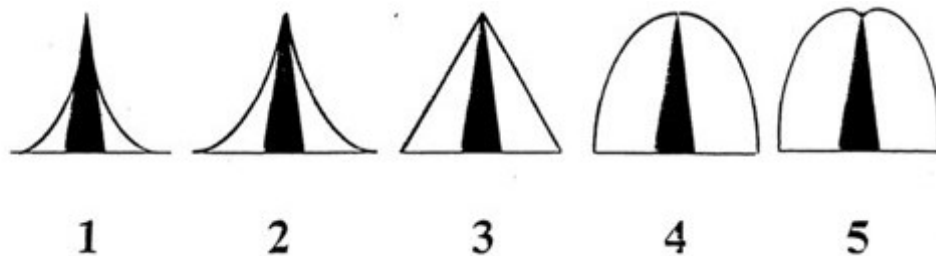


Figure 1. Body condition scoring chart for generic bird species. The drawings represent a body cross section with the black section representing the keel and the lines on either side indicating pectoral muscle. Healthy birds usually score from 3.5-4.5 with scores under 2.5 indicating emaciation. From <https://nagonline.net/3877/body-condition-scoring/> 2022, reproduced with permission.

Containers of filtrate were sorted using a stereomicroscope to obtain the associated arthropods. The number of nasal mites per host was recorded. Nasal mites were identified to species and the number of each species per host recorded. Representative specimens of adults of each species were cleared at room temperature in lactophenol for one to four hours, mounted in Hoyer's medium, and cured in a slide warmer at 45-50 °C for four days. Voucher specimens of both species of nasal mite were deposited in the J.B. Wallis/R.E. Roughley Museum of Entomology in the Department of Entomology, University of Manitoba, Winnipeg, Manitoba, Canada.

Archived data (2000-2011) from T.D.G and W.K. were pooled to generate historical infestation and coinfection parameters. The following data analyses were done using Quantitative Parasitology (QPweb) (Reiczigel *et al.* 2019). Confidence limits (95%) for prevalence were calculated using Sterne's exact method (new algorithm) and for mean intensity using the Bootstrap BCa method with 2000 replications. Bootstrap two sample t-tests with 1000 replications were used to compare mean intensities among selected variables. Prevalence of the two species of mites was compared using Fisher's exact test. We compared prevalence of mite infestations across BCS classes with Chi-squared in R v.4.3.1 (R Core Team 2023).

RESULTS

During the 2022 sampling period, 33/43 examined hosts (76.7%) had obvious traumatic injuries. General infestation parameters of *Tinaminyssus* spp. infesting rock pigeons (n=615) were determined. Of these, 322 birds (52.4% [95% C.I. 48.4-52.4]) were infested with one or more nasal mites. Among infested birds, the mean intensity was 14.9 (95% C.I. [12.9-17.6]) mites per

infested host. The greatest intensity of 178 mites occurred in a pigeon collected in 2004. Four other hosts had ≥ 100 nasal mites. Among the 75 birds sampled by M.D. and M.K., 38 birds or 50.7% (95% C.I. [(39.3-62.1)]) were infested with *Tinaminyssus* spp. at a mean intensity of 14.5 (95% C.I. [10.5-21.4]) mites per bird.

Mean intensity of *T. melloi* was greater than the mean intensity of *T. columbae* (bootstrap T-test: BCa method, $p = 0.014 < \alpha = 0.05$) (Table 1). Although prevalence of *T. melloi* was greater when compared to *T. columbae*, it was not statistically significant (Fisher's exact test, $p=0.0586 > \alpha=0.05$).

Table 1. Infestation parameters of *Tinaminyssus melloi* and *T. columbae* in rock pigeons (*Columba livia*, n=75) in southern Manitoba, collected 2016–2022.

	Infested	Prevalence % (95% C.I.)	Mean Intensity (95% C.I.)
<i>T. melloi</i>	32	42.7 (31.9-54.0)	13.6 (9.97-21.6)*
<i>T. columbae</i>	20	26.7 (17.8-37.9)	5.6 (3.4-10.6)*

* bootstrap T-test: BCa method, $p = 0.014 < \alpha = 0.05$

Out of the 38 recently sampled (2016-2022) and infested hosts (n=75), co-infestations of *T. melloi* and *T. columbae* were present in fourteen birds (36.8%). When recent samples were pooled with archived data (n=236), co-infestations were found in 78 infested hosts (33.1%).

There was a significantly greater prevalence of *Tinaminyssus* spp. in pigeons that were emaciated (BCS 1.0-2.5) when compared to healthy individuals (BCS 3.0-4.5) (Chi-squared test, $X^2=5.3788$, df=1, $p=0.02038 < \alpha=0.05$) (Table 2). There were no differences in mean intensities between BCS classes (bootstrap T-test: Bca method, $p=0.268 > \alpha=0.05$).

Table 2. Infestation parameters of *Tinaminyssus* spp. in rock pigeons (*Columba livia*) in Manitoba classified by body condition score as emaciated (BCS 1.0-2.5) or healthy (BCS 3.0-4.5).

	N	Infested	Prevalence % (95% C.I.)	Mean intensity (95% C.I.)
BCS 1.0-2.5	27	19	70.4 (50.0-85.3)*	14.32 (9.37-22.7)
BCS 3.0-4.5	48	19	39.6 (26.7-54.3)*	14.79 (8.95-28.4)

* Chi squared test, $X^2=5.3788$, df=1, $p=0.02038 < \alpha=0.05$

DISCUSSION

Nasal mites have been documented across a broad array of host species from many geographic regions worldwide (Knee 2018; Knee *et al.* 2008; Maa & Kuo 1965; Pence 1975; Spicer 1987). The taxonomic focus of these studies is diverse, with some focused on host diversity, while others target just a few host species. Rhinonyssids of rock pigeons have been studied in many other regions (Crossley, 1951; Foronda *et al.* 2004; Porto *et al.* 2022; Veiga *et al.* 2020) and

sample sizes have varied in examinations of epidemiological parameters for *Tinaminyssus* spp. For example, Veiga *et al.* (2020) (n=250), Porto *et al.* (2022) (n=202), and Grossi & Proctor (2021) (n=162) sampled relatively large numbers of pigeons, while in other studies, sample sizes are much smaller (*e.g.*, Crossley 1951 (n=60), Foronda *et al.* 2004 (n=50)). The cumulative infestation parameters in our study are based on the largest host sample size (n=651) available in the published literature.

About half (52.4%) of Manitoba pigeons were infested with *Tinaminyssus* spp. with an average intensity of 14.9 mites per infested host. Porto *et al.* 2022 determined that *Tinaminyssus* spp. infested rock pigeons in Brazil at a prevalence of 25.5% and mean intensity of 9.9 mites per infested host. Variation among infestation parameters of the Brazil study and the current study could be that hosts in Brazil were collected randomly rather than being salvaged from wildlife rehabilitation centres. Salvaging hosts from rehabilitation centres is an ethical source of hosts for parasitological research, even if it technically limits randomization of experimental units (Galloway 2023). Although, when the salvaged hosts from this study were examined, many of them had obvious injuries, suggesting a more random process than if the birds had been unwell for a period prior to their euthanasia.

Intensity of infestation with *Tinaminyssus* is variable, with many hosts having one to few mites and some hosts infested with more than 100. The reason certain individuals presented with such large infestations is unknown. Nasal mites are blood-feeders, so perhaps immunocompromised individuals are unable to mount an adequate defense, and mite populations rise precipitously. The highest mean intensity reported in the literature was by Foronda *et al.* (2004), 218.3 *T. melloi* per infested host (n=50 ± 117.3) which is much higher than that observed in Manitoba. Their study showed exceptionally high mean intensity compared to other reports in the literature, such as Veiga *et al.* (2020) with 14.4 *T. melloi* per infested host, and Mascarenhas *et al.* (2022) with 14.8 *T. melloi* per infested host. Regional differences among populations may reflect a combination of internal and external conditions in host accommodation of nasal mites. When sampling pigeons from major Canadian cities, hosts from Vancouver (British Columbia) had the highest prevalence of nasal mites and Edmonton (Alberta) the lowest (Grossi & Proctor 2021). Climatic data, including humidity and temperature extremes, were attributed to driving variation in the mite assemblage of rock pigeons (Grossi & Proctor 2021).

The infestation parameters for *T. melloi* and *T. columbae* in the present study are like those found by Veiga *et al.* (2020). Prevalence and mean intensity for *T. melloi* in Manitoba were greater than for *T. columbae*, although the difference in prevalence was not statistically significant (Table 1). Veiga *et al.* (2020) found similar results, with the principal difference being the greater prevalence of *T. melloi* compared to *T. columbae* (Fisher test, $p < 0.001$). Differences in reproductive capacity and/or survival could explain differences in infestation parameters of the two species. Most likely due to their cryptic nature, little is known about the life history and reproduction of rhinonyssids. It is possible that the prevalence and intensity of these mites are undervalued due to mites occupying regions of the respiratory tract that are not accessed through nasal flushing. For example, *T. columbae* occasionally occupies the tracheae. In some studies, host heads were dissected to expose mites (Crossley 1951; Knee *et al.* 2008; Mascarenhas *et al.*

2022). Porto *et al.* (2022) found three of 202 hosts with *Tinaminyssus* in their tracheae. One host was infested by one *T. melloi* and the other hosts by 1–13 *T. columbae* in their tracheae. However, it is unlikely that a significant portion of the hosts in our study were infested by mites that could not be collected using a nasal flush. Wilson (1964) found dissection and nasal flushing to be comparable techniques with the former being more thorough and the latter more efficient.

Co-infestations of *T. columbae* and *T. melloi* were common in our study. Among the recent (2016–2022) sample group (n=75), 14 out of 38 pigeons were co-infested. Infestations of both *T. melloi* and *T. columbae* have been previously documented in Manitoba (W. Knee, archived data). Rock pigeons infested with both *T. melloi* and *T. columbae* (8.8% of infested birds) have also been reported in Seville, Spain (Veiga *et al.* 2020). In contrast, coexisting infestations of *T. melloi* and *T. columbae* were not detected in rock pigeons in Texas (n=60), despite both species being present in the population of birds sampled (Crossley 1951). Co-infestation has been reported among other rhinonyssids, such as those infesting brown-headed cowbirds (*Molothrus ater* (Boddaert)) (Hilario-Pérez & Dowling 2024). Hilario-Pérez & Dowling (2024) reported 84 out of 764 infested hosts to be infested by two species and 11 additional hosts infested with three. Broader surveys of avian hosts by Knee *et al.* (2008) and Knee & Galloway (2017) in both cases, found four species of birds, including rock pigeons, co-infested by two species of nasal mites.

Emaciated pigeons are 30.8% more likely to be infested by *Tinaminyssus* spp. than their better-conditioned counterparts (Table 2). However, there was no difference in mean intensity between emaciated and well-conditioned hosts (Table 2). There was a concern that hosts salvaged from a rehabilitation centre would be biased towards emaciation. This did not seem to be the case in our study, since the average BCS was 3.0 and ranged from 1.0–4.5 out of 5. If the mites were the cause of the host's poor condition; the expected result would be elevated mean intensities among infested birds. Emaciated birds may be more likely to become infested by nasal mites if host immunity is compromised. Another unknown is the unexplored vector potential of rhinonyssids, with metagenomic analyses of *T. melloi* finding evidence of a bacterial endosymbiont in the family Bartonellaceae (Osuna-Mascaró *et al.* 2020, 2021). Along the same lines, 5% of splenic samples from feral pigeons taken by Ebani *et al.* (2016) (n=84) were infected with *Bartonella* spp. (family: Bartonellaceae) a genus where many species are transmitted by arthropods (Billeter *et al.* 2008). While the presence of a pathogen in a potential vector and host does not prove transmission this vector hypothesis could account for the lack of association between mean intensity and poor host body condition.

Other variables such as the age of the host could be independently associated with increased prevalence and with poor body condition; potentially driven by internal factors such as immunity. Increased prevalence of nasal mites with increased age has been previously documented among herring gulls (*Larus argentatus* Pontoppidan) by TerBush (1963) and sooty terns (*Onychoprion fuscatus* (Linnaeus)) (Amerson 1967). Among rock pigeons, Mascarenhas *et al.* (2022) found higher prevalence of *T. melloi* among sexually mature adults when compared to immatures; supporting the hypothesis that there is higher prevalence of nasal mites among older

birds as they have had higher probability of acquiring them through social behaviours suggested by TerBush (1963) and Amerson (1967).

This work may interest pigeon fanciers, ornithologists, acarologists and parasitologists. Infestation parameters of *Tinaminyssus* spp. were established with a robust sample size (n=615) with a prevalence of 52.4% and mean intensity of 14.93. Infestation parameters and co-infestations of *T. melloi* and *T. columbae* were determined (n=75), with *T. melloi* being present in higher levels and similar prevalence between species. Statistically greater prevalence among emaciated hosts is reported for the first time. These findings may be useful to infer health effects of Rhinonyssidae on rare and endangered bird species. Furthermore, we demonstrated how body condition scores are an efficient and informative variable to include when conducting studies pertaining to avian health.

ACKNOWLEDGEMENTS

This research could not have been completed without the assistance of many individuals, with the list below not being comprehensive. The authors thank the staff and volunteers of Wildlife Haven for their care in assessing and processing the birds used for this research. This work was conducted with consistent support from Rochon lab members Casandra Madden and Mabel Currie. Thank you to Graham Lock for lending your keen eye in reviewing the manuscript. Additional thanks to Jordan Bannerman for his advice throughout the project. This project was funded in part by the National Science and Research Council Undergraduate Research Awards and a Dr. J.A. Garland Summer Research Award in Agricultural and Food Sciences. The authors especially thank the Department of Entomology and the Faculty of Agricultural and Food Sciences, University of Manitoba, for their continued support.

REFERENCES

- Amerson, A.B. (1967) Incidence and transfer of Rhinonyssidae (Acarina: Mesostigmata) in Sooty Terns (*Sterna fuscata*). *Journal of Medical Entomology*, 4, 197–199.
- Bassini-Silva, R., Jacinavicius, F. de C., Pereira, J.S., Werther, K., Spicer, G.S. & Barros-Battesti, D.M. (2019) Parasitism of the nasal mite *Sternostoma tracheacolum* Lawrence, 1948 (Mesostigmata: Rhinonyssidae) in captive birds in Brazil. *Revista Brasileira de Parasitologia Veterinária*, 28, 754–759. <https://doi.org/10.1590/s1984-29612019053>
- Billeter, S.A., Levy, M.G., Chomel, B.B. & Breitschwerdt, E.B. (2008) Vector transmission of *Bartonella* species with emphasis on the potential for tick transmission. *Medical and Veterinary Entomology*, 22 (1), 1–15. <https://doi.org/10.1111/j.1365-2915.2008.00713.x>
- Bell, P.J. (1996) The life history and transmission biology of *Sternostoma tracheacolum* Lawrence (Acari: Rhinonyssidae) associated with the Gouldian finch *Erythrura gouldiae*. *Experimental and Applied Acarology*, 20, 323–341. <https://doi.org/10.1007/BF00052962>

- Capoccia, S., Boyle, C. & Darnell, T. (2018) Loved or loathed, feral pigeons as subjects in ecological and social research. *Journal of Urban Ecology*, 4, 1–6.
<https://doi.org/10.1093/jue/juy024>
- Crossley, D.A., Jr. (1951) Nasal mites of some columbiform birds. Master's thesis. Texas Technical College.
- De Rojas, M., Doña, J. & Dimov, I. (2020) A comprehensive survey of Rhinonyssid mites (Mesostigmata: Rhinonyssidae) in Northwest Russia: New mite-host associations and prevalence data. *Biodiversity Data Journal*, 8, e49535.
<https://doi.org/10.3897/BDJ.8.e49535>
- DeVoe, R. & Reininger, K. (2006) Keel scoring chart for birds at the North Carolina Zoo. Available from: <https://nagonline.net/3877/body-condition-scoring/> 2022 (accessed June 2022)
- Dimov, I. (2011) Rhinonyssidosis avium. *Journal VetPharma*, 3–4, 88–90. (In Russian)
- Ebani, V.V., Bertelloni, F. & Mani, P. (2016) Molecular survey on zoonotic tick-borne bacteria and chlamydiae in feral pigeons (*Columba livia domestica*). *Asian Pacific Journal of Tropical Medicine*, 9, 324–327. <https://doi.org/10.1016/j.apjtm.2016.03.005>
- Fain, A. (1994) Adaptation, specificity and host-parasite coevolution in mites (Acari). *International Journal for Parasitology*, 24, 1273–1283. [https://doi.org/10.1016/0020-7519\(94\)90194-5](https://doi.org/10.1016/0020-7519(94)90194-5)
- Foronda, P., Valladares, B., Rivera-Medina, J.A., Figueruelo, E., Abreu, N. & Casanova, J.C. (2004) Parasites of *Columba livia* (Aves: Columbiformes) in Tenerife (Canary Islands) and their role in the conservation biology of the Laurel pigeons. *Parasite*, 11, 311–316.
<https://doi.org/10.1051/parasite/2004113311>
- Galloway, T.D. (2023) Utilization of animals from Canadian wildlife rehabilitation hospitals to study the taxonomy and ecology of parasitic lice (Phthiraptera) and other ectoparasites. *Revista Chilena de Ornitología*, 29, 51–62.
- Grossi, A. & Proctor, H. (2021) Variation in ectosymbiont assemblages associated with rock pigeons (*Columba livia*) from coast to coast in Canada. *Diversity*, 13, 1–18.
<https://doi.org/10.3390/d13010009>
- Hilario-Pérez, A.D. & Dowling, A.P.G. (2024) Nasal mites in *Molothrus ater* (Aves: Icteridae) from different geographic locations in the USA. *International Journal of Acarology*, 50, 425–430. <https://doi.org/10.1080/01647954.2024.2355928>
- Jerolmack, C. (2008) How pigeons became rats: the cultural-spatial logic of problem animals. *Social Problems*, 55, 72–94. <https://doi.org/10.1525/sp.2008.55.1.72>
- Knee, W. (2018) New species of parasitic nasal mites infesting birds in Manitoba, Canada (Mesostigmata, Rhinonyssidae). *ZooKeys*, 786, 1–17.
<https://doi.org/10.3897/zookeys.786.28767>

- Knee, W. & Galloway, T.D. (2017) New host and locality records for endoparasitic nasal mites (Acari: Rhinonyssidae, Turbinoptidae, and Ereynetidae) infesting birds in Manitoba, Canada. *The Canadian Entomologist*, 149, 89–103. <https://doi.org/10.4039/tce.2016.47>
- Knee, W., Proctor, H. & Galloway, T. (2008) Survey of nasal mites (Rhinonyssidae, Ereynetidae, and Turbinoptidae) associated with birds in Alberta and Manitoba, Canada. *The Canadian Entomologist*, 140, 364–379. <https://doi.org/10.4039/n08-017>
- Lowther, P.E. & Johnston, R.F. (2020) Rock Pigeon (*Columba livia*). In: S.M. Billerman (Ed.), *Birds of the World*. Cornell Lab of Ornithology, Ithaca, New York, USA.
- Maa, T.C. & Kuo, J.S. (1965) A field survey of arthropod parasites of birds in Taiwan. *Journal of Medical Entomology*, 1, 395–401. <https://doi.org/10.1093/jmedent/1.4.395>
- Mascarenhas, C.S., Porto, C.C., dos Santos, L.S.S., dos Santos, C.C., da Rosa Farias, N.A. & Müller, G. (2022) The relation between columbiform birds (*Columba livia*) age and gender and infection indices of rhinonyssid and ereynetid mites. *Parasitology Research*, 121, 2233–2239. <https://doi.org/10.1007/s00436-022-07543-2>
- Osuna-Mascaró, C., Doña, J., Johnson, K.P., Esteban, R. & de Rojas, M. (2020) Complete mitochondrial genomes and bacterial metagenomic data from two species of parasitic avian nasal-mites (Rhinonyssidae: Mesostigmata). *Frontiers in Ecology and Evolution*, 8, Article 142. <https://doi.org/10.3389/fevo.2020.00142>
- Osuna-Mascaró, C., Doña, J., Johnson, K.P. & de Rojas, M. (2021) Genome-resolved metagenomic analyses reveal the presence of a putative bacterial endosymbiont in an avian nasal mite (Rhinonyssidae; Mesostigmata). *Microorganisms*, 9, 311–316. <https://doi.org/10.3390/microorganisms9081734>
- Pence, D.B. (1975) Keys, species and host list, and bibliography for nasal mites of North American birds (Acarina: Rhinonyssinae, Turbinoptinae, Speleognathinae, and Cytoditidae). *Special Publications of the Museum Texas Tech University*, 8, 1–148
- Porter, J. & Strandtmann, R.W. (1952) Nasal mites of the English sparrow. *The Texas Journal of Science*, 3, 393–398.
- Porto, C.C., dos Santos, L.S.S., Mascarenhas, C.S., dos Santos, C.C., Farias, N.A.R. & Müller, G. (2022) Rhinonyssidae and Ereynetidae mites in *Columba livia* (Columbiformes: Columbidae) in southern Brazil. *Revista Mexicana de Biodiversidad*, 93, e933983. <https://doi.org/10.22201/ib.20078706e.2022.93.3983>
- Proctor, H. & Owens, I. (2000) Mites and birds: diversity, parasitism and coevolution. *Trends in Ecology & Evolution*, 15, 358–364. [https://doi.org/10.1016/S0169-5347\(00\)01924-8](https://doi.org/10.1016/S0169-5347(00)01924-8)
- R Core Team (2023) R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. <https://www.R-project.org/>

- Reiczigel, J., Marozzi, M., Fábán, I. & Rózsa, L. (2019) Biostatistics for parasitologists – A primer to Quantitative Parasitology. *Trends in Parasitology*, 35, 277–281. <https://doi.org/10.1016/j.pt.2019.01.003>
- Spicer, G.S. (1987) Prevalence and host-parasite list of some nasal mites from birds (Acarina: Rhinonyssidae, Speleognathidae). *Journal of Parasitology*, 73, 259. <https://doi.org/10.2307/3282076>
- TerBush, L.E. (1963) Incidence of nasal mites in different age classes of herring gulls (*Larus argentatus*). *Journal of Parasitology*, 49, 525. <https://doi.org/10.2307/3275831>
- Veiga, J., Dimov, I. & de Rojas, M. (2020) Endoparasitic mites (Rhinonyssidae) on urban pigeons and doves: updating morphological and epidemiological information. *Diversity*, 13, 11. <https://doi.org/10.3390/d13010011>
- Walter, D.E. & Proctor, H. (2013) Animals as Habitats. In: Walter, D.E. & Proctor, H. *Mites: Ecology, Evolution & Behaviour: Life at a Microscale*. CABI Publishing, New York, New York, USA, pp. 341–422.
- Wenker, E.S., Kendrick, E.L., Maslanka, M. & Power, M.L. (2022) Fat scoring in four sparrow species as an estimation of body condition: a validation study. *Journal of Field Ornithology*, 93, 5. <https://doi.org/10.5751/JFO-00119-930205>
- Wilson, N. (1964) An evaluation of Yunker's technique for the recovery of nasal mites from birds. *Journal of Medical Entomology*, 1, 117. <https://doi.org/10.1093/jmedent/1.1.117>

DISTRIBUTION OF SPONGILLAFLIES (NEUROPTERA: SISYRIDAE) IN MANITOBA

Lisa Capar¹, Michael Alperyn², and Jordan Bannerman^{1*}

¹Department of Entomology, University of Manitoba, Winnipeg, Manitoba, Canada R3T 2N2

²North/South Consultants Inc., Winnipeg, Manitoba, Canada R3Y 1G4

*Corresponding author: E-mail: jordan.bannerman@umanitoba.ca

ABSTRACT

Although the presence of the family Sisyridae in Manitoba has been acknowledged in the literature, it has only briefly and indirectly mentioned, with no detailed locality data. We provide the first verified distribution records for *Climacia areolaris* (Hagen), *Sisyr nigra* (Retzius), and *Sisyr vicaria* (Walker), in Manitoba. Due to limitations in the larval taxonomy, we were unable to distinguish between *S. nigra* and *S. vicaria* larvae; these specimens were therefore identified as *S. nigra/S. vicaria*. Potential diagnostic differences between the larval stages of these two species are discussed.

Keywords: *Climacia areolaris*, *Sisyr nigra*, *Sisyr vicaria*

INTRODUCTION

Sisyridae (spongillaflies), members of the order Neuroptera, typically deposit their eggs on vegetation that overhangs still or slow-flowing freshwater bodies such as lakes and rivers. The larvae are aquatic, undergo three instars, and develop within freshwater sponges and bryozoans, which they also consume. Their elongated mouthparts allow them to penetrate sponge tissue and extract nutrients. Pupae are encased in a distinctive, net-like, usually double-layered cocoon. Adults are generally observed near larval habitats and are frequently attracted to artificial light sources (Oswald & Machado 2018).

Sisyrids have a cosmopolitan distribution and include 71 species in four genera (Oswald & Machado 2018). In the Nearctic region (excluding Mexico), six species in two genera are recognized (Tauber 1991; Penny et al. 1997; Cover & Resh 2008; Flint 2015). The six Nearctic species include *Sisyr apicalis* Banks, *Sisyr nigra* (Retzius) (historically referred to as *Sisyr fuscata* in older literature), *Sisyr vicaria* (Walker), *Climacia areolaris* (Hagen), *Climacia californica* Chandler, and *Climacia chapini* Parfin and Gurney (Parfin & Gurney 1956; Poirrier & Arceneaux 1972). Of these, only three species are currently known from Canada: *S. nigra*, *S. vicaria*, and *C. areolaris* (Parfin & Gurney 1956; Penny et al. 1997; Bowles 2006).

The distribution of Sisyridae in the United States is relatively well documented, with publications covering the entire country (Carpenter 1940; Chandler 1956; Parfin & Gurney 1956; Brown 1974; Bowles 2006), as well as regional studies in the southern U.S. (Poirrier & Arceneaux 1972), California (Grigarick 1975), Idaho (Clark 1985), Iowa (Bowles & Courtney 2020), Kentucky (Resh 1976), Michigan (Old 1933; Skelton & Strand 2013), Minnesota (Parfin 1952), Mississippi (Poirrier & Holzenthal 1980), North Dakota (Stoaks et al. 1983), Utah (Fisher et al. 2019), Virginia (Flint 2015), Ohio (Brown 1952), Wisconsin (Matteson & Jacobi 1980), Washington (Whaley et al. 2003), Florida (Rasmussen & Pescador 2002), and Texas/Oklahoma (White 1976).

In contrast, distribution records of Sisyridae in Canada are scarce. Parfin & Gurney (1956) noted that Sisyridae appear to be limited to the southern part of the country. *Climacia areolaris* has an eastern Canadian distribution, occurring in Ontario and Quebec (Carpenter 1940; Brown 1974; Parfin & Gurney 1956; Penny et al. 1997; Bowles 2006). *Sisyrna nigra* is known from British Columbia, Ontario, Quebec (Parfin & Gurney 1956; Penny et al. 1997), Alberta (Retallack & Walsh 1974), and Newfoundland (Bowles 2006). This species is Holarctic in distribution, with a broad range encompassing Canada, Europe, and northern parts of the United States (Bowles 2006). *Sisyrna vicaria* has been recorded from British Columbia, Nova Scotia, Ontario, and Quebec (Parfin & Gurney 1956; Penny et al. 1997; Bowles 2006). Carpenter (1940) suggested that *S. vicaria* may occur across southern Canada.

There are no well-documented publications specifically detailing Sisyridae from Manitoba. One reference comes from a 1962 report by the Canadian Department of Forestry on potential predators of the larch sawfly (Ives 1962). In this report, three Sisyridae species (*C. areolaris*, *S. nigra*, and *S. vicaria*) were recorded from light trap collections in a tamarack bog in Manitoba in 1961. However, no specific location details were provided for these captures.

Lehmkuhl (1975), a Saskatchewan researcher, published a field guide to aquatic insect families that includes distribution tables for the Canadian Prairie Provinces. In this guide, he lists Sisyridae as occurring in Alberta, Saskatchewan, and Manitoba.

Due to their small size (adults are 4–8 mm in length; Bowles & Contreras-Ramos (2019)) and lack of economic importance, Sisyridae have received limited taxonomic attention in recent decades in North America, particularly in the United States and Canada. This includes a lack of work aimed at resolving longstanding gaps in distribution records and ambiguities in species-level identification. The most recent key that covered this area is in Bowles (2006). The interpretation of early accounts of Sisyridae has presented challenges (Parfin & Gurney 1956; Brown 1952). Brown noted issues with redrawing and misinterpreting earlier figures. Tauber (1991) incorrectly stated that all Sisyridae larvae exhibit the same gill segmentation, citing the figure of *S. vicaria* from Parfin & Gurney (1956).

For the three species present in Manitoba (*C. areolaris*, *S. nigra*, and *S. vicaria*), keys for adults describe clear differences at both the generic and species levels, including forewing venation, the shape of the labial palps, and colouration (Parfin & Gurney 1956; Bowles 2006; Bowles & Contreras-Ramos 2019). However, no published keys are available to distinguish the larvae of *S. nigra* and *S. vicaria*. Bowles (2006) concluded that the two species cannot be distinguished reliably in the larval stage, and Poirrier & Arceneaux (1972) recorded *S. nigra* from New

England through the Great Lakes but omitted it from his key to larvae. Pupedis (1980) attempted to describe larval differences between these two species, but the characters he proposed are ambiguous. For example, he noted that the middle tubercle on the sixth abdominal segment is positioned more medially in *S. vicaria* than in *S. nigra*, and he compared ratios between tubercle placements on the pronotum. However, these ratios overlapped between the two species, reducing their diagnostic value.

Characters proposed elsewhere all involve comparison with species outside of Manitoba. Differences between European *S. nigra* and *Sisyr terminalis* Curtis larvae are given in Weissmair & Waringer (1994) and Elliott (2009), while distinctions between southern U.S. *S. vicaria* and *S. apicalis* larvae are provided by Rasmussen & Pescador (2002).

METHODS

The specimens used in this study were obtained from several sources. The majority are housed at the J.B. Wallis/R.E. Roughley Museum of Entomology (WRME) in Winnipeg, Manitoba, which includes both previously catalogued material and newly deposited specimens collected from the Winnipeg River and Burntwood River. These additional specimens were formally added to the WRME during the present study.

Specimens from the Winnipeg River were donated by Manitoba Hydro and originally collected by North/South Consultants Inc. (NSC) as part of an environmental monitoring project at the Pointe du Bois Generating Station. These were collected in 2018; earlier collections from 2016 were not available for use. All specimens were initially identified to the family level, with species-level identifications completed during the current study. Additional materials came from Manitoba Hydro on behalf of the Wuskwatim Power Limited Partnership (WPLP), collected from the Burntwood River by NSC in 2008 and 2016. These were also originally identified to family and were re-identified to species level for this work. Several Manitoba specimens were loaned by the Northern Forestry Centre Insect Collection (NFRC), Canadian Forest Service, Natural Resources Canada, Edmonton, Alberta.

Research-grade observations were obtained from iNaturalist.org. Only photographic records with unambiguous species-level identifications were included; no physical specimens were examined. The Global Biodiversity Information Facility (GBIF) occurrence numbers are provided for each of these records.

Occurrence data from Manitoba Hydro and the Manitoba government's Coordinated Aquatic Monitoring Program (CAMP) were used under limited permission for the inclusion of two general presence locations (Cross Lake and Rat River) on the distribution map. No specimen or field data are provided.

Taxonomic keys and descriptions used to identify both larvae and adult Sisyridae were drawn from Longinos (1935), Killington (1936), Chandler (1956), Parfin & Gurney (1956), Poirrier &

Table 1. Manitoba Sisyridae *Climacia* records.

Species	N	Stage	Location	Lat. (N)	Long. (W)	Date	Collection Method	Collector ¹	Depository ²	Voucher #
<i>C. areolaris</i>										
1	adult	Burntwood River	55.92	-97.46	24.vii.1967	Light Trap	CFS	NFRC		
1	adult	Rennie	49.85	-95.55	16.viii.1961	Light Trap	CFS	NFRC		
5	adult	Rennie	49.85	-95.55	6.viii.1961	Light Trap	CFS	NFRC		
1	adult	Star Lake, Whiteshell Provincial Park	49.7527	-95.2569	21.viii.2015	Light Trap	<i>C. Mills</i>	UM-WRME		JBWN0359851
1	adult	Star Lake, Whiteshell Provincial Park	49.7527	-95.2569	21.viii.2015	Light Trap	<i>E. Bairstead</i>	UM-WRME		JBWN0359852
1	larva	Winnipeg River	50.2965	-95.5409	20.vi.2018	Drift Net	NSC	UM-WRME		WRME0519828
1	larva	Winnipeg River	50.2963	-95.5424	20.vi.2018	Drift Net	NSC	UM-WRME		WRME0519838
2	larva	Winnipeg River	50.2959	-95.5429	20.vi.2018	Drift Net	NSC	UM-WRME		WRME0519829
2	larva	Winnipeg River	50.2964	-95.5416	20.vi.2018	Drift Net	NSC	UM-WRME		WRME0519839
2	larva	Winnipeg River	50.2965	-95.5409	21.vi.2018	Drift Net	NSC	UM-WRME		WRME0519823
3	larva	Winnipeg River	50.2961	-95.5425	21.vi.2018	Drift Net	NSC	UM-WRME		WRME0519826
3	larva	Winnipeg River	50.2963	-95.5424	21.vi.2018	Drift Net	NSC	UM-WRME		WRME0519831
1	larva	Winnipeg River	50.2968	-95.5400	21.vi.2018	Drift Net	NSC	UM-WRME		WRME0519835
1	larva	Winnipeg River	50.2959	-95.5430	21.vi.2018	Drift Net	NSC	UM-WRME		WRME0519837
1	larva	Winnipeg River	50.2964	-95.5413	22.vi.2018	Drift Net	NSC	UM-WRME		WRME0519824
1	larva	Winnipeg River	50.2963	-95.5424	22.vi.2018	Drift Net	NSC	UM-WRME		WRME0519832
2	larva	Winnipeg River	50.2959	-95.5429	22.vi.2018	Drift Net	NSC	UM-WRME		WRME0519834
1	larva	Winnipeg River	50.2969	-95.5401	22.vi.2018	Drift Net	NSC	UM-WRME		WRME0519841
2	larva	Winnipeg River	50.3183	-95.5282	23.vi.2018	Drift Net	NSC	UM-WRME		WRME0519827
7	larva	Winnipeg River	50.3042	-95.5477	24.vi.2018	Drift Net	NSC	UM-WRME		WRME0519836
1	larva	Winnipeg River	50.3172	-95.5301	24.vi.2018	Drift Net	NSC	UM-WRME		WRME0519840
1	larva	Winnipeg River	50.3042	-95.5477	25.vi.2018	Drift Net	NSC	UM-WRME		WRME0519830
2	larva	Winnipeg River	50.3180	-95.5290	25.vi.2018	Drift Net	NSC	UM-WRME		WRME0519833

¹ Canadian Forest Service (CFS), North/South Consultants Inc. (NSC).² Northern Forestry Centre Insect Collection (NFC) in Edmonton, Alberta. J.B. Wallis/R.E. Roughley Museum of Entomology (WRME) in Winnipeg, Manitoba.

Table 2. Manitoba Sisyridae *Sisyra* records.

Species	N	Stage	Location	Lat. (N)	Long. (W)	Date	Collection Method	Collector ¹	Depository ²	Voucher # ³
<i>S. nigra</i>	1	adult	Winnipeg	49.8602	-97.0726	5.vii.2022	Photo	B. Guinn	iNaturalist	4162280354
	1	adult	Winnipeg	49.8306	-97.0991	30.vii.2023	Photo	B. Guinn	iNaturalist	4519302878
	1	adult	Winnipeg	49.8534	-97.0448	12.vii.2024	Photo	B. Guinn	iNaturalist	5006904025
	4	adult	Rennie	55.58	-98.36	18.vii.1961	Light Trap	CFS	NFRC	
<i>S. vicaria</i>	1	adult	Rennie	55.58	-98.36	6.viii.1961	Light Trap	CFS	NFRC	
	1	adult	Glenlea Research Station	49.65	-97.12	15.viii.1984	C0 ₂ Trap	L. Reichert	UM-WRME	JBWM0093571
	1	adult	Glenlea Research Station	49.65	-97.12	23.vii.1987		L. Manaiagre	UM-WRME	JBWM0093339
	1	adult	Glenlea Research Station	49.65	-97.12	24.vii.1985		D.M. Currey	UM-WRME	JBWM0093379
	1	Adult	Oak Hammock ⁴	50.1881	-97.1249	3.vii.1986		E. Fortney	UM-WRME	JBWM0093572
	9	adult	Rennie	55.58	-98.36	10.vii.1961	Light Trap	CFS	NFRC	
	2	adult	Rennie	55.58	-98.36	18.vii.1961	Light Trap	CFS	NFRC	
	1	adult	Rennie	55.58	-98.36	17.vii.1961	Light Trap	CFS	NFRC	
	1	adult	Rennie	55.58	-98.36	21.vii.1961	Light Trap	CFS	NFRC	
<i>S. vicaria/nigra</i>	1	adult	Winnipeg	49.868	-97.163	1.vii.1978	UV Light Trap	W.B. Preston	UM-WRME	WRME0519809
	1	adult	Winnipeg	49.868	-97.163	1.vii.1978	UV Light Trap	W.B. Preston	UM-WRME	WRME0519810
	1	larva	Burntwood River	55.5755	-98.3641	26.viii.2008	Kicknet	NSC	UM-WRME	WRME0519812
	1	larva	Burntwood River	55.5412	-98.4559	10.ix.2016	Ponar	NSC	UM-WRME	WRME0519813
	1	larva	Crooked Creek/ (Hwy 20) near Dauphin	51.135	-99.821	19.viii.1982		B. Heise	UM-WRME	WRME0519811
			Cross Lake ⁵						CAMP	
			Rat Lake ⁵						CAMP	

¹ Canadian Forest Service (CFS), North/South Consultants Inc. (NSC).
² Northern Forestry Centre Insect Collection (NIFC) in Edmonton, AB. J.B. Wallis/R.E. Roughley Museum of Entomology (WRME) in Winnipeg, MB.
³ Voucher #s from iNaturalist are GBIF Occurrence Numbers.
⁴ This adult specimen was damaged, see Results for details.
⁵ No data given about these specimens as per data agreement.

Arceneaux (1972), Aspöck *et al.* (1980), Weissmair & Waringer (1994), Rasmussen & Pescador (2002), Bowles (2006), Elliott (2009), Heckman (2017), and Bowles & Contreras-Ramos (2019). Additionally, reference material (larvae and adults of *S. nigra* from Alberta) was borrowed from the University of Alberta Freshwater Invertebrate Collection (UAFIC) for comparative purposes.

RESULTS

Remarks on Examined Material

The following four specimens in WRME were originally misidentified as Hemerobiidae (brown lacewings) and were identified as *S. vicaria* in this study; WRME0519809, WRME0519810, JBWM0093379, and JBWM0093339.

One specimen of *S. vicaria* in WRME was represented only by a detached forewing and a pin bearing a locality label. No body parts remained on the pin, and no other *Sisyra* specimens were present in the collection drawer. Based on wing venation, the detached wing was confidently identified as *S. vicaria*. Given the absence of any other potential source, we consider it highly likely that the wing originated from the missing specimen on the pin. This record (JBWM0093572) is included here with this caveat.

New Manitoba Records

A total of 74 sisyrinid specimens were identified or verified during this study (Tables 1 & 2). These include 44 *C. areolaris* specimens (34 larvae, 10 adults) (Table 1), 8 adult *S. nigra*, and 19 *S. vicaria* specimens (Table 2). Three additional larval specimens could only be identified as *S. vicaria/nigra*. Additional *S. vicaria/nigra* larvae (CAMP) were included on the distribution map.

Climacia areolaris was primarily observed and collected in the south-east, with a single northern locality (Figure 1). *Sisyra* specimens were found in the northern, south-western, and south-eastern regions of Manitoba (Figure 2). The larvae identified as *S. vicaria/nigra* represent the northernmost records of *Sisyra* in the province. Adults of both *S. vicaria* and *S. nigra* were recorded in the south-eastern and south-western areas.

DISCUSSION

This study provides first clear documentation of the distribution of the three Sisyridae species in Manitoba: *Climacia areolaris*, *Sisyra nigra*, and *Sisyra vicaria*. It is likely that their ranges extend beyond the localities mapped here. Many areas of Manitoba remain under-sampled due to remoteness, limited accessibility, or location on private property. Notably, none of the specimens examined in this study were collected as part of targeted efforts for Sisyridae. To our knowledge, no prior studies in Manitoba have specifically focused on collecting sisyrinids or investigating their larval habitats.

There appears to be a geographic overlap in the distribution of *C. areolaris*, *S. vicaria* and *S. nigra*. *Sisyra nigra* is known to occur in other northern regions, including Finland, Norway, Sweden, and Alaska (Aspöck *et al.* 1980). Previous to this study, the northernmost

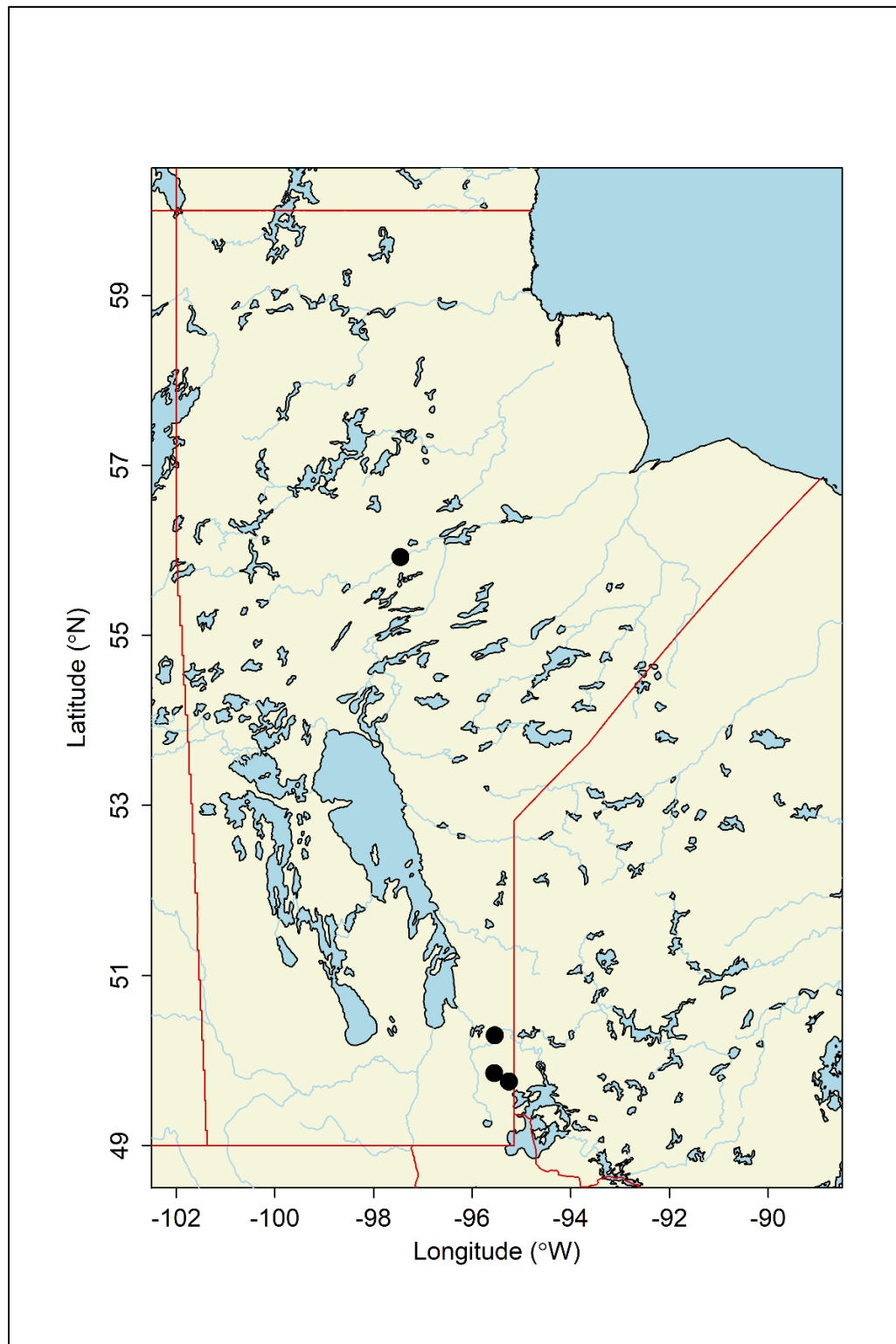


Figure 1. Distribution of *Climacia areolaris* in Manitoba.

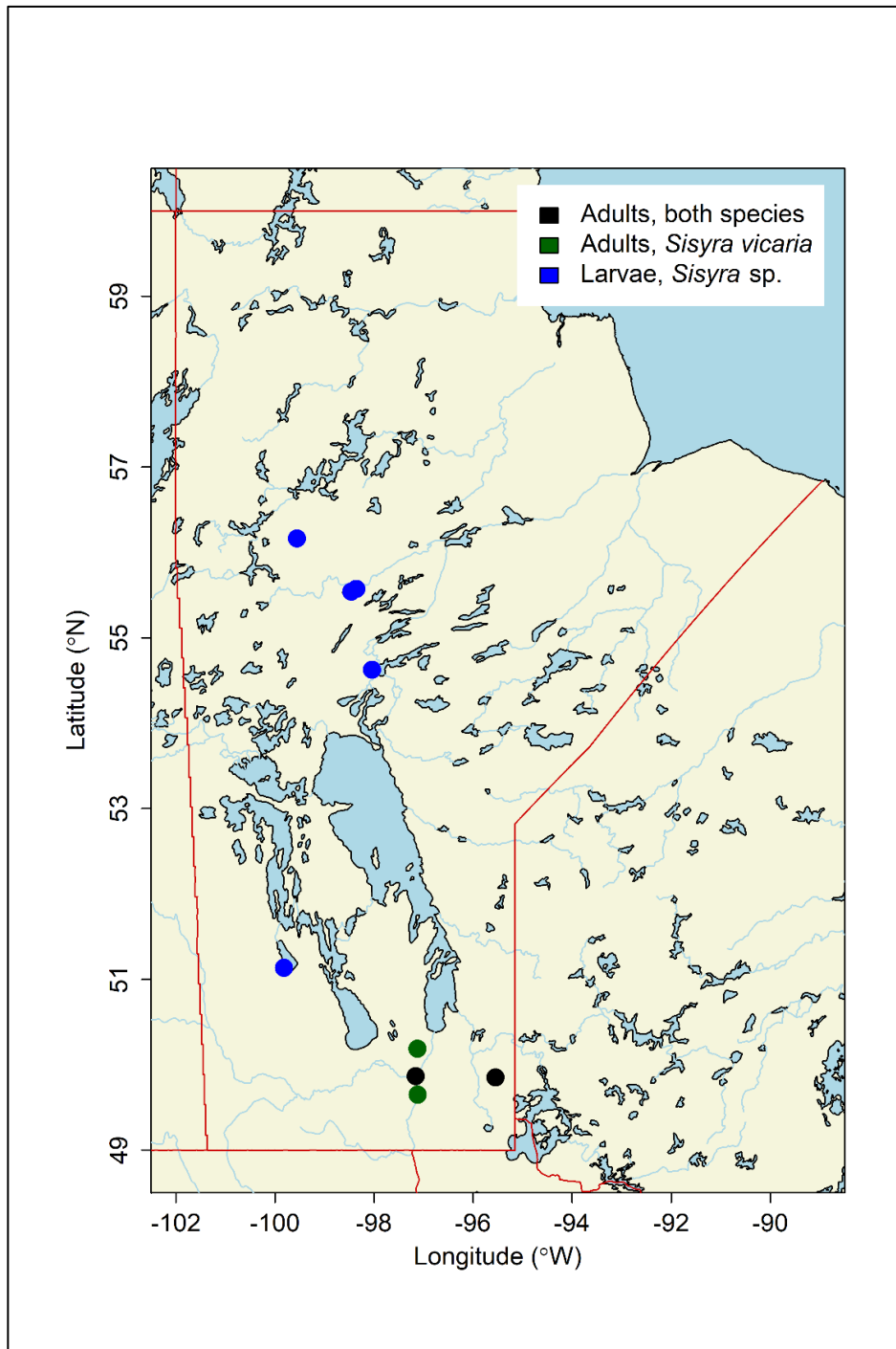


Figure 2. Distribution of *Sisyra* in Manitoba. Black symbols indicate sites where adults of both *S. nigra* and *S. vicaria* were recorded; green symbols indicate sites where only *S. vicaria* adults were recorded; blue symbols indicate sites where larvae identified as *S. vicaria* /*S. nigra* were recorded.

Verified occurrence of *S. vicaria* species in Canada was from Anglin Lake in Sask. (GBIF, 2025, occurrence 1416451201) suggesting that *S. vicaria* may also have a broad northern distribution.

Preliminary examination of larval specimens from Manitoba identified as *Sisyrta vicaria* or *S. nigra* suggests that these individuals may possess a greater number of gill segments on abdominal segments II–VII than the three segments typically reported for *S. nigra* (Lestage 1921; Weissmair & Waringer 1994; Elliott 1996, 2009; Ecosystema Ecological Center 2025). The number of gill segments in *S. vicaria* has not been explicitly described in the literature, except for indirect reference to Anthony (1902). In that work, Anthony illustrated gills II–VII with three segments from a specimen identified as *Sisyrta umbrata*. Parfin and Gurney (1956) later synonymized *S. umbrata* with *S. vicaria*, but they also noted that at least one adult male of *S. nigra* was present in the same material, suggesting that Anthony's illustration could likely depict gill segmentation of *S. nigra* rather than *S. vicaria*. This same illustration has been reproduced in subsequent works (Parfin & Gurney 1956; Tauber 1991; Rasmussen & Pescador 2002; Elliot 2009). Gill segmentation has been recognized as a diagnostic character among *Sisyrta* species elsewhere: Bowles (2006) distinguished *S. nigra* from *S. apicalis* in North America using this feature, and Weissmair and Waringer (1994) separated *S. nigra* from *S. terminalis* in Austria on the same basis. These comparisons suggest that gill segmentation may represent a useful morphological character for distinguishing *S. vicaria* from *S. nigra*, although additional material is needed to confirm whether the observed variation reflects interspecific differences or intraspecific variability.

ACKNOWLEDGEMENTS

We thank the Wuskwatim Power Limited Partnership (WPLP) for granting use of its Burntwood River monitoring data and for donating specimens to the J.B. Wallis / R.E. Roughley Museum of Entomology (WRME); Manitoba Hydro for providing Winnipeg River specimens from the Pointe du Bois monitoring programme and for depositing this material in WRME; Manitoba Hydro and the Manitoba government for granting permission to include limited presence data from the Coordinated Aquatic Monitoring Program (CAMP) in the form of generalized site locations for Cross Lake and Rat River; the Canadian Forest Service for supplying adult Sisyridae specimens for examination and inclusion in this study from the Northern Forestry Centre Insect Collection (NFRIC); and Heather Proctor and Victor Shegelski (University of Alberta Freshwater Invertebrate Collection (UAFIC), Edmonton, Alberta) for generously providing *Sisyrta nigra* adults and larvae from Alberta for taxonomic reference.

REFERENCES

- Anthony, M.H. (1902) The metamorphosis of *Sisyrta*. *The American Naturalist*, 36, 615–631.
- Aspöck, H., Aspöck, U. & Hölzel, H. (in collaboration with Rausch, H.) (1980) *Die Neuropteren Europas. Eine zusammenfassende Darstellung der Systematik, Ökologie und Chorologie der Neuropteroidea (Megaloptera, Raphidioptera, Planipennia) Europas*. Band I–II. Goecke & Evers, Krefeld, Germany, 495 pp. (vol. I) & 355 pp. (vol. II).
- Bowles, D.E. (2006) Spongillaflies (Neuroptera: Sisyridae) of North America with a key to the larvae and adults. *Zootaxa*, 1357 (1), 1–19.

- Bowles, D.E. & Contreras-Ramos, A. (2019) Megaloptera and aquatic Neuroptera. In: Merritt, R.W., Cummins, K.W. & Berg, M.B. (Eds.), *An Introduction to the Aquatic Insects of North America*. 5th edn. Kendall/Hunt Publishing Company, Dubuque, Iowa, USA, pp. 569–584.
- Bowles, D.E. & Courtney, G.W. (2020) The aquatic Neuropterida of Iowa. *Proceedings of the Entomological Society of Washington*, 122 (3), 556–565.
- Brown, H.P. (1952) The life history of *Climacia areolaris* (Hagen), a neuropterous ‘Parasite’ of Fresh Water Sponges. *The American Midland Naturalist*, 47 (1), 130–160.
- Brown, H.P. (1974) Distributional records of spongilla flies (Neuroptera: Sisyridae). *Entomological News*, 85 (1), 31–33.
- Carpenter, F.M. (1940) A revision of the Nearctic Hemerobiidae, Berothidae, Sisyridae, Polystoechotidae and Dilaridae (Neuroptera). *Proceedings of the American Academy of Arts and Sciences*, 74 (8), 193–280.
- Chandler, H.P. (1956) Aquatic Neuroptera. In: Usinger, R.L. (Ed.), *Aquatic Insects of California: With Keys to North American Genera and California Species*. University of California Press, Berkeley, California, USA, pp. 234–236.
- Clark, W.H. (1985) First record of *Climacia californica* (Neuroptera: Sisyridae) and its host sponge, *Ephydatia mulleri* (Porifera: Spongillidae), from Idaho with water-quality relationships. *Great Basin Naturalist*, 45 (3), 391–394.
- Cover, M.R. & Resh, V.H. (2008) Global diversity of dobsonflies, fishflies, and alderflies (Megaloptera; Insecta) and spongillaflies, nevrothids, and osmylids (Neuroptera; Insecta) in freshwater. *Freshwater Animal Diversity Assessment*, 595, 409–417.
- Ecosystema Ecological Center. (2025) *Sisyra fuscata* species page. Available from: <https://ecosystema.ru/08nature/w-invert/160.htm> (accessed 22 June 2025).
- Elliott, J.M. (1996) *British freshwater Megaloptera and Neuroptera: A key with ecological notes*. Freshwater Biological Association Scientific Publication, No. 54, Ambleside, UK, 68 pp.
- Elliott, J.M. (2009) *Freshwater Megaloptera and Neuroptera of Britain and Ireland: Keys to Adults and Larvae, and a Review of Their Ecology*. Freshwater Biological Association, Ambleside, UK, 71 pp.
- Fisher, M.L., Mower, R.C., & Nelson, C.R. (2019) *Climacia californica* Chandler, 1953 (Neuroptera: Sisyridae) in Utah: taxonomic identity, host association and seasonal occurrence. *Aquatic Insects*, 40 (4), 317–327.
- Flint Jr, O.S. (2015) Annotated checklist of the Neuropterida of Virginia (Arthropoda: Insecta). *Banisteria*, 45, 3–47.
- GBIF (2025) *GBIF occurrence: 1416451201*. Global Biodiversity Information Facility. Available from: <https://www.gbif.org/occurrence/1416451201> (accessed 17 October 2025).

- Grigarick, A.A. (1975) The occurrence of a second genus of spongilla-fly (*Sisyr vicaria* Walker) at Clear Lake, Lake County, California. *Pan-Pacific Entomologist*, 51, 296–297.
- Heckman, C.W. (2017) Sisyridae. In: Heckman, C.W. (Ed.), *Encyclopedia of South American Aquatic Insects: Illustrated Keys to Known Families, Genera, and Species in South America, Neuroptera (Including Megaloptera)*. Springer International Publishing, Cham, Switzerland, pp. 429–445.
- Ives, W.G.H. (1962) Preliminary studies of some invertebrate predators of the larch sawfly, *Pristiphora erichsonii* Htg. *Interim Report 1962–3*. Government of Canada, Department of Forestry, Forest Research Laboratory, Winnipeg, Manitoba. Forest Research Report, 8 pp.
- Killington, F.J. (1936) *A Monograph of the British Neuroptera*. Vol. 1. Ray Society, London, UK, 269 pp.
- Lehmkuhl, D.M. (1975) Field guide to aquatic insect families. *Blue Jay*, 33 (4), 199–219.
- Lestage, J.A. (1921) Sous-famille II – Sisyrinae. In: Rousseau, E. (Ed.), *Les larves et nymphes aquatiques des insectes d'Europe*, Vol. 1, pp. 337–342, figs. 101–103.
- Matteson, J.D. & Jacobi, G.Z. (1980) Benthic macroinvertebrates found on the freshwater sponge *Spongilla lacustris*. *Great Lakes Entomologist*, 13, 169–172.
- Old, M.C. (1933) Observations on the Sisyridae (Neuroptera). *Papers of the Michigan Academy of Science, Arts and Letters*, 18, 681–684.
- Oswald, J.D. & Machado, R.J.P. (2018) Biodiversity of the Neuropterida (Insecta: Neuroptera, Megaloptera, and Raphidioptera). In: Footitt, R.G. & Adler, P.H. (Eds.), *Insect Biodiversity: Science and Society*. Vol. 2. Wiley-Blackwell, Chichester, UK, pp. 627–672.
- Parfin, S.I. (1952) The Megaloptera and Neuroptera of Minnesota. *American Midland Naturalist*, 47 (2), 421–434.
- Parfin, S.I. & Gurney, A.B. (1956) The spongilla-flies, with special reference to those of the Western Hemisphere (Sisyridae, Neuroptera). *Proceedings of the United States National Museum*, 105 (3356), 421–501.
- Penny, N.D., Adams, P.A. & Stange, L.A. (1997) Species catalog of the Neuroptera, Megaloptera, and Raphidioptera of America north of Mexico. *Proceedings of the California Academy of Sciences*, 50 (3), 39–114.
- Poirrier, M.A. & Arceneaux, Y.D. (1972) Studies on southern Sisyridae (spongilla-flies) with a key to the third-instar larvae and additional sponge-host records. *American Midland Naturalist*, 88 (2), 455–458.
- Poirrier, M.A. & Holzenthal, R.W. (1980) Records of spongilla-flies (Neuroptera: Sisyridae) from Mississippi. *Journal of the Mississippi Academy of Science*, 25 (1), 1–2.

- Pupedis, R.J. (1980) Generic differences among New World spongilla-fly larvae and a description of the female of *Climacia striata* (Neuroptera: Sisyridae). *Psyche: A Journal of Entomology*, 87 (3–4), 305–314.
- Rasmussen, A.K. & Pescador, M.L. (2002) *A guide to the Megaloptera and aquatic Neuroptera of Florida*. Department of Environmental Protection, State of Florida, Tallahassee, USA, 78 pp.
- Resh, V.H. (1976) Life cycles of invertebrate predators of freshwater sponge. In: Harrison, F.W. & Cowden, R.R. (Eds.), *Aspects of Sponge Biology*. Academic Press, New York, New York, USA, pp. 299–314.
- Retallack, J.T. & Walsh, R.F. (1974) A new distribution record for the spongilla fly, *Sisyra fuscata* (Neuroptera: Sisyridae). *The Canadian Field-Naturalist*, 88 (1), 90.
- Skelton, J. & Strand, M. (2013) Trophic ecology of a freshwater sponge (*Spongilla lacustris*) revealed by stable isotope analysis. *Hydrobiologia*, 709 (1), 227–235.
- Stoaks, R.D., Neel, J.K. & Post, R.L. (1983) Observations on North Dakota sponges (Haplosclerina: Spongillidae) and sisyrids (Neuroptera: Sisyridae). *Great Lakes Entomologist*, 16 (4), 171–176.
- Tauber, C.A. (1991) Order Neuroptera. In: Stehr, F.W. (Ed.), *Immature Insects*. Vol. 2. Kendall/Hunt Publishing Company, Dubuque, Iowa, USA, pp. 126–143.
- Weissmair, W. & Waringer, J. (1994) Identification of the larvae and pupae of *Sisyra fuscata* (Fabricius, 1793) and *Sisyra terminalis* Curtis, 1854 (Insecta: Planipennia: Sisyridae), based on Austrian material. *Aquatic Insects*, 16 (3), 147–155.
- Whaley, D.K., Boyd, E.A., Johnson, D.G. & Zack, R.S. (2003) A new state record for *Climacia californica* Chandler (Neuroptera: Sisyridae) in Washington. *Pan-Pacific Entomologist*, 79 (3–4), 247–248.
- White, D.S. (1976) *Climacia areolaris* (Neuroptera: Sisyridae) in Lake Texoma, Texas, and Oklahoma. *Entomological News*, 87 (10), 287–291.

FIRST RECORDS OF FAMILY EMBOLEMIDAE (HYMENOPTERA: DRYINOIDEA) IN MANITOBA

James B Watson¹ & Jordan A Bannerman¹

¹ Department of Entomology, University of Manitoba, 12 Dafoe Rd., Winnipeg MB, R3T 2N2

Corresponding author email: JamesBWatson@shaw.ca

ABSTRACT

We provide the first records of Embolemidae (Hymenoptera: Dryinoidea) in Manitoba with the recent collection of three *Ampulicomorpha confusa* Ashmead specimens and an additional unpublished historical record from northern Manitoba.

Key words. *Ampulicomorpha*, *Embolemus*, Chrysidoidea, distribution, *Cixidia*, Achilidae

INTRODUCTION

Ampulicomorpha confusa Ashmead are parasitoids of fulgoroid nymphs (Bridwell 1958). They have similar life histories to Dryinidae (Hymenoptera: Dryinoidea); the family sister to Embolemidae (Carpenter 1999; Zhang *et al.* 2024). There are two species of embolemids known in North America, *A. confusa* and *Embolemus nearcticus* Brues, the latter has wingless females that are possibly associated with ant nests and small mammal burrows (Donisthorpe 1927; Heim de Balsac 1935; Krombein *et al.* 1979). Several more embolemid species are known from the Palearctic and Afrotropical regions (van Achterberg & van Kats 2000). *Ampulicomorpha confusa* has a widespread North American distribution from as far south as Georgia and California in the USA to as far north as the Yukon, and spanning from eastern coast to the western coast (Krombein *et al.* 1979). They attack leafhoppers in the family Achilidae, specifically those in the genus *Cixidia*; insects that are found under bark of conifer and oak trees (Bartlett *et al.* 2014; Bridwell 1958). *Ampulicomorpha confusa* has been reared from its achilid host, *Cixidia floridiae* (Wharton 1989). While we recognize the genus *Ampulicomorpha*, it has been suggested that the genus should be synonymized with *Embolemus* (van Achterberg & van Kats 2000).

Within Canada, *A. confusa* has been documented in British Columbia, Yukon, Ontario, Quebec, and New Brunswick in the Canadian National Collection (CNC), and southern Alberta and Anticosti Island, Quebec on iNaturalist. There is also one historical record from Manitoba in the Canadian National Collection, reported below, that has not been previously published. The only host species from which *A. confusa* has been reared, *Cixidia floridae* (Walker) is not presently known in Manitoba, but other species from the genus are known in the province including *Cixidia manitobiana* (Beirne) (Wharton 1989).

METHODS

Two *A. confusa* individuals were collected in 2023 (Figure 1) and one more was collected the following year in 2024. All individuals were collected using Malaise traps (Sante traps) deployed in Sandilands Provincial Forest in south-eastern Manitoba (Figure 2). Sandilands Provincial Forest is a mixed deciduous-coniferous forest featuring exposed dry sandy ridges. The sampling area featured exposed sandy soils and was dominated by jack pine (*Pinus banksiana* Lamb) and trembling aspen (*Populus tremuloides* Michx).

Embolemid specimens were determined to family using the key in Goulet & Huber (1993). The characters diagnostic of Embolemidae include a conical protuberance above the middle front of the head from which antennae with 8 flagellomeres insert and an anterior flange on the pronotum (Goulet & Huber 1993). The specimens were then compared against published descriptions to determine species (Olmi 1996). All collected specimens were deposited in the J.B. Wallis / R.E. Roughley Museum of Entomology at the University of Manitoba. Achilid specimens archived in the J.B. Wallis / R.E. Roughley Museum of Entomology that were near the recent collection location of the embolemid wasps in South-Eastern Manitoba were identified to species using published keys (Figure 2) (Bartlett 2020; Beirne 1950).

New Manitoba Records

Embolemidae

Ampulicomorpha confusa Ashmead

Material Examined. CANADA: MANITOBA: 1♀; Reynolds; Sandilands Provincial Forest; 49.62, -95.95; 27 Jul. 1995, Malaise trap, leg. James Watson; WRME_JW00077. 1♂; Reynolds; Sandilands Provincial Forest; 49.62, -95.95; 26–29 Aug. 2023, Malaise trap, leg. James Watson; WRME_JW00174. 1♂; Reynolds; Sandilands Provincial Forest; 49.626, -95.954; 19–21 Aug. 2024, Malaise trap, leg. Jordan Bannerman; WRMERA_02000.

Additional record. CANADA: MANITOBA: 1♂; Grass River Provincial Park; 100 km SE Flin Flon; 54.660, -100.823, 7 Jun.-13 Sep. 1984, flight interception trap, leg. S. & J. Peck; CNC1282192. Det. M. Olmi.



Figure 1. Lateral habitus of WRME_00077 ♀. Antenna with eight flagellomeres, emerging from a conical protuberance on the face is characteristic of the family (Goulet & Huber 1993).

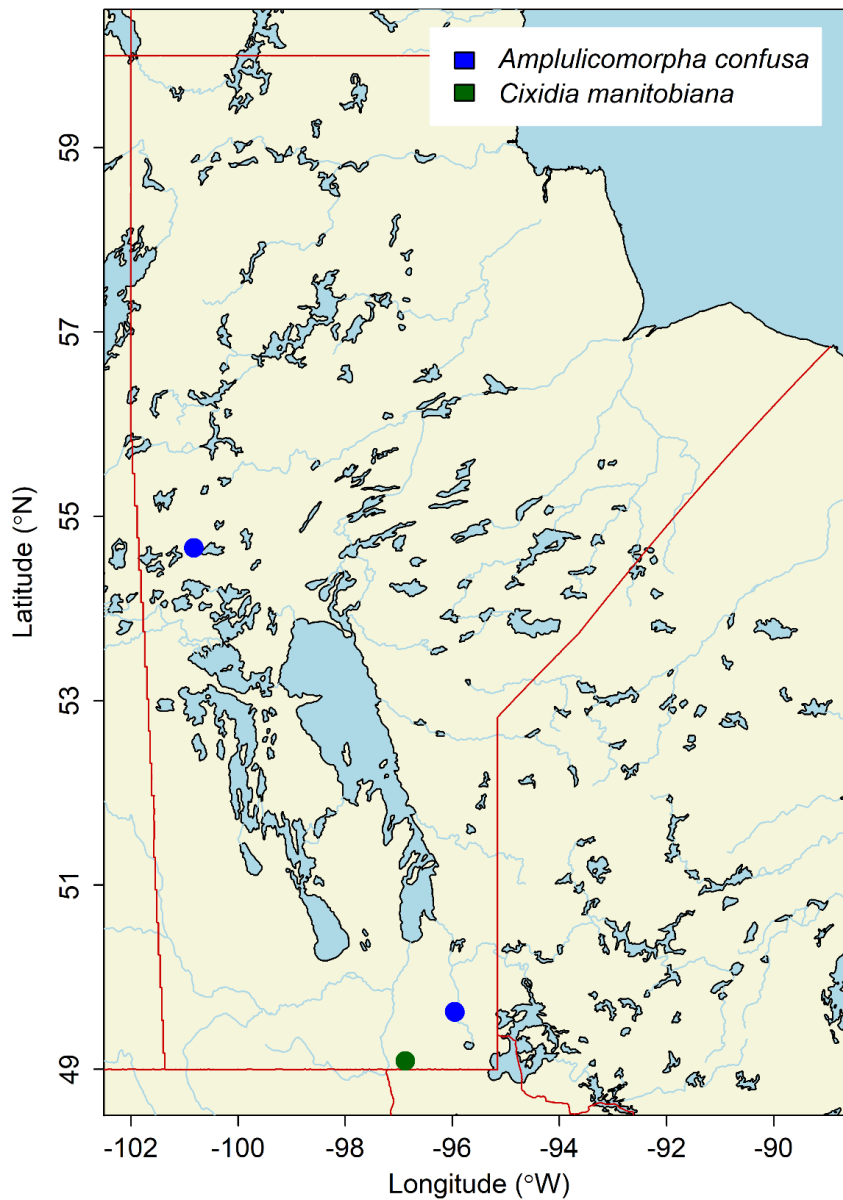


Figure 2. Collection locations of *Ampulicomorpha confusa* and the presumed host, *Cixidia manitobiana*.

Host Records

Achilidae

Cixidia manitobiana (Beirne)

Material Examined. CANADA: MANITOBA: 1♂; Tolstoi (SE6-26E); 25 Aug. 1954, reared from spruce log, leg. C. Borkowsky; JBWM0048220.

DISCUSSION

Ampulicomorpha confusa has been collected from areas surrounding Manitoba, these records serve to fill in a central portion of the known North American distribution. Since 2013 there has been an annual entomology field course at the University of Manitoba, which has been sampling with Malaise traps in jack pine forests with sandy soils in south-eastern Manitoba, yet no *A. confusa* have been previously identified. It is possible that the unassuming nature of embolemids as small black hymenopterans makes them difficult to distinguish from other more common parasitoid fauna.

While *C. floridae* has not been recorded in Canada, members of the genus *Cixidia* have been recorded in Quebec, Ontario, Newfoundland and Labrador, British Columbia, Manitoba, Northwest Territories, and Yukon (CNC). Achilid planthoppers eat fungal hyphae of dead conifer (and oak) logs as nymphs and can be collected from light traps as adults (Bartlett *et al.* 2014; Bridwell 1958). Fallen jack pine and spruce in eastern and northern Manitoba would make a suitable habitat for *Cixidia* species. The single recorded achilid was collected within 88.5 km of the location where the three recently collected embolemids were found, but *Cixidia* are known to occur in northern Canadian forests, meaning that they likely have viable hosts in the region. While *A. confusa* individuals have only been reared from *C. floridae*, Krombein *et al.* (1979) speculated other species from genus *Cixidia* might be viable hosts (Wharton 1989).

ACKNOWLEDGEMENTS

We thank Thilina Hettiarachchi for assistance with photo editing and achilid identification and Jason Gibbs for advice on the presentation of taxonomic information.

REFERENCES

- van Achterberg, C. & van Kats, R. (2000) Revision of the Palearctic Embolemidae (Hymenoptera). *Zoologische Mededelingen*, 74 (17), 251–269.
- Bartlett, C.R. (2020) Planthoppers of North America: Genus *Cixidia*. <https://sites.udel.edu/planthoppers/north-america/north-american-achilidae/genus-cixidia-fieber-1866/> (accessed 10 May 2025)

- Bartlett, C.R., O'Brien, L.B. & Wilson, S.W. (2014) A review of the planthoppers (Hemiptera: Fulgoroidea) of the United States. *Memoirs of the American Entomological Society*, 50 (1), 12–14. <https://doi.org/10.3157/061.149.0104>
- Beirne, B.P. (1950) The Canadian Species of *Eiptera* (Homoptera: Achilidae). *The Canadian Entomologist*, 82 (9), 186–190. <https://doi.org/10.4039/Ent82186-9>
- Bridwell, J.C. (1958) Biological notes on *Ampulicomorpha confusa* Ashmead and its Fulgorid host. *Proceedings of the Entomological Society of Washington*, 60 (1), 23–26.
- Canadian National Collection. (2025) Canadian National Collection (CNC) Specimen Search. Available from: <https://www.cnc.agr.gc.ca/taxonomy/SpecSearchD15.php> (accessed 12 May 2025)
- Carpenter, J.M. (1999) What do we know about chrysidoid (Hymenoptera) relationships? *Zoologica Scripta*, 28 (1–2), 215–231. <https://doi.org/10.1046/j.1463-6409.1999.00011.x>
- Donisthorpe, H.St.J.K. (1927) *The Guests of British Ants: Their Habits and Life-histories*. G. Routledge and Sons, London, 244 pp.
- Goulet, H. & Huber, J.T. (1993) *Hymenoptera of the world: an identification guide to families*. Agriculture Canada, Ottawa, 688 pp.
- Heim de Balsac, H. (1935) Ecologie de *Pedinomma rufescens* Westwood; sa presence dans les nids des micromammiferes (Hym. Embolemidae). *Revue Française d'Entomologie*, 2(1), 109–112
- Krombein, K.V., Hurd, P.D., Smith, D.R. & Burks, B.D. (1979) *Catalog of Hymenoptera in America North of Mexico. Vol. 2*. Smithsonian Institution Press, Washington, D.C., USA, 2209 pp.
- Olmi, M. (1996) A revision of the world Embolemidae (Hymenoptera Chrysidoidea). *Frustula Entomologica*, 18 (31), 85–146.
- Wharton, R.A. (1989) Final instar larva of the Embolemid wasp, *Ampulicomorpha confusa* (Hymenoptera). *Proceedings of the Entomological Society of Washington*, 91 (4), 509–512.
- Zhang, Y.M., Bossert, S., & Spasojevic, T. (2025) Evolving perspectives in Hymenoptera systematics: Bridging fossils and genomes across time. *Systematic Entomology*, 50 (1), 1–31. <https://doi.org/10.1111/syen.12645>

80TH ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF MANITOBA

ABSTRACTS

Keynote

HIDDEN BIODIVERSITY: THE FASCINATING LIFE OF PARASITIC LICE THAT INFEST BIRDS (SOMETIMES YOU HAVE TO RUFFLE A FEW FEATHERS)

Terry D. Galloway

Department of Entomology, University of Manitoba, Winnipeg, Manitoba, R3T 2N2

There is tremendous interest in birds in Canada, of which there are more than 700 species recorded. Information about these birds comes from diverse sources, from amateur birders to professional ornithologists. However, few people appreciate the hidden diversity of parasitic lice that infest these birds, and in fact, our knowledge about the louse fauna is limited. Barely 50% of the expected known fauna infesting birds in Canada has been recorded, most of which are from only a few occurrences. Part of the reason for this is the cryptic nature of these lice, most of which are relatively small and live deep within their hosts' feathers. In addition, most people have little opportunity to see these birds up close, or to handle them, and so never appreciate the diversity of their lice. We know almost nothing about basic ecological relationships of chewing lice with their hosts, including seasonal occurrence, prevalence, intensity of infestation, geographic distribution, and impact on host fitness and well being. I want to tell you about my experiences with this mysterious group of ectoparasites, most of which spend the majority of their time outside Canada, accumulated over more than 30 years, and having examined nearly 12,000 specimens of birds, of 246 species. I plan to introduce you to some of the most bizarre species of parasitic lice, and why we need to keep our attention on even the most familiar birds, such the introduced rock pigeon.

Student Competition - Posters

EXPLORING THE INFLUENCE OF 4,8-DIMETHYLDECANAL PHEROMONE ON THE MOVEMENT OF *TRIBOLIUM CASTANEUM* IN WHEAT FLOUR USING X-RAY MICRO-COMPUTED TOMOGRAPHY

H. Slobodian, C. Findlay, J. Paliwal

Department of Biosystems Engineering, Price Faculty of Engineering, University of Manitoba, Winnipeg, Manitoba, R3T 2N2

This study employs X-ray micro-computed tomography to investigate the influence of the synthetic pheromone 4,8-dimethyldecenal (4,8-DMD) on the movement patterns of *Tribolium castaneum* in wheat flour. By observing insect behavior within two compaction levels of flour (uncompacted and 30% compacted), paired with either the presence or absence of a pheromone lure, the study captures a three-dimensional view of insect movement through a flour substrate. The results highlight the influence of compaction on insect travel, with substantially greater distances traveled in uncompacted flour. While the presence of 4,8-DMD did not yield statistical significance overall, specific scenarios exhibited variations in insect movement, challenging assumptions about the universal effectiveness of these pheromones. The findings from this study provide insights for optimizing compaction levels in grain storage to impede insect movement, which is important in the design of flour mill facilities. Additionally, further research is recommended to refine pheromone formulations, considering concentrations and exposure durations, to enhance the effectiveness of pest management strategies in real-life scenarios.

USING INSECT BITES ON PLASTICINE SENTINEL CATERPILLARS TO IDENTIFY INSECT PREDATORS IN AGROECOSYSTEMS

S. Morris, C. Montemayor Aizpurua, R. Chinchín and A.C. Costamagna

Department of Entomology, University of Manitoba, Winnipeg, Manitoba, R3T 2N2

Arthropod predators in agroecosystems provide important pest control ecosystem services to farmers. There are many ways of identifying the presence, identity, and impact of predators such as through the use of plasticine sentinel caterpillars. Existing research focuses on identifying bite marks on these models to general taxonomic categories such as ‘mammal’, ‘bird’, and ‘arthropod’. Our research tested carabids, crickets, spiders, and a silphid to try to identify bites to more specific taxonomic levels such as family and genera. Twenty-eight carabids (*Calosoma*, *Harpalus*, *Pterostichus*) and five crickets showed significant results. Five spiders tested did not produce bites. Other beetles tested belonged to different taxa without enough number of replicates to include in the analyses. Measuring the lengths of the whole bite, the space between

the mandible marks, and each mandible mark yielded significant differences among the four taxa compared. By considering the three measurements in tandem, it is possible to distinguish between these insects based on their bites. We also found differences between the bites on plasticine sentinel caterpillars, balls, and cylinders, indicating that different shapes can be used for different research goals. By developing a key based on the results of this experiment, scientists can identify the marks of the insects studied. Further work should be done to test more carabid genera and other arthropod natural enemies. Pairing these sentinels with pitfall traps and cameras may help guide finer identification.



Student Competition – Oral Presentations

VIRAL PATHOGEN SPILLOVER FROM HONEY BEES TO WILD BEES - 2024 FIELD SEASON REVIEW

K. Peters and K. Bobiwash

Department of Entomology, University of Manitoba, Winnipeg, Manitoba, R3T 2N2

Bee pollination is integral for food security and ecosystem function, but these services are likely increasingly affected by stressors including habitat loss, pesticides, poor nutrition, and pathogens. Viruses are a pathogen well studied in managed honey bees (*Apis mellifera*), but in unmanaged wild bees the impact of viruses is not well understood. High honey bee mortality has been increasingly reported due to a combination of stressors, including the ectoparasitic Varroa mite (*Varroa destructor*) and the viruses it hosts. As these colony mortalities continue, wild bees may become more important in mitigating pollination deficits from honey bees. The transmission of viruses between honey bees and wild bees is not well studied, but pollen and shared floral resources are suspected to play a role. This project aims to study the pathogen spillover of viruses from honey bees to wild bees, and the role of pollen in this transmission. Across twenty field sites, honey bees, wild bees, and pollen from wild bees were collected during the summer of 2024. Sites included both agricultural canola sites and natural sites with a range of honey bee densities. Following viral analysis, samples will be used to assess viral abundances in honey bees, wild bees, and pollen. These data will be used to analyze how honey bee density and viral abundance affects wild bee diversity and viral abundance across sites, and how viruses in pollen relate to the bee that collected the pollen and the properties of the site where it was collected.

FIRST RECORDS OF THE SLAVE-MAKING ANT *HARPAGOXENUS CANADENSIS* IN MANITOBA

B. Krongold

Department of Entomology, University of Manitoba, Winnipeg, Manitoba, R3T 2N2

Harpagoxenus canadensis Smith is a rare socially parasitic ant species that enslaves various members of the genus Leptothorax, which are widely distributed throughout Canada. In Manitoba the species was first collected in July of 2020 from a fallen oak stick at the Birch Ski Area near Roseisle, but wasn't formally recorded at the time. On August 20th, 2024 I collected two more colonies of *H. canadensis*, also both in oak sticks at Stephenfield Provincial Park, which is around 12 kilometers north of the first locality. Due to the cryptic nesting habits and small size of this species, plus the fact that slave-making ants tend to be quite abundant in areas

with a large population of their host, I suspect that *H. canadensis* may be much more common and widely distributed than previous records suggest.

CAMERA, SET, PREDATION! SIMPLE AND FEASIBLE

C. Montemayor Aizpurua¹, Y. Lawley², J. Gibbs¹, and A.C. Costamagna¹

¹. Department of Entomology, University of Manitoba, Winnipeg, Manitoba, R3T 2N2; ².

Department of Plant Science, University of Manitoba, Winnipeg, Manitoba, R3T 2N2

Predation is a vital ecosystem service that helps regulate populations across various environments. In agriculture, beneficial arthropods play a key role in pest regulation. However, assessing predation in small arthropods can be challenging due to their size. While cameras have been extensively used to study predation in large mammals, there are few studies focused on arthropod interactions, largely due to complex setups and high costs. This study evaluates the effectiveness of a solar-powered surveillance camera for monitoring ecological parameters in the field, particularly behavior and predation using plasticine caterpillars. The camera was modified with a +3.25 armless lens (glued externally), allowing clear visibility at 26 cm above the ground. It recorded continuously 20-hour sessions each week (n=4) in experimental plots (4 x 8 m) as part of a habitat pollinator project. The camera focused on seven plasticine caterpillars to collect data on predator type, activity duration, and biting attempts. After recording, the 128GB micro-SD card was analyzed in the lab. Results indicated that this affordable and easy-to-install camera could record up to 12 days in night mode. The footage facilitated the identification of common taxa, including Gryllidae (crickets) and Carabidae (ground beetles). Additionally, the duration of various activities, such as wandering, touching, and biting was measured, demonstrating that predator-prey interactions can be effectively assessed with this technology.



PHYLOGENETIC DIVERSITY OF GRASSLAND BEES

T. Hettiarachchi

University of Manitoba, Winnipeg, Manitoba, R3T 2N2

Grassland habitats are important because of their potential to promote carbon storage and support biodiversity. Traditional diversity indices fail to encapsulate the evolutionary history of bees. Functional approaches incorporate some behavioural and size variation, but underlying traits that are phylogenetically constrained are not accounted for. Grassland Genomics for Greenhouse Gas Mitigation (GG4GHG) is a Genome Canada funded project investigating grasslands for greenhouse gas mitigation and ecosystem provisioning biodiversity. This past summer, I conducted fieldwork across 16 sites in southern Manitoba, using passive traps (raised bee bowls) and netting techniques to capture bee-flower interactions. This combined approach helps to ensure a wide variety of species are represented and provides insights into habitat needs. Although I faced challenges like unpredictable weather and wildlife, the experience was rewarding. So far, I have collected over 2,100 bees, along with selected wasps and hoverflies, through netting. Passive trapping yielded an additional 2,000 bees and some wasps. Using a method called targeted enrichment of ultra-conserved elements (UCE), my goal is to explore the evolutionary relationships of prairie bees, which are essential for understanding biodiversity and creating effective conservation strategies. I look forward to analyzing the DNA from the bee samples to carry out a full phylogenomic study. This work will contribute valuable data for understanding pollinator diversity in prairie ecosystems and will support efforts to protect these vital species.

THE 2024 POWESHIEK SKIPPERLING MARK-RESIGHT PROJECT AT THE MANITOBA TALL-GRASS PRAIRIE PRESERVE

J. Pound¹, and R. Westwood^{1,2}

1. Department of Environmental Studies and Sciences, University of Winnipeg, Winnipeg, Manitoba, R3B 2E9; 2. Department of Biology, University of Winnipeg, Winnipeg, Manitoba, R3B 2E9

The Manitoba Tall-Grass Prairie Preserve (MTGPP) represents one of the few remaining Tall Grass Prairie landscapes in North America, and acts as a critical habitat for a variety of threatened or endangered species, including the Poweshiek Skipperling, a small prairie-obligate butterfly. Since 2018, The Assiniboine Park Zoo has been managing a head-starting program for Poweshiek Skipperlings, raising them through their various early life stages from fall to spring, and releasing them at the MTGPP in the summer once adult butterflies emerge. These actions have successfully increased abundances in each of the remaining sites they occupy, and enabled

conservation authorities to carry out a reintroduction into a formerly-occupied site last year (2023). However, it remains unclear whether butterflies are capable of dispersing between these sites, since their habitat is highly fragmented and they are relatively poor fliers. In summer 2024, I participated in a variety of Poweshiek conservation activities in the MTGPP, including surveying for wild Poweshiek individuals, conducting daily pupae checks, marking zoo-reared individuals that had eclosed, and surveying for marked individuals at various distances from release locations. We released a record high number of individuals, found at least six wild individuals at the new reintroduction site, and re-sighted marked individuals at significant distances away from release sites, indicating they might be capable of dispersing further than previously thought. Our findings are encouraging, and will help conservation authorities plan how to manage Poweshiek populations and their habitat over the coming years and decades.

Submitted Papers

CONSERVATION OF WINNIPEG'S URBAN ELM POPULATION USING NEW FINDINGS TO IMPROVE DUTCH ELM DISEASE MANAGEMENT STRATEGIES

J. Ehn and R. Westwood

Department of Environmental Studies and Sciences, University of Winnipeg, Winnipeg, Manitoba, R3B 2E9

Dutch elm disease (DED) is a deadly and ongoing threat to elm trees in Winnipeg, with losses of over 5,000 elm trees per year. The City of Winnipeg runs a DED management program to slow down the spread of disease and maintain the urban elm population. This project focused on the use of new technologies and an update of information to aid in improving current DED management strategies. The study was divided into two components. First, we tested a new method of detecting DED using a remote piloted aircraft with remote sensing technology. Second, we studied elm bark beetle activity patterns to gain updated information on species composition and larval emergence dates. The elm bark beetle study led to the observation of an invasive elm bark beetle (*Scolytus schevyrewi*) breeding in multitude in American elm (*Ulmus americana*) wood. These findings suggest the need for discussion to modify methods within the DED management program, most importantly updating the current elm pruning ban dates in Winnipeg.

IS *CHLAENIUS CORDICOLLIS* (COLEOPTERA: CARABIDAE) A FREQUENT FLIER?

N.J. Holliday

Department of Entomology, University of Manitoba, Winnipeg, Manitoba, R3T 2N2

Although some literature suggests that *Chlaenius cordicollis* flies frequently, flight in the wild was not observed in over 40 years of study of this species on the beaches of Hecla Island, Manitoba. Window traps were operated throughout the active season of *C. cordicollis* on a beach where the beetle was abundant. Seven individuals were caught, all in a 20-day period in June. Laboratory flight tests in June revealed that females fly more frequently than males and have a lower threshold temperature for flight. New-generation beetles collected in late August, some beetles were also flight-capable in laboratory tests, although to a lesser extent than those tested in June. Dissections of beetles showed that the flight period seen from window trap catches coincided with the appearance of fully developed eggs in females, and terminated before the date of maximum gravidity - a pattern consistent with the oogenesis-flight syndrome. In addition to the physiological constraints of the oogenesis-flight syndrome, flight is further constrained by temperatures below the threshold for flight. Based on 16 years of temperature records from a lakeside weather station, in 50% of years, flight is possible for females on 9 or fewer days, and for males on 5 or fewer days. Thus, in Manitoba, *C. cordicollis* cannot be considered a frequent flier.

RANGE EXTENSION OF RED-TAILED LEAFHOPPER (*AFLEXIA RUBRANURA*) IN MANITOBA

J. Henault¹, R. Foster², C. Neufeld³ and S. Lee³

1. Independent Researcher, Winnipeg, Manitoba, R3L 2G5; 2. Northern Bioscience, Thunder Bay, Ontario, P7A 3G3; 3. Canadian Wildlife Service, Environment and Climate Change Canada, 115 Perimeter Road, Saskatoon, Saskatchewan, S7N 0X4

Corresponding author: J. Henault (henaultjps@gmail.com)

The Red-tailed Leafhopper (*Aflexia rubranura* (DeLong 1935)) is an insect of Special Concern distinguished by black dashes on its head and a red “tail” (males) or black “V” (females) at the posterior of its abdomen. It only feeds on Prairie Dropseed (*Sporobolus heterolepis*) throughout its range in areas that can support this grass. Historical surveys for Red-tailed Leafhopper in Manitoba have found its range to generally be restricted to the Interlake region. Recent surveys have confirmed its presence at most historical sites and have located new populations, including at disjunct locations in western Manitoba. This range extension increases the known redundancy of Red-tailed leafhopper populations in Manitoba. Idle and haying disturbances regimes may be relatively supportive. Potential expansion of surveys to neighbouring jurisdictions combined with observational studies may improve our understanding of Red-tailed leafhoppers range and ecology in Manitoba.



CLIMATE CHANGE, AN APHID, *UROLEUCON RUDBECKIAE*, AND ITS WILDFLOWER HOST, *RUDBECKIA LACINIATA*, 1999-2023.

R.J. Lamb and P.A. MacKay

Department of Entomology, University of Manitoba, Winnipeg, Manitoba, R3T 2N2

Corresponding author: R.J. Lamb (lambmack@mymts.net)

Five populations of an aphid, *Uroleucon rudbeckiae* (Fitch), and its wildflower host, *Rudbeckia laciniata* L., were assessed in southern Manitoba from 1999-2023. These populations live at the northern edge of their extensive range in the southern half of North America. Temporal trends in host plant densities and life history traits were detected, that might be attributed to climate change. From 1999-2023, the climate at four weather stations near the populations revealed no significant climate change measured as annual mean temperatures or precipitation, but monthly mean temperatures for April declined significantly by 4.1 °C and June temperatures increased significantly by 3.4 °C on average, at the four weather stations. This climate change, particularly the trend of rising temperature in June, was a cause of declining flower stem height and stem density in some plant populations but had no detectable effect on the density of the aphid populations. However, survival of aphid eggs or newly hatched juveniles was affected by declining April temperatures, with one population having little or no spring establishment on the host in the last 12 years of the study. The relative importance and repercussions of direct effects of climate change and indirect effects through the host plant on aphid populations are described.

UNCOVERING FUTURE CLIMATIC SUITABILITY: CONSTRUCTING CLIMATE ENVELOPE MODELS FOR THREE ENDANGERED HESPERIIDAE SPECIES AT THEIR RANGE MARGINS IN MANITOBA, CANADA

A. Thorkelson, K. Dearborn and R. Westwood

Department of Environmental Studies and Sciences, University of Winnipeg, Winnipeg, Manitoba, R3B 2E9

Poweshiek skipperling (*Oarisma poweshiek*), Dakota skipper (*Hesperia dacotae*), and Mottled duskywing (*Erynnis martialis*) are three federally listed, critically endangered butterflies found within the province of Manitoba. In recent decades each species has experienced substantial declines in both abundance and range, and there exists considerable uncertainty as to why, presenting a challenge for conservation efforts. The rapidly changing climate could be contributing to these declines, but the potential impacts of climate change have yet to be quantified and incorporated into conservation planning for the species. In an effort to bring forth such considerations we constructed ensemble climate envelope models (CEMs) for each species, using six statistically independent and biologically relevant climatic predictors. These models use associations between climate and known occurrences of a species across a landscape to infer the set of conditions under which hosting a population of that species is viable, and map its predicted potential range change based on these requirements under climate change. Six of the most commonly used modelling algorithms were considered for analysis and included in the final ensemble based on performance. Current climate envelopes were projected to future conditions under moderate and high carbon emissions scenarios for the 2050 and 2080 periods. All three species show almost complete loss of climatic suitability under all conditions, underscoring the importance of considering climate change in long term conservation planning and reducing emissions globally.

COMPARISON OF HABITAT STRUCTURE AND COMPOSITION ACROSS DISTURBANCE BASED MANAGEMENT REGIMES IN POWESHIEK SKIPPERLING SITES IN MANITOBA

J.M. Sánchez-Jasso¹, **R. Westwood**² and N. Koper³

1. Natural Resources Institute, University of Manitoba, Winnipeg, Manitoba; 2. Department of Biology, University of Winnipeg, Winnipeg, Manitoba; 3. Faculty of Environment, University of Northern British Columbia, Prince George, British Columbia

The Poweshiek skipperling, *Oarisma poweshiek*, Parker 1870 (Lepidoptera: HesperIIDae), is an endemic prairie-obligate butterfly species on the brink of extinction in the Tall-grass prairies in North America. Poweshiek skipperling is adapted to natural disturbances as wildfire, flooding, and grazing in Tall-priairies and the Canadian recovery strategy promotes disturbance-based management practices (e.g., grazing by cattle, prescribe burns, haying, and mowing) to recover

and maintain populations. To enhance the recovery process for this species it is necessary to understand how management practices have shaped habitat structure and composition in remaining skipperling sites. We compared the habitat structure and composition, and plant, bird and invertebrate diversity between treatments at different temporal scales of management in occupied and formerly occupied Poweshiek skipperling sites in Manitoba. Soil variables important to larval host plant health were analyzed with significant differences found between some management regimes. Preferred adult nectar plant density was different between management types as well as plant species richness and presence of other invertebrates and birds.

Symposium

TINY BUT MITE-Y SYMBIONTS: AN EXPLORATION OF AVIAN FEATHER MITE ECOLOGY AND EVOLUTION

A.E. Matthews

Department of Biological Sciences, Arkansas State University, Jonesboro, Arkansas, USA;
Department of Biological Sciences, University at Buffalo (SUNY), Buffalo, New York, USA

Symbionts play fundamental ecological and evolutionary roles across multiple levels of biological organization – from individual organisms to entire ecosystems – and can have strong effects on global biodiversity. Birds, as hosts, provide multiple “niches” for a wide range of internal and external symbionts to inhabit. Among these, feathers serve as a unique avian “niche” and provide habitat for one of the most mysterious groups of avian symbionts: feather vane-dwelling mites. This presentation highlights recent discoveries on the biodiversity, (co)evolutionary history, and functional nature of vane-dwelling feather mites associated with a colorful group of avian migrants – the parulid warblers. Genomic analyses conducted at the species- and population-levels shed light on their biodiversity and population genetics, as well as uncover valuable information about their transmission dynamics and ecology. Field experiments provide novel insight into the context-dependent functional nature of the symbiotic relationship (i.e., are mites parasites, mutualists, or commensals?) and microbial surveys reveal the potential “protective” role that mites play on host feathers. By studying these tiny organisms as a model, we have been able to gain significant insights into the ecology and evolution of species interactions more broadly.

TO BITE OR NOT TO BITE: SOME THOUGHTS ON VECTOR PARASITE INTERACTIONS AND BLOOD-FEEDING BEHAVIOUR

R. Anderson

Department of Biology, University of Winnipeg, Winnipeg, Manitoba, R3B 2E9

Paul Ewald's book, *Evolution of Infectious Disease*, largely set the intellectual stage for a more theory-driven consideration of the shaping forces of long-term interactions between disease-causing parasites and their hosts, with each player acting as a selective force on the other, especially given the obligate nature of such symbioses to the parasite. Janice Moore's book, *Parasites and the Behavior of Animals* focused on the intriguing ways in which many parasites affect the behavior of their hosts so as to increase parasite success. Transmission, a key aspect of parasite biology given the risks associated with leaving one host for another and which depends significantly on host behavior is a much-studied subject in this context. After I left the U of M Entomology Department as a newly-minted PhD, I was fortunate to post-doc with a theoretician who was interested in these questions and in addressing them with *Anopheles* mosquitoes and *Plasmodium* parasites as model organisms and in my expertise in mosquito-feeding behavior. There was a further nexus with a prominent player in the "parasite manipulation of hosts" scientific community at the time such that I was generously mentored to pursue some fascinating research. I present field and laboratory data to address the hypothesis that malaria parasites can and do affect the biting persistence of malaria mosquitoes to potentially enhance transmission.

Symposium

THE DIVERSITY OF PARASITIC BEES IN MANITOBA

J. Gibbs

Department of Entomology, University of Manitoba, Winnipeg, Manitoba, R3T 2N2

There are 95 brood parasitic bees in Manitoba in 12 genera. These comprise 24% of all bees in the province. Six evolutionary lineages are represented, which collectively invade the nests of at least 16 genera of bees in all six families occurring in Manitoba. Surprisingly little is known about host associations for many of these brood parasites. A brief summary of their diversity and associations will be provided with a focus on how more needs to be learned about these amazing bees.

Symposium

INSECTS ON CROPS IN MANITOBA IN 2024 - AN EXTENSION UPDATE

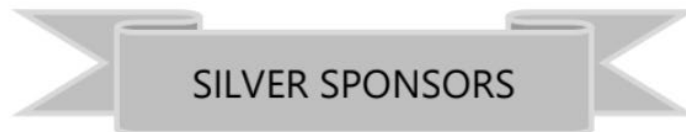
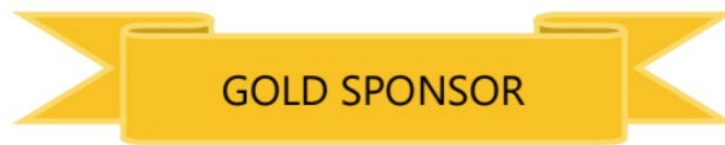
J. Gavloski

Manitoba Agriculture, Carman, Manitoba, R0G 0J0

Crop feeding insects of greatest concern in Manitoba in 2024 will be discussed. Flea beetles in canola (*Phyllotreta species*), and cutworms, in many crops, were early-season insect concerns that were quite widespread. Alfalfa weevil (*Hypera postica*) was at high levels in some alfalfa and sweet clover fields in June and early-July. Aphids got to high levels, resulting in control, in some crops, mainly peas, soybeans and to a lesser extent small grains. High levels of natural enemies of aphids were also present in some fields. Armyworms (*Mythimna unipuncta*) were a concern in cereals and forage grasses in some areas. Bertha armyworm (*Mamestra configurata*) was controlled in some canola fields in the western part of Manitoba in late-July and August. Lygus bugs (*Lygus* spp.) were controlled in some fields of canola, dry beans, faba beans and strawberries. Grasshoppers were still a concern in some areas, although not to the same extent as the previous few years. Range expansions within Manitoba were detected for cabbage seedpod weevil (*Ceutorhynchus obstrictus*) and pea leaf weevil (*Sitona lineatus*). Grape berry moth (*Paralobesia viteana*) was collected for the first time in Manitoba.

ACKNOWLEDGEMENTS

*The Entomological Society of Manitoba Wishes to
Thank the Following Sponsors for Their Generous
Support of the 80th Annual Meeting*



Taz Pest Control

Meeting Minutes
80th Annual General Meeting
Saturday, 2 November 2024, 1:30 PM

Attendance:

D. Wade
N. Holliday
A. Civetta
R. Lamb
P. MacKay
R. Anderson
J. Gibbs
J. Henault
J. Bannerman

T. Hettiarachchi
C. Montemayor
M. Dupuis
M. Currie
E. Martineau
Y. Liu
L. Capar
R. Wrigley
J. Gavloski
R. Currie

M. Hansen
A. Costamagna
V. Hervet
S. Wolfe

1. Acceptance of Agenda at 1:30 pm

Motion: N. Holliday motioned to accept the revised agenda, 2nd P. MacKay ... Carried.

2. Acceptance of the Minute

s of the last Annual Meeting (29 October 2022)

Motion: R. Lamb motioned to accept the 2022 minutes, 2nd R. Anderson ... Carried.

3. Business Arising from the Minutes

Business arising throughout the year was addressed by the executive during the year. One outstanding action item was the Youth Encouragement application to ESC for the Youth Outreach Award. Lisa has passed the information to Mabel who is the chair of the ESM Youth Encouragement Committee.

Motion: J. Gavloski motioned to submit to the Youth Encouragement and Public Education Committee and Treasurer of the Entomological Society of Canada, 2nd J. Bannerman ... Carried

4. Reports of the Executive

Motion: J. Gibbs motions to receive the reports, 2nd A. Civetta ... Carried

President – V. Hervet

Treasurer – L. Capar

Website host fee has expenses incurred listed as October 2023. Would this be included in the general expense line? Lisa will ask Kathy Kano
Lisa has copied the totals which have been used since Ian was treasurer
Neil pointed out discrepancy in the figures. The first table shows a -\$1400 loss.
Executive will look closely and find why this is not adding up. Maybe invite Kathy to aid in clarification. Lisa will follow up.

Regional Director(s) to the ESC – J. Gavloski

Editor of the Proceedings – J. Gibbs

Membership – L. Capar

5. Reports of the Committees

Endowment Fund – R. Westwood/L. Capar

Scientific Program – J. Henault

Newsletter – J. Henault

Youth Encouragement/Public Education – M. Currie

David will look for email and provide Mable with form for donations.
Jordan raised a comment / question :
He does the work on the website and there is a form to request extension events online. -new in 2023/24
Each grad student does 1 event per year. There is a \$20 'bond' volunteer deposit which is returned after they complete their outreach.
John does Carman / Morden youth encouragement / outreach events; schools, daycares, and day camps.
David has gone to daycares and monarch festival.
Would it be useful to have a list of people who contributed to events and present at the ESC?
There is an application form to receive \$\$'s from ESC for outreach events and if successful you automatically receive funds.
John did mention the ESM outreach at the ESC meeting and it was agreed that it is really well done and is something to 'brag' about.
For clarification on how to get access to this funding please send an email to Neil.
Lisa has funds and will be able to write a cheque.

Action Item for executive / treasurer / youth encouragement to review rules and get on the same page in regards to procedures what is currently being done and what should be done.
- can itemize what money is being used towards.
- expense receipts to be signed by committee chair then forward to treasurer for reimbursement.
Action Item Justis will make form into a PDF and get it to treasurer

Social – C. Montemayor

Scholarship and Awards – D. Vanderwel

Fundraising – read on behalf of K. Cano

Archives and Web Page – J. Bannerman

Common Names – J. Gibbs

Honorary Members – T. Galloway

7. New Business

a. Update signatories

Appendix A

1. President

2. Treasurer

3. Person in charge of GIC

Motion: V. Hervet motioned to change signatories to persons above, 2nd N. Holliday ...
Carried

Action Item Sheila to update bylaws and sent to Jordan for posting to website

8. Adjournment at 3:43 pm

Motion: N. Holliday motions to adjourn, 2nd V. Hervet ... Carried.

APPENDIX A: Agenda of the Entomological Society of Manitoba

80th Annual General Meeting

Saturday, 2 November 2024, 1:30 PM

Department of Entomology Rm 219

- | | |
|---|---------------------------------|
| 1. Call to Order | V. Herve |
| 2. Notice of meeting | V. Herve |
| 3. Additions to and approval of the Agenda | V. Herve |
| 4. Acceptance of the Minutes from the last Annual Meeting (28 October 2023) | V. Herve |
| 5. Business arising from the minutes | V. Herve |
| a. ESC youth outreach fund award from the ESC | Lisa Capar |
| 6. Reports of the Executive | |
| a. President | Vince Herve |
| b. Treasurer | Lisa Capar |
| c. Regional Director(s) to the ESC | John Gavloski |
| d. Editor of the Proceedings | Jason Gibbs |
| e. Membership | Sheila Wolfe |
| 7. Reports of the Committees | |
| a. Endowment Fund | Richard Westwood / Lisa Capar |
| b. Scientific Program | Justis Henault/Vince Herve |
| c. Newsletter | Justis Henault/Phoenix Nakagawa |
| d. Youth Encouragement/Public Education | Mabel Currie |
| e. Social | Cecil Montemayor Aizpurúa |
| f. Scholarship and Awards | Désirée Vanderwel |

- | | |
|---|------------------|
| g. Fundraising | Kathy Cano |
| h. Archives and Web Page | Jordan Bannerman |
| i. Common Names | Jason Gibbs |
| j. Report of the Honorary Members Committee | Terry Galloway |
8. Results from the election: New executive/committee members
9. New business
- | | |
|---|--------------|
| a. Updating list of signatories in the bylaws (APPENDIX A.) | Vince Hervet |
| b. Draft a budget for annual meetings | Vince Hervet |
| c. Looking for a Chair for the 2025 ESM annual meeting | Vince Hervet |
| d. Urgent need to plan the 2026 JAM – volunteers needed | Vince Hervet |
10. Other business
11. Adjournment

APPENDIX B: Entomological Society of Manitoba
Annual Business Meeting – President’s Report to the Membership
28 October 2023

Prepared by V. Hervet

There were three meetings of the Executive Committee of the Entomological Society of Manitoba between December 2023 and September 2024:

First Executive meeting: 30 November 2023

The Executive discussed previous businesses, as well as businesses arising from the AGM:

The process to apply to the ESC’s ESC Public Encouragement Grant was discussed.

To thank the persons who helped digitize the ESM archives, the Executive decided to award a certificate to the students who digitalized the archives, the certificate will be titled “ESM Award for Outstanding Service”. This was subsequently done. This award will also be published on the website, newsletter, and proceedings. Since the digitization of archives is not complete, this award will also be presented to persons who continue this work.

The implementation of a system for update of signatories yearly was discussed. It was thought to be appropriate to get the new signatories to sign the relevant documents at the AGM, when everybody is present. However, there were uncertainties as to what is required by the bank so we decided to ask the bank for their requirements before going further.

The Past-President, Alberto Civetta, provided an update on the call for nominations. The positions that needed to be refilled were discussed. These included the positions of: President-elect, Scientific program Chair, Member-at-Large, and Secretary. The Secretary was asked to send the list of current ESM members to all members of the Executive, so that members of the Executive could peruse the list of ESM members and try to identify potential persons to ask for these positions. This was subsequently performed.

The President stressed that we needed to identify a Program Chair for the next ESM meeting as soon as possible to prevent last minute planning of the meeting, as it has happened some previous years. John Gavloski volunteered to send the Executive a list of previous meetings themes and their Chairs to ease finding a potential Chair who had not recently done it. This was subsequently done. A tentative meeting Chair was subsequently found, but due to ongoing difficulties over the following months, this person had to eventually step down, leading the President, Vincent Hervet, and the past meeting Chair and current Newsletter Co-Editor, Justis Henault, joined forces to co-organize the 2024 ESM annual meeting.

Second Executive Meeting – 30 May 2024

The process to apply to the ESC's ESC Public Encouragement Grant was discussed once again. However, no action items were made related to this item during this meeting so this item was not followed upon on the third Executive meeting, and it appears that no application was submitted. Therefore, We will make it an action item at the next AGM to ensure that this is not forgotten since we now have a clear indication of who should submit the application (i.e., the Treasurer) and who to submit it to (i.e., Chris MacQuarrie).

The need to update signatories was once again discussed.

The refilling of vacant positions was also once again discussed. Following this meeting, the President and the Vice-President had several conversations to find candidates for the various positions that remained vacant. Many persons contacted declined to step up, and the last vacant position was finally refilled in October 2024, so nearly one year after the annual meeting, thus highlighting the difficulties in finding sufficient volunteers.

These three items remained outstanding after the meeting. All vacant positions were finally refilled in October 2024, so nearly one year after the annual meeting. For reasons that we are

The March 25 edition of the ESC Bulletin mentioned that hard copies of *The Canadian*

Entomologist, *Memoirs*, and *Bulletin*, would be given for free (minus the cost of shipping) to ESC members who asked for them, and that the copies not claimed by 19 October 2024 would be disposed of. The president proposed to ask all the EM members if they were interested in these copies so that we could place a single order. The ESM Secretary subsequently asked the ESM membership if they were interested in these copies, and a note to this effect was also placed in the ESM Newsletter, but nobody expressed interest. Therefore, the ESM President contacted the ESC only to ask for his own missing issues of the ESC Memoirs.

The Executive discussed the need to get organized for the upcoming JAM in Winnipeg in 2026. Kateryn Rochon previously agreed to coordinate initial activities for this meeting, but additional volunteers will be necessary.

Third Executive Meeting – 25 September 2024

The main discussion of this meeting was the organizing of the 2024 ESM annual meeting. Due to unforeseen events, the ESM Executive, led by Justis Henault and Vincent Hervet, organized this meeting.

Was also discussed the updating of the ESM signatories. The bank informed the Treasurer that there can only be up to 3 signatories, and that only one person can access the bank account, and only one person can use the debit card. It also came to light that the person in charge of the

captured in the ESM bylaws, which stipulate that: “The signing officers of the Society shall be the President, Past-President or the President-Elect and the Treasurer or the Secretary.” It therefore appeared that the ESM bylaws would need to be updated to reflect this need.

The President’s inbox received a request for a species identification, which was a female pigeon tremex, and I happily provided ample details on the identification, the evolutionary history, and ecology of this species.

During the winter the President’s inbox received three requests to give presentations on insects at two elementary schools in Winnipeg. Due to the restructuring of the Youth Encouragement and Public Outreach Program at the time two of these requests were received, I accepted to give these presentations myself. I brought my personal collection of tropical insects and live insects, and borrowed additional insects (live and pinned) from the University of Manitoba Department of Entomology, and brought other props including a microscope and insect stickers. The presentations were extremely well received, which encouraged me to give further such presentations in the future if time allows.

The next big thing for the ESM will be the organization of the 2026 Joint Annual Meeting in Winnipeg. Organizing this meeting is not small feat, and virtually nothing has been done thus far, so it is urgent that the ESM identifies individuals to lead and conduct the organizing of this meeting.

Another important point that I would like to make is that it appears that in the past a red binder existed that described the role of each position within the ESM. It would be essential to locate this binder so that when someone new steps into a role at the ESM, they are provided with information on what they are supposed to do. If this binder cannot be located, then I would strongly encourage each current (and past) members of the ESM who played a role in the Executive and in committees to write down a list of duties, and when and how to do them.

As a concluding remark, I would like to mention that it has been a real honor and pride for me to stand as the President of the Entomological Society of Manitoba for a year. During my term, I have fully appreciated the efforts of all the volunteers who make this society work, so everybody who volunteers for the society, in any capacity, has my deepest gratitude.

APPENDIX C: Report of the Treasurer

FINANCIAL STATEMENTS YEAR ENDING AUGUST 31, 2023

NOTE: These Financial statements have not been audited. The accounts, bank statements and receipts were provided by the treasurer.

Treasurer: Lisa Capar Date: October 23, 2024

	2024	2023	2022
Current Assets (Aug. 31)			
CASH	\$8,186.77	\$5,831.22	\$11,496.00
GIC's	\$50,000.00	\$50,000.00	\$50,000.00
TOTAL (Cash+GIC's)	\$58,186.77	\$55,831.22	\$61,496.00
LIABILITIES			
Current	NIL	NIL	NIL
NET ASSETS			
Unrestricted net assets	\$8,186.77	\$5,831.22	\$11,496.00
Internally restricted	\$50,000.00	\$50,000.00	\$50,000.00
	\$58,186.77	\$55,831.22	\$61,496.00

	2024	2023	2022
REVENUES			
Annual Meeting (Registration)	1135	820	0
Donations	950	600	800
ESC	0	0	0
Interest income	1428	839	778
Membership fees	1170	1165	1500
Miscellaneous	0	0	0
Youth encouragement & Pub Ed ¹	490	500	0
Total	5173	3924	3078
EXPENDITURES			
Awards and Scholarships	3300	6300	3250
Donations	0	0	0
General	199	138	107
Meetings: ESC	0	0	0
Meetings: ESM	3004	3907	?
Social Committee	0	0	0
Youth Encouragement & Public Education	0	512	0
Bank fees	100	114	86
TOTAL	6603	10830	3462
	-1430	-6906	-385

¹ Grant from ESC

Totals rounded to nearest whole number

APPENDIX D: Report of the Regional Director

Prepared by John Gavloski; John.Gavloski@gov.mb.ca

The Entomological Society of Canada (ESC) Board of Directors held four meetings in 2024; January 17, April 29, June 10 and October 20. I attended all of these virtually. Highlights of importance to members of the Entomological Society of Manitoba (ESM) were communicated primarily through the Regional Director's Message in the Entomological Society of Manitoba Newsletter.

Some issues of potential interest or relevance to Entomological Society of Manitoba membership include:

Some of the physical asset of the Entomological Society of Canada that are stored in Ottawa have been moved to a new locker. The material is now being stored at Just Right Self-Storage in Ottawa. The material includes complete sets of *The Canadian Entomologist*, historical administrative documents, ESC awards related material, and extra copies of ESC publications that are marked for disposal unless requested by the membership.

The Bylaws committee had proposed revision to the financial arrangements between societies for Joint Annual Meetings (JAM). The proposed revisions were shared with ESM executive members to determine if our society supports these changes to the bylaws, or if we have suggestions or questions. The ESM executive was good with the proposed changes.

At recent Joint Annual Meetings, the board of directors has worked on developing a strategic plan for the ESC. A special meeting, led by a facilitator, was conducted before the 2023 JAM. The facilitator compiled the feedback from the strategic planning session, and a summary identifying opportunities and challenges was shared with the ESC Board. Input was gathered from the regional societies and ESC membership. The strategic plan was presented for approval at the Board of Directors meeting at the 2024 JAM in Quebec City, as well as an implementation plan. The board presented the strategic plan to the membership at the AGM on Monday October 21. The board hopes to have the implementation processes finalized and approved at the Annual Meeting in 2025. I will provide more details on the strategic plan as discussions continue. Any members would be welcome to share their input with the Regional Director, so it can be brought to the attention of the ESC.

Revisions to the ESC committee structure were proposed. The committee restructuring would result in fewer committees, with some amalgamated, and others becoming subcommittees. This was approved at the Board of Directors meeting on the Sunday (October 20) at the joint annual meetings.

Applications for all Entomological Society of Canada student scholarships are to be submitted by email by March 1 each year. A list of scholarships that are available, and instructions on how to apply, is posted on the Entomological Society of Canada website at: <https://esc-sec.ca/student/student-awards/>

Scholarships are available in many disciplines of entomology, including integrated pest management (John H. Borden scholarship), arthropod community ecology (Dr. Lloyd M.

Dosdall Memorial Scholarship), arthropod biodiversity (Biological Survey of Canada Scholarship), as well as travel scholarships.

Concerns over some of the challenges of smaller entomological societies planning and hosting joint annual meetings was discussed at the Board of Directors Meeting on October 20. The two main challenges discussed were finding volunteers and hotel costs. Food and Beverage minimums have increased, and the cost of audiovisual support can be high.

The next joint annual meeting will be hosted by the ESC and the Entomological Society of Alberta in Calgary from October 5 – 8, 2025. The theme will be: New Bugs Rising.

Members of the ESM are encouraged to provide feedback to the Regional Director on matters related to the ESC.

APPENDIX E: Report of the Proceedings Editors

Prepared by Jason Gibbs; jason.gibbs@umanitoba.ca and Justis Henault; henaultjps@gmail.com

Volume 79 (2024) of the *Proceedings of the Entomological Society of Manitoba* has been prepared for exclusive distribution in electronic format. It will be sent to the Secretary (Jade Tanner) to be distributed to the membership and so the Webmaster (Jordan Bannerman) can post it at the appropriate time to the website. Volume 79 includes two scientific papers. Abstracts from presentations at the 2023 Annual Meeting of the Entomological Society of Manitoba are also included. Abstracts are accompanied by images provided by the presenters. Annual Meeting Minutes and Committee Reports from the 79th Annual Business Meeting can be found at the end of the volume. Thanks to Jade Tanner for providing committee reports.

Justis Henault has agreed to serve as co-editor for the *Proceedings*.

All future Scientific Note and Scientific Paper submissions should be emailed to jason.gibbs@umanitoba.ca. Please see the revised “Instructions for Authors” document to aid in the formatting and submission process. This document is accessible on the Entomological Society of Manitoba website. A .csl file for use in the bibliographic software Mendeley or Zotero has been prepared and posted to the website.

We encourage everyone to consider submitting Scientific Notes and full Scientific Papers. The *Proceedings* is a terrific place to publish new distribution records and faunal lists for insects and related arthropods in Manitoba, as well as the results of a wide variety of entomological study. We received four manuscript submissions in 2024 but would welcome more. All submitted manuscripts are peer-reviewed; all published papers are available as PDF reprints on the website. Issues of the *Proceedings* are fully accessible using on-line search engines. There are no page charges to authors for published manuscripts, and with our electronic format, colour images can be included in manuscripts. In theory, there are no practical limits to manuscript length. All issues of the *Proceedings* are freely available to entomologists around the world. If you have something of relevance to entomology in Manitoba, we encourage you to consider submitting it to the *Proceedings*.

APPENDIX F: Report on Membership by the Secretary

Prepared by Jade Tanner

The Entomological Society of Manitoba currently has 82 members (88 in 2023). Our membership is composed of 28 students, 49 regular members, three honorary members, and two lifetime members. At the time of the meeting, we have 7 members with overdue membership fees.

I would like to welcome our new members and thank them for joining our entomological fold. If you have not done so, please fill out our membership information forms at the sign in desk. If your personal contact information has changed recently, please also update it with us on a new form. Please continue to invite students and colleagues to join.

Members are encouraged to get in touch when they come across insect related (or adjacent) events / activities / job opportunities that would be of interest to our group. The Secretary can help by sending out calls for volunteers and notices for events.

Regrettably, I was unable to attend this year's meeting due to on going medical issues and as this is my last year with the executive. I would like to wish you all well and I hope that this year's meeting was enjoyable for all our attendees! Sheila Wolfe will be taking over as your secretary, and I know you are all in good hands with her going forward!

APPENDIX G: Report of the Endowment Fund Board for 2022–2023

A summary of investments and projected interest income for the fiscal year is attached (Table 1). Interest generated by the Endowment Fund provides a basis for funding the Society activities. The Endowment Fund principal is \$50,000. There are three GIC's coming due in November and December 2024. These will be renewed on a timeline to ensure investment income will continue to be available in the future over a five year period.

Richard Westwood, Endowment Fund

Lisa Capar, Treasurer

Table 1: Account information as of October 12, 2023.

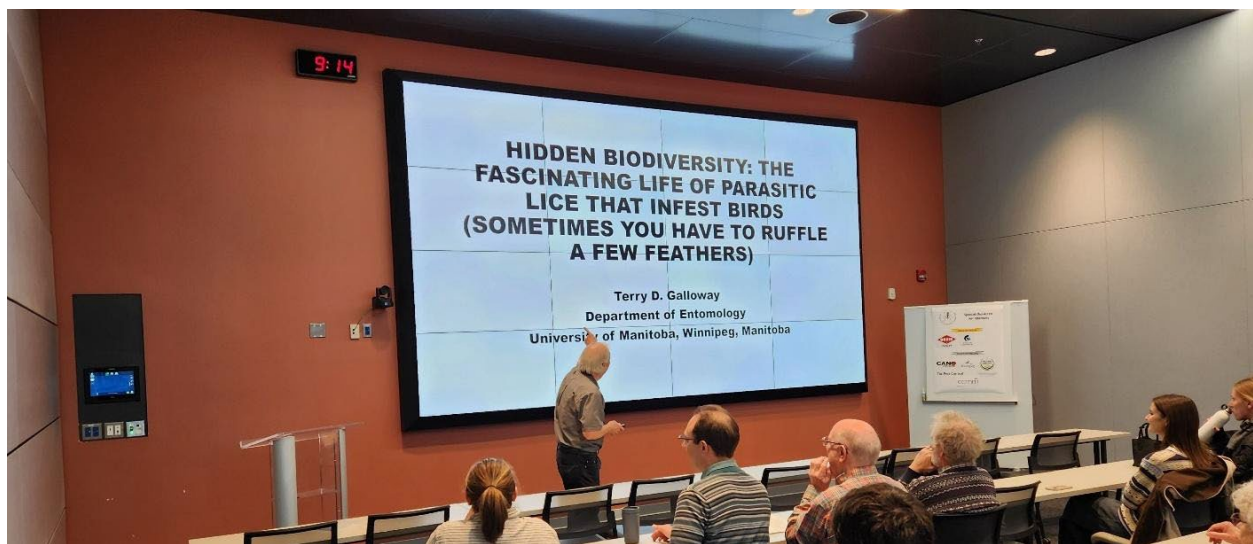
Certificate No.	Principal \$	Interest Rate (%)	Term	Maturity Date	Anticipated interest (\$)
00920196133-0006	10000.00	2.00	5 yrs	November 19, 2024	1000.00
00920196133-0007	10000.00	2.25	5 yrs	December 13, 2024	1125.00
00920196133-0012	1000.00	4.90	3 yr	November 4, 2025	147.00
00920196133-0010	10000.00	2.18	5 yrs	November 30, 2026	1090.00
00920196133-0011	10000.00	2.18	5 yrs	December 2, 2026	1090.00
00920196133-0001	9000.00	5.75	5 yrs	November 10, 2027	2587.50
Total	50000.00				

APPENDIX H: Report of the Scientific Chair

Co-Chairs Justis Henault (henaultjps@gmail.com) and Vincent Hervet (vincent.hervet@agr.gc.ca)

Submitted to the Entomological Society of Manitoba President (David Wade) on 2025 April 17

This year's meeting provided us with the opportunity to celebrate one of our members' achievements while discussing parasites! Overall, we had a satisfying meeting.



Planning

Scientific Program Committee

Initially, Taz Stuart agreed to try to chair the meeting, guided by a theme of atypical entomological careers. After receiving very little interest from potential speakers, Taz stepped-down from the role. Justis (Chair of the previous meeting) and Vince (ESM President) stepped-up as Co-Chairs. The following people assisted with the meeting:

Desiree Vanderwel (certificates for student awards)

David Wade, Jeffrey Marcus and Lisa Capar (judges of the student competition)

Alberto Civetta, Jason Gibbs, John Gavloski, and Sheila Wolfe (planning and logistics)

Cecil Montemayor (refreshments)

Elaine Martineau and Lisa Capar (registration desk)

Jason Gibbs (session chair)

Lisa Capar (sponsorship)

Kateryn Rochon (venue booking)

We recommend selecting the Chair of the upcoming meeting within a couple months after the current year's meeting.

Meeting Date

To decide on a meeting date, we considered:

- 1) The time crunch (the chairs swapped in mid-September)
- 2) The dates during which the following occurred:
 - a) Previous ESM meetings
 - b) Other scientific meetings of potential interest to ESM members in 2024.
 - c) Winnipeg Blue Bomber home games
- 3) The start of the academic year.
- 4) If enough time had elapsed for researchers to compile summer data.
- 5) Potential conflicts with exam periods.

We decided to hold the meeting on 1 and 2 November 2024. Following the 2023 meeting, ESM members provided feedback regarding hybrid events that the increased accessibility provided by a hybrid format was not worth the reduced experience for in-person attendees; relatively more accessible events may be held periodically (see relevant report in Proceedings of the Entomological Society of Manitoba, Volume 79, 2024

[https://entsocmb.ca/pdf/Proceedings/ESMproceedings_V79.pdf]). Given this, we decided to host an in-person-only meeting. A "Call for Papers" was circulated amongst the ESM membership approximately 1 month before the meeting (Appendix A). Within this communication, details about the meeting were communicated. An online registration form, to attend and/or submit a paper, was used. Given the time constraint, a stylised logo to match the theme was not created as had been in 2023.

Venue

Given the positive reviews during last year's meeting, we returned to the Smartpark Innovation Hub at the University of Manitoba campus on November 1st. Unfortunately, the restaurant in the atrium of the building was no longer open. To compensate for the amount of time that would be required to locate a restaurant, we increased the time slot for lunch. Going forward, catering may be an option to provide lunch while simultaneously catalysing stimulating conversations amongst

registrants to take-place. On November 2nd, we heard the symposium papers and had the Member's Meeting at the Department of Entomology.

Thanks to Javier Uribe and Larry Paskaruk at Smartpark Innovation Hub, and Alejandro Costamagna at the Department of Entomology, for hosting us.

Scientific Program

As suggested by Bob Lamb and Pat MacKay, we chose to centre our meeting's theme around Terry Galloway, who delivered the Keynote Address, in honour of him being awarded the Gold Medal by the Entomological Society of Canada in 2024. As such, our theme was *Parasitic Life: Behind the Feathers, Fur and Setae*. After contacting numerous potential symposium speakers, four speakers agree to deliver presentations: Alix Matthews, Rob Anderson, Jason Gibbs, and John Gavloski during our symposium. While we were inherently interested to hear about Alix Matthews' research, our difficulty in finding speakers influenced our decision to pay to fly her in from the United States. Being local, Terry Galloway declined a "Speaker's Dinner"; being away-from-home, Alix Matthews was taken for lunch at NuBurger. All invited speakers were presented with a thank-you gift (homemade card and framed image of an arthropod [images donated by Thilina Hettiarachchi]).

In addition to our invited speakers, numerous registrants submitted papers - including students - during our main paper session, and several students competed in the Student Competition. The Scientific Program is shown in Appendix B and the full list of papers with abstracts will be published in the upcoming volume of the Proceedings of the ESM. Congratulations to Kira Peters (Oral Presentation) and Shirley Morris (Poster Presentation) as winners of the Student Competition, and to all competitors for a proud effort (Appendix C)! Thanks to everyone who delivered a paper at the 80th Annual Meeting of the ESM!

Attendance

Forty-six people registered: 17 Student registrants and 29 Regular (including 1 Non-Member; numbers supplied by the ESM Treasurer, Lisa Capar). Registrant cards with names for insects in Indigenous languages were mixed-in with those containing only the ESM logo in an effort to do something meaningful toward reconciliation.

Mixer

In the evening of November 1st, we went to Bob and Pat's home for yet another lovely evening of socialising and celebrating our students' endeavors.

Finances

Sponsors

Thank you to the following organisations for sponsoring our event:

Gold

AAE Consultants, North/South Consultants Inc., Orkin Canada

Silver

Canadian Centre for Mosquito Management, Cano Pest Control, City of Winnipeg, Maria David by Carol Luna, Prairie Cricket Farms, Taz Pest Control

As included in the recommendations from 2023's report, the new ESM President, David Wade, contacted the organisations to personally thank them for their support after the meeting.

Revenue/Expenses

We aimed to provide a meeting that satisfied the expectations of the membership while using the least amount of money that we could. We used the itemised revenue and expenses table documentation from the 2023 meeting for guidance.

In addition to soliciting financial sponsorships for the overall meeting, sponsors for food were also sought out. Cecil Montemayor acquired delicious, sponsored food from Maria David by Carol Luna for both meeting days, in addition to snacks, coffee and lunch (for the Annual Members meeting) purchased from nearby vendors (as is typical). This sponsored food allowed us to provide food for our members for a lower cost while also providing the vendor with exposure to potential clients. The savings have been conservatively estimated to be ~\$350 (Lisa Capar). Given the success of this approach, we recommend that future organisers continue in this manner. We also recommend that volunteers consider making refreshments from scratch, to compare the financial and temporal benefits/detriments of doing so against purchasing from vendors.

The Keynote speaker, Terry Galloway, declined to eat out for dinner. Lunch for the invited speaker from the United States was purchased by the ESM, in an effort to provide a welcoming meal for our out-of-town guest, but the Co-Chair's lunch was purchased by the Co-Chair. The other Co-Chair hosted this out-of-town speaker for dinner at their family home guided by the same rationale as above. We support continued efforts to be welcoming hosts to our invited speakers, paying particular attention to those who are not local to the area.

We decided that flying-in a speaker would be worth the financial expense. The speaker's research was directly relevant to the meeting's theme and would enhance the scientific experience of ESM attendees. Since we had received declines from numerous potential speakers, we decided to make the expense in order to provide the ESM membership with a full program. Alix Matthews' presentation and presence was well-received by the membership. We hope that this mutually beneficial experience might provide guidance to future organising committees who find themselves in similar situations.

The revenue and expenses for this meeting are outlined below. Overall, we generated a surplus of \$1,732.90. These funds may now aid the achievement of the ESM's interests, including to promote entomology in Manitoba.

Date (date of receipt OR purchase)	Expense	Revenue	Description	Section
2024-Oct-20	\$55.99		Slide advancer (https://www.londondrugs.com/logitech-wireless-presenter-r400---910-001355/L4203139.html)	Scientific Venue
2024-Oct-29	\$8.64		Mileage (16 km @ \$0.54/km) Pick-up poster board at UofM and buy tape and gifts supplies.	Miscellaneous
2024-Oct-29	\$6.44		Dollarama - Gift bags and tissue paper for speaker gifts	Invited Speakers
2024-Oct-29	\$5.59		Staples - Tape	Scientific Venue
2024-Oct-29	\$2.10		Honk - Parking_pick-up poster board at UofM	Sponsor
2024-Oct-30	\$6.48		Mileage (12 km @ \$0.54/km) Pick-up pictures and picture frames	Invited Speakers
2024-Oct-30	\$46.99		London Drugs - Picture frames for Speaker gifts	Invited Speakers
2024-Oct-30	\$11.15		London Drugs - Pictures for speaker gifts	Invited Speakers
2024-Oct-31	\$12.42		Mileage (23 km @ \$0.54/km) Pick-up sponsor poster at UofM and purchase blank cards and scissors.	Miscellaneous
2024-Oct-31	\$2.10		Parking_pick-up sponsor poster at UofM	Sponsor
2024-Oct-31	\$15.66		Michaels - Blank cards and scissors	Invited Speakers
2024-Nov-01	\$22.06		Nuburger - Lunch for Invited Speaker	Invited Speakers
2024-Nov-01	\$343.83		ESM Social at Pat and Bob's	Refreshments_Mixer
2024-Nov-02	\$219.28		Air Canada Flight- Toronto to Winnipeg	Invited Speakers
2024-Nov-02	\$257.89		Queen Bee Hotel	Invited Speakers
2024-Nov-02	\$19.14		Freshii - Dinner at Wpg Airport	Invited Speakers
2024-Nov-02	\$114.00		Parking at Toronto Airport	Invited Speakers
2024-Nov-02	\$39.25		Gas in New York	Invited Speakers
2024-Nov-02	\$14.88		Sobeys - paper plates	Refreshments_Meeting
2024-Nov-02	\$11.18		Sobeys - Paper cups	Refreshments_Meeting
2024-Nov-02	\$182.45		Dominos Pizza - ESM lunch	Refreshments_Meeting
2024-Nov-02	\$39.73		Sobeys - Drinks	Refreshments_Meeting
2024-Nov-02	\$199.85		FreshCo - Food	Refreshments_Meeting
2024-Nov-04	\$200.00		Presentation Award - Kira Peters	Awards
2024-Nov-04	\$200.00		Poster Award - Shirley Morris	Awards
2024-Oct-17		\$300.00	Ryan and Lesley Stepler - Prairie Crickets	Sponsor
2024-Oct-28		\$200.00	Ignacio Cano - Cano Pest Control	Sponsor
2024-Oct-29		\$500.00	Friederike Schneider-Vieira - NSC	Sponsor
2024-Oct-30		\$100.00	Randy Gadawski - CCMM	Sponsor
2024-Oct-31		\$500.00	Mark Lowdon - AAE Consultants	Sponsor
2024-Nov-01		\$350.00	Maria David by Carol Luna (estimated monetary equivalent of sponsored food; see report)	Sponsor
2024-Nov-04		\$500.00	Amanda Richardson - Orkin	Sponsor
2024-Nov-05		\$1,070.00	Conference fees paid (Student Members: 17 @ \$10, Regular Members: 28 @ \$30, Regular Non-Member: 1 @ \$60).	Conference fees
2024-Nov-13		\$150.00	Taz Stuart TDTS Consulting	Sponsor
2024-Nov-15		\$100.00	David Wade - City of Winnipeg	Sponsor
	\$400.00		Awards	
	\$758.34		Invited Speakers	
	\$21.06		Miscellaneous	
	\$448.09		Refreshments_Meeting	
	\$343.83		Refreshments_Mixer	
	\$61.58		Scientific Venue	
	\$0.00		Speaker Honourariums	
		\$1,070.00	Conference fees	
		\$2,700.00	Sponsor	
		\$0.00	Stand-alone donations	
	Expenses	\$2,037.10		
	Revenue	\$3,770.00		
	Total	\$1,732.90		

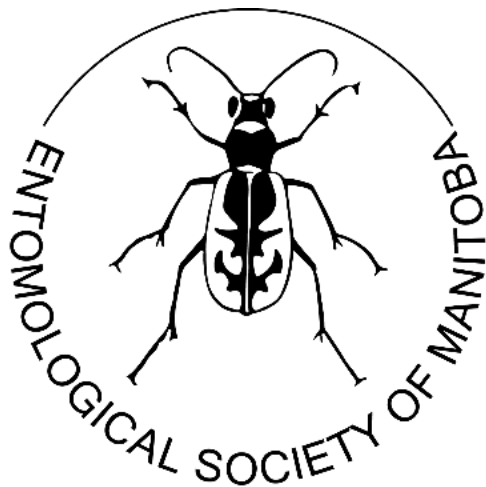
The sponsor foam board, poster stands, name tag pouches, slide advancer, pens, etc. are with the ESM Secretary (Sheila Wolfe) and Treasurer (Lisa Capar).

If you have questions, comments or would like clarification please email us.

We are please to report that the 80th Annual Meeting of the Entomological Society of Manitoba was successful. In addition to those we have already thanked, we also extend our thanks to anyone who registered, asked questions, and/or discussed entomology, and anyone who we may have missed

Scientific Program Report Appendix I: Call for Papers

80th Annual Meeting: Call for Papers



Parasitic Life: Behind the Feathers, Fur and Setae

1 – 2 November 2024

Please join us at the 80th Annual Meeting of the ESM! We welcome our keynote speaker Dr. Terry Galloway, the 2024 recipient of the Gold Medal by the Entomological Society of Canada, who will discuss the biodiversity of avian lice. An array of researchers will deliver complementary presentations on parasitic life during our symposium. Attendees and student competitors will be able to participate in-person. Abstracts will be published in the next volume of the Proceedings of the Entomological Society of Manitoba. **November 1:** Smartpark Innovation Hub (SIH)- 100 Innovation Drive, University of Manitoba campus - Meeting takes place in MPR 1 (northwest side of main floor).

- Free parking is available northwest of the building (49.80270, -97.15065). Day - Scientific papers a) *Keynote address:* Dr. Terry Galloway (Professor Emeritus, Dept. of Entomology, University of Manitoba)

Hidden biodiversity: The fascinating life of parasitic lice that infest birds (sometimes you have to ruffle a few feathers)

b) Student competition and general papers

Lunch on your own (restaurants available in SIH and nearby) Evening - Mixer You are invited to our mixer at Pat McKay and Bob Lamb's home, where we can socialize and announce the winners of the student competition! Directions to their home will be provided at SIH. **November 2:** Department of Entomology (Room 219), 12 Dafoe Road, University of Manitoba campus a) Morning - Symposium b) Catered lunch c) Afternoon - Annual Business Meeting

Please register for the meeting using this form or in-person. If submitting a paper, please use this form. Email any questions to the Co-Chairs (Vincent Hervet - vincent.hervet@agr.gc.ca – and Justis Henault - henaultjps@gmail.com) or the ESM Secretary (Jade Tanner - entsocmanitobasecretary@gmail.com) where appropriate. We look forward to seeing you!

Vince and Justis, on behalf of the Scientific Program Committee

Registration

Annual Membership Dues

Member - Regular: \$25.00 Member - Student: \$10.00 Please be sure that your dues are up to date before the meeting begins. Conference Fees Member - Regular: \$30.00 Member - Student: \$10.00 Non-member* - Regular: \$60.00 Non-member* - Student: \$25.00 Fees for online participants are the same. * If you are interested in becoming a member, visit the ESM website for more information (<http://entsocmb.ca/membership.html>).

Donations

We welcome donations to the Society, particularly to increase the value of student scholarships. Receipts are available upon request for tax purposes.

Membership dues/conference fees/donations can be made by e-transfer to the Treasurer: entsocmanitobatreasurer@gmail.com.

Scientific Program Report Appendix II: Scientific Program

80 TH ANNUAL MEETING			
			
<i>Parasitic Life: Behind the Feathers, Fur and Setae</i>			
1 November 2024 Smartpark Innovation Hub (Room 1MR 2), 100 Innovation Drive, University of Manitoba, Winnipeg, Manitoba, Canada			
2 November 2024 Department of Entomology (Room 219) 12 Dafoe Road, University of Manitoba			
1 NOVEMBER		Submitted papers	
8:30	Parking, registration, refreshments	10:45	VIRAL PATHOGEN SPOILOVER FROM HONEY BEES TO WILD BEES - 2024 FIELD SEASON REVIEW. K. Peters* and K. Bobiwash; Department of Entomology, University of Manitoba [SC]
9:00	Welcome		
	Justis Henault and Vince Hervet, Scientific Chairs	11:00	FIRST RECORDS OF THE SLAVE-MAKING ANT <i>HARPAGOXENUS CANADENSIS</i> IN MANITOBA. B. Krongold; Department of Entomology, University of Manitoba [SC]
9:05	Greetings from ESM President		
	Vince Hervet	11:15	CAMERA, SET, PREDATION! SIMPLE AND FEASIBLE. C. Montemayor Alzpurua*, Y. Lawley*, J. Gibbs*, and A.C. Costamagna ¹ ; ¹ Department of Entomology, University of Manitoba; ² Department of Plant Science, University of Manitoba [SC]
9:10	Greetings from ESC President		
	Vince Hervet on behalf of Christine Noronha	11:30	PHYLOGENETIC DIVERSITY OF GRASSLAND BEES. T. Hettiarachchi; University of Manitoba [SC]
Keynote address			
Chair: Justis Henault			
9:15	HIDDEN BIODIVERSITY: THE FASCINATING LIFE OF PARASITIC LICE THAT INFEST BIRDS (SOMETIMES YOU HAVE TO RUFFLE A FEW FEATHERS). Dr. Terry D. Galloway ; Department of Entomology, University of Manitoba, Winnipeg, Manitoba		
Submitted papers Chair: Justis Henault			
		13:45	IS <i>CHLAENIUS CORDICOLLIS</i> (COLEOPTERA: CARABIDAE) A FREQUENT FLIER? N.J. Holliday; Department of Entomology, University of Manitoba
		14:00	RANGE EXTENSION OF RED-TAILED LEAFHOPPER (<i>AFFLELIA RUBRANUBRA</i>) IN MANITOBA. J. Henault*, R. Foster*, C. Neufeld* and S. Lee*; ¹ Independent Researcher, Winnipeg, Manitoba; ² Northern Bioscience, Thunder Bay, Ontario; ³ Canadian Wildlife Service, Environment and Climate Change Canada, Saskatoon, Saskatchewan
		14:15	CLIMATE CHANGE, AN APHID, <i>UROLEUCON RUDBECKIAE</i> , AND ITS WILDFLOWER HOST, <i>RUDBECKIA LACINIATA</i> , 1999-2023. R.J. Lamb* and P.A. Mackay; Department of Entomology, University of Manitoba
		14:30	Refreshment break and Poster session
Submitted papers			
Chair: Vince Hervet			
		15:00	THE 2024 POWESHIEK SKIPPERLING MARK-RESEIGN PROJECT AT THE MANITOBA TALL-GRASS PRAIRIE PRESERVE. J. Pound*, and R. Westwood ^{1,2} ; ¹ Department of Environmental Studies and Sciences, University of Winnipeg; ² Department of Biology, University of Winnipeg [SC]
		15:45	Lunch on your own
		10:15	Refreshment break and Poster session
		Posters	
		10:15	EXPLORING THE INFLUENCE OF 4,8-DIMETHYLDECANAL PHEROMONE ON THE MOVEMENT OF <i>TRIBOLITUM CASTANEUM</i> IN WHEAT FLOUR USING X-RAY MICRO-COMPUTED TOMOGRAPHY. H. Siobodan*, C. Findlay, J. Pailwal; Department of Biosystems Engineering, Price Faculty of Engineering, University of Manitoba [SC]

* – presenting author; [SC] – Student competition participant; Please see abstracts for detailed affiliations.

Submitted papers continued

- 15:15 UNCOVERING FUTURE CLIMATIC SUITABILITY: CONSTRUCTING CLIMATE ENVELOPE MODELS FOR THREE ENDANGERED HESPERIIDAE SPECIES AT THEIR RANGE MARGINS IN MANITOBA, CANADA. A. Thorkeelson, K. Dearborn and R. Westwood; Department of Environmental Studies and Sciences, University of Winnipeg
- 15:30 COMPARISON OF HABITAT STRUCTURE AND COMPOSITION ACROSS DISTURBANCE BASED MANAGEMENT REGIMES IN POWESHIEK SKIPPERLING SITES IN MANITOBA. J.M. Sánchez-Jasso¹, R. Westwood^{*2} and N. Koper³; ¹, Natural Resources Institute, University of Manitoba, ², Department of Biology, University of Winnipeg, ³, Faculty of Environment, University of Northern British Columbia, Prince George, British Columbia

Mixer

- 20:00 You are invited to our Mixer at Pat Mackay and Bob Lamb's home, where we will socialise and grant awards to winners of the Student Competition and the Student Achievement awards! Directions to their home are provided at the registration desk.

2 NOVEMBER

- 8:30 Parking, registration, refreshments
- 8:55 Welcome
Justis Henault and Vince Hervet, Scientific Chairs

Symposium

- Chair: Vince Hervet
- 9:00 TINY BUT MITE-Y SYMBIONTS: AN EXPLORATION OF AVIAN FEATHER MITE ECOLOGY AND EVOLUTION. A.E. Matthews; Department of Biological Sciences, Arkansas State University, Jonesboro, Arkansas, USA; Department of Biological Sciences, University at Buffalo (SUNY), Buffalo, New York

Symposium continued

- 9:40 TO BITE OR NOT TO BITE: SOME THOUGHTS ON VECTOR PARASITE INTERACTIONS AND BLOOD-FEEDING BEHAVIOUR. R. Anderson; Department of Biology, University of Winnipeg
- 10:20 Refreshment break
- 10:50 THE DIVERSITY OF PARASITIC BEES IN MANITOBA. J. Gibbs; Department of Entomology, University of Manitoba.
- 11:30 INSECTS ON CROPS IN MANITOBA IN 2024 - AN EXTENSION UPDATE. J. Gavlowski; Manitoba Agriculture, Carman, Manitoba
- 12:05 Adjournment
Justis Henault and Vincent Hervet
- 12:10 Catered lunch

Annual Business Meeting (Room 219, Entomology)

- 13:20 ESM Annual Business Meeting

REGISTRATION

Annual Membership Dues

- Member - Regular: \$25.00
Member - Student: \$10.00

Conference Fees

- Member - Regular: \$30.00
Member - Student: \$10.00
Non-member - Regular: \$60.00
Non-member - Student: \$25.00

Donations

We welcome donations to the Society, particularly to increase the value of student scholarships. Receipts are available upon request for tax purposes.

The ESM thanks the following Sponsors for their generous support of the meeting



Taz Pest Control

2024 Organising Committee: Justis Henault (Co-Chair), Vincent Hervet (Co-Chair), Alberto Civetta, Cecil Montemayor, David Wade, Jade Tanner, Jason Gibbs, John Gavlowski, Lisa Capar, Sheila Wolfe

* – presenting author, [SCJ] – Student competition participant; Please see abstracts for detailed affiliations.

Scientific Program Report Appendix III: Student Awards

Including contributions from ESM Scholarships and Awards Committee (Rob Anderson, Jeffrey Marcus, Taz Stuart, Désirée Vanderwel [Chair]).

The competitors of the student achievement awards were celebrated during our Mixer at Bob and Pat's home. To all the student competitors – well done! Whether or not you won an award, be proud of your efforts and incorporate the feedback that you received to be even more competitive in the future. The following students are the recipients of the 2025 awards:



From left to right: Cecil Montemayor, Shirley Morris, Madeleine Dupuis, Désirée Vanderwel (Chair of the ESM Scholarships and Awards Committee), James Watson, Kira Peters, Vince Hervet (President of the ESM).

APPENDIX I: Report of the ESM Newsletter Committee

The *Newsletter* committee has published two issues of the 50th Volume of the *Newsletter* in 2024. The *Newsletter* received fascinating submissions from several authors, to which we are grateful: Jacqueline Bowles, Mabel Currie, Madeleine Dupuis, Ellen Freeth, Thilina Hettiarachchi, Todd Lawton, Kira Peters, James Watson and Robert Wrigley. We rely on the contributions of members to be able to produce these fantastic issues of the *Newsletter*. We encourage all of the membership to contribute to the newsletter through articles, announcements and pictures. If anyone is interested in submitting an article to the *Newsletter*, please contact Justis Henault (henaultjps@gmail.com) and Phoenix Nakagawa (tyrone.nakagawa@gmail.com).

In 2025, we will transition to publishing an issue once in Jan/Feb, May and September/October. This schedule will better align with key events during the year when our members are most engaged – Post-AGM, Pre-field season/summer activities and Post-field season/summer activities. The first issue of 2025 will recap the Scientific Meeting, including recognition of award winners.

Justis Henault & Phoenix Nakagawa

Newsletter Co-Editors

APPENDIX J: Election Scrutineers Report 2024

October 15, 2024

Elections closed September 23, 2024 for the Entomological Society of Manitoba offices of President-Elect and ESM Regional Director. There were 79 ballots issued and 38 ballots were returned, with 37 ballots containing votes and one ballot that was submitted blank. There were no spoiled ballots.

The successful candidate for President-Elect is **Jason Gibbs**.

The successful candidate for Member-at-Large is **Elaine Martineau**.

This was the seventh year using an electronic voting process. All votes were done through Election Runner for third time this year. Responses are anonymous. The source of the vote is not visible or collected. Election Runner is also set to only allow one vote per respondent.

We thank all candidates for their willingness to participate in the election.

Jeffrey Marcus, Chair

APPENDIX K: Report of the ESM Student Awards and ESM Scholarship Committee 2024

Applications were accepted for four scholarships and awards offered: Orkin Student Award; the ESM Student Achievement Award; the ESM Student Leadership and Service Award; and the ESM Graduate Student Scholarship. The committee was impressed by the high quality of the applicants/nominees: it certainly made our work difficult! The committee would like to thank the referees and nominees who participated in the process: your input was invaluable.

ESM Student Achievement Award: *Awarded to a student who is in or recently completed a Bachelor's degree program. This award recognizes students who have shown exceptional interest in entomology as evidenced by their insect collections, insect photography, published articles of entomological interest, insect experiments and/or outstanding contributions during summer employment.*

This year's winner of the ESM Student Achievement Award is **James Watson** (University of Manitoba). James is in his fourth year of studies towards a B.Sc. (Honours) in Biological Sciences at the University of Manitoba, with a minor in Entomology. James not only has an exceptional academic record, but he has extensive undergraduate research experience. James has spent the last three summers on research involving pollinators, most recently supported by prestigious RBC Scholarship in Sustainable Agriculture. James has a keen interest in entomology, and has helped organize curation events for the J.B. Wallis / R.E. Roughley Museum of Entomology.



Orkin Student Award: *This award is designed to foster and encourage student interest in general Entomology including natural methods of insect pest control and the proper use of insecticides. Candidates must have a demonstrated interest in entomology, superior scholastic ability, high research potential, originality and industriousness in their university courses and/or summer work.*

This year's winner of the Orkin Award is **Shirley Morris** (University of Manitoba), who is working towards a B.Sc. (Honours) in Biological Sciences with a minor in Entomology. With an outstanding academic record and a keen interest in natural methods of insect pest control, Shirley is an extremely deserving recipient of this award. Shirley worked in a research lab for the first time last summer, studying sentinel plasticine caterpillars as tools to assess predation in agroecosystems with Dr. Alejandro Costamagna (Department of Entomology, University of Manitoba). Shirley was an extremely hard-working and enthusiastic summer student, and plans to present the results of her research at Undergraduate Student Competition of the University of Manitoba and at the ESM Annual Scientific Meeting. Her summer research project sparked Shirley's interest in non-chemical methods of pest control, especially those employing the use of predators and parasitoids in order to control pest populations. Shirley says that she would "love to see research that I am involved in being applied to real-world environments and leading to significant differences in a grower's life and an ecosystem's health".



ESM Student Leadership and Service Award: *This award recognizes a student (at the graduate or undergraduate level) who has promoted the goals of the Entomological Society of Manitoba (i.e., to foster the exchange of information on entomology and to further the spread of entomological knowledge) through their volunteer activities.*

This year's winner of the ESM Student Leadership and Service Award is **Madeleine Dupuis**. Madeleine recently began graduate studies (M.Sc.) in the Department of Entomology (University of Manitoba) with Dr. Kateryn Rochon (funded by an RBC Scholarship in Sustainable Agriculture). As an undergraduate, Madeleine was an excellent student, and was the recipient of two NSERC Undergraduate Student Research Awards (2022 and 2023) as well as the J. A. Garland Award (2023), to study ticks with Dr. Kateryn Rochon, and pigeon ectoparasites with Dr. Terry Galloway. Madeleine served as the undergraduate student representative for both the *Department of Entomology Graduate Student Association* (DEGSA) and the *Entomology Department Council*, and is currently the President of DEGSA. Madeleine organized two

curation-blitzes for the J.B. Wallis / R.E. Roughley Museum of Entomology, which were each attended by about two dozen undergraduate and graduate students. In addition, Madeleine has been extremely active on the Youth Encouragement Committee of the ESM (both as an undergraduate and as a graduate student), and organized a "Girls in Science" event and has participated in several other outreach events. From any perspective, Madeleine is an extremely deserving recipient of this award.



The ESM Graduate Scholarship: This scholarship is awarded to students in a M.Sc. or Ph.D. program related to entomology at the University of Manitoba, University of Winnipeg or University of Brandon. Students must be enrolled in their graduate program for at least 12 months prior to Oct 1 of the award year. This award recognizes superior scholastic ability, high research potential, and excellent communication skills.

This year's winner of the ESM Graduate Scholarship is **Cecil O. Montemayor**, a third-year PhD student in the Department of Entomology, University of Manitoba (supervisor: Ale Costamagna). Cecil came to UofM with a B.Sc. in Agriculture Engineering from the prestigious Zamorano University (Honduras; an M. Sc. in Entomology from the University of Florida; and several years of applied work experience in the private sector in crop protection and irrigation. Cecil has currently has 7 publications (6 in refereed journals) and has made 11 presentations at conferences and outreach events. Cecil's excellence in scholarship has been recognized with eleven scholarships/fellowships, which help to support her research and travel. Cecil is also very active in the Department of Entomology, and participates in outreach events on behalf of the Entomological Society of Manitoba. Cecil's current research project focuses on developing sustainable and resilient ways to grow crops in Manitoba, which may have broad impact on supporting biodiversity in the Priarie Provinces. Respectfully,



Respectfully,

ESM Student Awards and ESM Scholarship Committee

Rob Anderson

Jeffrey Marcus

Taz Stuart

Désirée Vanderwel (Chair)

October 31, 2024

APPENDIX L: Youth Encouragement and Public Education Committee Report: 2024

Submitted by Mabel Currie, ESM public outreach coordinator

Last fall we had a pause in outreach activities due to coordinator turnover, but as of this spring we have gotten fully back into the swing of things.

In 2024 we have been busy hosting and attending a variety of events, including daycare visits, department tours, and most recently a Halloween themed presentation at Fort Whyte! This amounted to a total of 11 events in and around Winnipeg, including 450 people of all ages interested in learning more about insects. People had the opportunity to look at our pinned insect, live insects, and even collect their own using nets and flight cages purchased thanks to the ESC Public Encouragement grant.

Thank you to all of our student volunteers for sharing their time and enthusiasm that makes these events possible. Special thanks also to John Gavloski who presented at 9 youth events in the Carman and Morden area. We are looking forward to continuing our outreach through our future presentations!

APPENDIX M: Report of the Funding Raising Committee

The Entomological Society of Manitoba requested donations this past year from ten potential sponsors. The City of Winnipeg Insect Control, The Canadian Centre for Mosquito Management, Cano Pest Control, Valkyrie Pest Solutions and Taz Pest Control provided donations totaling \$1050. Sponsors were recognized for their contributions at the meeting and their names and contact information were added to the ESM website.

Kathy Cano

Fundraising Committee

APPENDIX N: ESM Website/Archivist Report – 2024

In the past year I have managed the ESM website and updated it at the direction of the Executive. Following the 2023 meeting, I posted a thank you section to the meeting sponsors, hopefully we can continue to update this on an annual basis.

I have no new developments to report regarding the archives. Thanks to the Executive for recognizing the hard work of Madeleine Dupuis, James Watson, and Keziah Bartel in digitizing society documents..

Jordan Bannerman

ESM Webmaster and Archivist

APPENDIX O: Report of the Common Names of Insects Committee

Prepared by Jason Gibbs

No updates to the common names. Adam Brunke has stepped down as Chair of the ESC Common Names Committee. A replacement has not yet been found to my knowledge. Anyone interested in the position should contact: escsecretary@esc-sec.ca

APPENDIX P: Report of the Honorary Members Committee

The committee was struck in May 2024, too late to submit nominations for this year. However, we met several times via email and are well positioned to proceed with nominations in 2025. The call for nominations appeared in the most recent Entomological Society of Canada *Bulletin*.

We suggest that the current committee membership be maintained for one more year to complete our proposed activities.

Since this committee has not been active for some time, guidelines are provided below, copied from Society Committee Guidelines.

Respectfully submitted, 2 November, 2024

Jordan Bannerman

Brent Elliott

Terry Galloway, Chair

Composition: A chairperson (active member of ESM and ESC) with power to add to the committee.

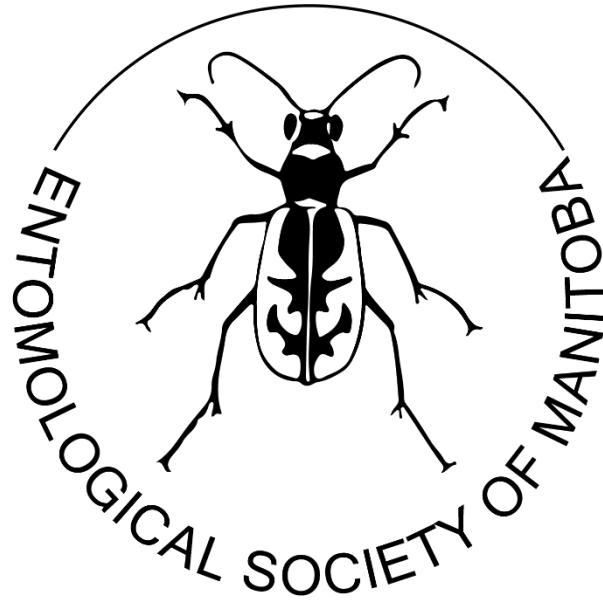
Appointment: By the Executive of the ESM.

Term of Office: One year. Successive appointment may occur.

Objective: To nominate worthy members of the ESM for Honorary Membership or appointment as a fellow in the Entomological Society of Canada.

Duties: When appropriate, forward the name of nominees to the Membership Committee of the ESC, over the signature of five active ESC members. The nominee must be an active member or former active member of the ESC who has made an outstanding contribution to the advancement of entomology. Nominations for honorary member may be submitted at any time* to the Membership Committee of the ESC who will decide if the nominee shall be listed on a ballot. Nominations are only considered by the ESC in the year they are made. The committee will report on activities at the Annual General Meeting.

*Although it is indicated here that nominations for Honorary Member can be submitted at any time, according to ESC guidelines, nominations must be received by the end of February in the year under review. Any nominations we put forward for either Honorary Membership, or for Fellowship in ESC, will be for 2025.



ISBN 0315-2