

The Entomological Society of Manitoba *Newsletter*



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About the ESM Newsletter

The Entomological Society of Manitoba Newsletter is published three times per year. It is a forum whereby information can be disseminated to Society members. As such, all members are encouraged to contribute often. The Newsletter is interested in opinions, short articles, news of research projects, meeting announcements, workshops, courses and other events, requests for materials or information, news of personnel or visiting scientists, literature reviews or announcements and anything that may be of interest to ESM members.

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Editors' Comments

The ESM Annual Meeting is coming up fast! Friday, October 19th, at the Freshwater Institute and Saturday, October 20th at the Department of Entomology. Don't forget the Mixer at Pat and Bob's on Friday evening – look for information on theme, presenters and other details on the Entomological Society of Manitoba webpage:

<http://home.cc.umanitoba.ca/~fieldspg/>

In this issue we are once again treated to a travelogue from Bob Wrigley, down in South Dakota this time to observe and collect the Great Plains Giant Tiger Beetle, *Amblycheila cylindriformis*. As usual, Bob's enthusiasm makes one wish to be there too.

John Gavloski writes about another of his Incredible Creatures, this time the walking stick.

See you in a couple of weeks at the Annual Meeting!

Marjorie Smith & Jordan Bannerman



President's Message

I hope you all had an enjoyable and productive summer season. I would like to thank the executive members, committee chairs, and all the hardworking volunteers who worked collectively for the society. We still need to encourage students, faculty members, and others who are working in the field of Entomology and related areas to become active members of the Entomological Society of Manitoba.



Some local updated insect news: We had relatively dry and hot summer in Manitoba and low mosquito activities. However, based on Manitoba Health statistics as of September 14, 2018 there were 168 West Nile virus positive mosquito pools and 28 human cases of West Nile virus infection in the province of Manitoba. These numbers were much lower in 2017 (41 positive mosquito pools and 5 human cases) which is likely due to higher *Culex tarsalis* abundance and warmer temperature during the summer of 2018. For Lyme disease as of August 31, 2018, there were 10 confirmed or probable cases who acquired the pathogen in the province of Manitoba. For agricultural pest insects in 2018, the top three important pests would likely be flea beetles in canola, cutworms (mainly red-backed and dingy cutworm) and grasshoppers. In spite of most canola having an insecticide/fungicide seed treatment, there were still a lot of foliar insecticide applications for flea beetles, and some reseeded. Both cutworms and grasshoppers were a concern in many crops. Within the city, Emerald ash borer, Elm bark beetles, bed bugs, and German cockroaches were problematic. Forest tent caterpillar, cankerworms, and elm span worm were problems in forestry. Fall web worm also caused concern in certain areas. Yellow Jackets, similar to last year, were a problem in the city.

The 2018 joint meeting of Entomological Society of America (ESA), Entomological Society of Canada (ESC), and Entomological Society of British Columbia (ESBC) is going to be held in Vancouver, BC from November 11th to 14th, 2018. It is anticipated that over 3,000 scientists from all around the world will be attending this meeting and exchanging their research findings and experience. More information about this event can be found [here](#).

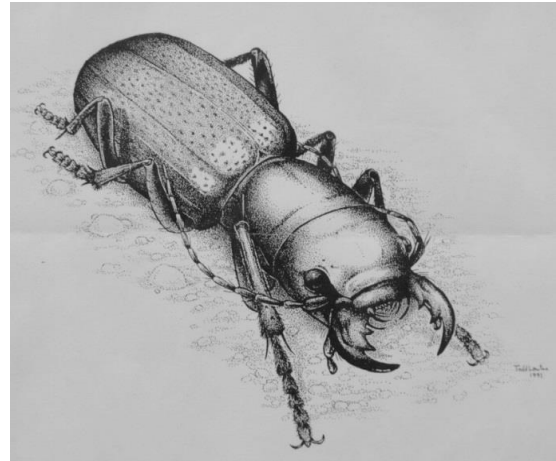
Entomological Society of Manitoba annual meeting is going to be held on Friday October 19th and Saturday October 20th at Fresh Water Institute and University of Manitoba. The theme of the meeting will be “Invasive species: Impacts on forestry to managed pollinators”. I encourage you all to attend and present at this wonderful meeting in October. [Click here](#) to view the first announcement of the meeting. We need more volunteers to take over vacant positions at the society so please contact the ESM secretary to be involved. I wish you all an enjoyable fall and hope to see you at the ESM annual meeting in October.

Mahmood Iranpour

A NIGHT WITH THE GREAT PLAINS GIANT TIGER BEETLE (*AMBLYCHEILA CYLINDRIFORMIS* SAY) AND DARKLING BEETLES (*ELEODES* ESCHSCHOLTZ)

By Robert E. Wrigley

Of all the North American species of insects that I have captured over the years, my favourite is the Great Plains Giant Tiger Beetle, *Amblycheila cylindriformis*. Not only is it amazing in appearance, with its large size (35 mm), stout cylindrical body, and impressive mandibles, but it is also challenging to find, since it occurs in sporadic colonies in sparsely vegetated, arid, short-grass prairie. Todd Lawton introduced me to this species by showing me specimens in his collection and informing me where to search along the dusty road that leads to the Black Hills Wild Horse Sanctuary (home to hundreds of rescued wild horses) near the Cheyenne River in extreme southwestern South Dakota -- the northern-most population of the species' distribution, which extends south to southwestern Texas. I have spent many an exciting



A. cylindriformis drawing by Todd



A view at dusk of the road leading to the Wild Horse Ranch.

night over the years patrolling this remote road, the first few times being unsuccessful in seeing a single specimen. One year, on my way to the site, I was stopped by a forestry officer standing beside a barricade on the highway, and on asking what was the problem, he pointed to the horizon which was billowing smoke from a serious forest fire. These disappointments only engendered a keener anticipation of finding this elusive, nocturnal, flightless tiger beetle -- the largest of the seven species of *Amblycheila* found in the United States and northern Mexico, and the largest tiger beetle in the Western Hemisphere (dwarfed only by the genus *Manticora* endemic to Africa).

It turned out I was looking along the wrong stretch of the right road, even though all the roadside brushy vegetation looked the same to me. Apparently I had not travelled sufficiently far along the road to reach the beetle colony. With more-specific information from Todd for the next trip, I leapt from the car at dusk and began walking slowly, searching both sides of the road. In the swaying light of my headlamp, eerie shadows kept leaping out behind oddly shaped plants, and I became aware that each of my steps sent a flurry of minute dust particles floating up past my head, which I had never noticed in sunlight. A few minutes later, a metre-long piece of thick

rope caught my attention, stretched out across my path, and I suddenly realized it was a Prairie Rattlesnake (*Crotalus viridis*), presenting a most-evil-looking head. I approached cautiously, taking photos, until it reared up menacingly and began to rattle. I shuddered when I remembered how boldly I had walked through the nearby brush in past years without much thought of any danger. From then on I was determined to walk through the roadside brush with my insect net ahead of me to provide some warning of other possible snakes in my path; I did come across a smaller rattlesnake later that night. These reptiles were no doubt hunting pocket mice, kangaroo rats, and deer mice, which I occasionally observed scurrying through the vegetation.

Then I spotted a big, black insect that I identified immediately as *Amblycheila cylindriformis*, sitting boldly atop an ant mound and feasting on the swarm, which attempted to bite through the beetle's hard chitinous exterior. To say I was excited is such an understatement -- it was one of the most-thrilling moments of my entomological



Our host Glen relaxing before a busy night searching for beetles.

obsession. After observing its behaviour

for some time, I collected the specimen and continued on with my search for others. It was so interesting to see how the beetles hunted for prey, waving their antennae in the forward position like a divining rod used backwards. The little beady eyes seemed to be of little use, and the insect only noticed my presence when I touched it or placed my foot nearby, likely having detected vibrations through their legs. An hour later, I had a dozen specimens in my collecting jar, along with four species of darkling beetles (*Eleodes*) and two species of carabids (*Calosoma luxatum* and *Pasimachus elongatus*). The former, relatively rare species I had never taken previously, and it was remarkably common that night (45 specimens, and absent in other years), sitting in little depressions they had formed in the dust, or actively feeding on the numerous 4-cm-long, juicy Jerusalem Crickets (*Stenopelmatus*) that had been run over by the occasional passing car; the crickets were also extraordinarily abundant that year, and I pondered what climatic or other factors had promoted such outbreaks.

On July 19, 2018, I headed out to the same dusty road accompanied by my Hot Springs friend Glen Anderson, my son Rob, and my twin 14-year-old grandsons Luc and



Author picking up a beetle.

Aidan. I wanted the boys to experience a night with my special beetle, before they grew to an age where such an experience might not hold the same fascination. We arrived just before dark, and as we opened the car door, I could not believe it -- there was an *Amblycheila* sauntering down the road. Rob snapped several photos and I picked up the first specimen of the



Got one!

night. What great luck!

Although we were here at the right time (Adults emerge and are active only from June to early August), we may have arrived during a year with few or no beetles. Next, Glen found another beetle and picking it up, it promptly bit his finger with its large, sharp mandibles.

Jumping back and dropping his quarry, we all laughed and I suggested to Glen that he target the other end of the beetle next

time. Having seen Glen bitten, the boys were at first hesitant to grasp a beetle, but after some practice (involving repeated missed attempts) and mounting confidence, they succeeded in capturing several specimens. It turned out that the boys had an uncanny knack of spotting specimens immediately after I had just walked past the same sites, which made me wonder how many beetles I had missed in previous years.



Amblycheila cylindriformis demonstrating its impressive bite.

While the *Amblycheila* were no doubt scattered around the nearby fields and hillsides, major habitat disturbance (i.e., large grain fields and horse pastures) likely concentrated their numbers along the brushy roadsides, while the road itself provided easy maneuverability for the beetles while searching for prey. As the evening darkened, I could see several *Amblycheila* still sitting in their burrow entrances with their heads inside and their rears sticking out, obviously waiting for the preferred level of darkness. I had also seen this behaviour with a number of *Eleodes* species as well. The latter much prefer the dark, but I have found an occasional specimen still active above ground during the day, particularly under cloud cover. *Amblycheila* begin to emerge at dusk, but I have never known them outside their burrows (often excavated by small mammals) during the day.



Amblycheila backing out of its daytime burrow.

For the next hour, we walked up and down the road in the dark, with headlamps and flashlights exposing a beetle every few moments. Luc and Aidan suddenly called out to me with great excitement in their voices about a big spider, and when I ran over to check it out, I was amazed at the size (30-mm body length) and thought for a moment it might be a small brown tarantula (family Theraphosidae), however, this family does not occur as far north as South Dakota. Dropping to my hands and knees for a closer look, I realized that its dorsal abdomen was completely covered with tiny spiderlings. Securing the spider with a piece of tissue sent the spiderlings scattering in all directions. I preserved the female and one young for the J.B. Wallis/R.E. Roughley Museum of Entomology, and I believe it is *Hogna carolinensis*, whose females may reach a body length of 35 mm.

In one hour we captured 22 *Amblycheila*, a Hastate Hide Beetle (*Omorgus scabrosus*), three carabids (two species of *Pterostichus*, *Calosoma frigidum*), and 18 darkling beetles (*Eleodes suturalis*, *E. acutus* and *E. hispilabris*). The darkling beetles assumed their usual raised-rear-end defensive stance (i.e., head-standing) and emitted a quinone



Enjoying an evening of night-lighting on Glen's property at Hot Springs. The evening heat was relieved by 'blizzards' from Dairy Queen.



An *Eleodes acutus* in a defensive stance, ready to discharge.

spray which deterred the boys, but not an old hand like me (with a poor olfactory sense). After all, their chemical arsenal was nothing as powerful and stinky as that sprayed copiously by another of my favourite beetles -- the bright green, red and blue Fiery Searcher (*Calosoma scrutator*), which I had collected many times in the eastern United States.

When I had visited this remote road several times previously, I had collected numerous specimens of what I thought was the large, black and faintly red-striped tenebrionid *Eleodes suturalis* (body length up to 27 mm), but had noticed when I was pinning them that some specimens were significantly larger than others, and had a slightly different- shaped pronotum. It was only much later that I learned that another closely related species, *Eleodes acutus* (up to 35 mm), which I first caught and identified at White Sands, New

Mexico, also reached southern South Dakota. In fact, I was dealing with both species at the *Amblycheila* site. I found it fascinating that these two darkling beetles, whose food habits and life history must be almost identical, could often be found in good numbers inhabiting the same habitats from New Mexico to South Dakota. In such cases of related-species overlap, usually one outcompetes or displaces the other.



This individual reveals damage to its pronotum, perhaps inflicted during a sparring match with another individual.

One behaviour I had never noticed before was that two individuals of *Amblycheila* raised their rear slightly like an *Eleodes*, as if to spray, and appearing to mimic the latter's defensive stance. Also, some *Amblycheila* are a faint reddish on the elytra approaching the muted, red dorsal stripe on most of the above *Eleodes* species (aposematism). It seemed that the two unrelated genera mimic each other in size, colour and defensive stance, and employ complementary weapons -- *Amblycheila*'s powerful jaws, *Eleodes*' chemical discharge (possibly Mullerian mimicry).

We observed mating pairs of both *Amblycheila* and *Eleodes*; in one case, the latter pair was lying upside-down, motionless, with all their feet sticking up (not sure what this position is called!).

Likely they just

tipped over backwards and kept on mating. The larva of *Amblycheila cylindriformis* is remarkably large (62 mm) for a tiger beetle and is armed with an impressive set of mandibles. It lies in a vertical burrow, about 75-cm deep, and leaps out to grasp passing insects such as ants, grasshoppers and crickets, and then pulls them down the burrow, whereupon the prey is torn apart and its juices ingested. Hooks on the larva's dorsal abdominal segment help ensure that the larva is not pulled out of its burrow by a large prey or a predator, however this adaptation is useless against parasitoid wasps and beflies such as *Anthrax* species. The beefly flips several eggs at the entrance of the open tiger beetle burrow, and they settle to the bottom, where they soon hatch and attach themselves to the larval tiger beetle. When the latter pupates, the beefly larva devours its host. If the tiger beetle escapes being infested, it lives in its burrow for one or two years before pupating and emerging in June and July. My friend Ted MacRae from Missouri has published an interesting account in his blog "Beetles in the Bush," on; "How to Collect



Mating pair of *Amblycheila cylindriformis*.

Larvae of *Amblycheila cylindriformis*,” and his close-up photographs of an adult in another account are unsurpassed.

Eleodes species are renowned for their ability to survive in some of the harshest and driest habitats in North America, avoiding the intense heat of the day by remaining in underground burrows, and venturing out at night to gnaw on dried plant and animal materials. The physiological and morphological adaptations related to oxygen and carbon dioxide exchange, and reduction of water loss via spiracles and the subelytral space, in *Eleodes* species have attracted numerous researchers, and much remains unknown. The ability to close off the body from outside challenges was ably demonstrated by the fact that some individuals that I collected survived submersion in a 75% mixture of propanol and vinegar overnight, and continued to attempt an escape for another day until I froze them. The pinned specimens also took a couple of months to dry, whereas other beetles of comparable size were dry in a week. Darkling beetles are remarkable insects in so many ways, and I have accumulated a collection of 350 species from around the world.

I once raised several Montane Giant Tiger Beetles, *Amblycheila baroni* (native to Arizona) which were provided by Curator Tom Mason from the Toronto Zoo, who had been the first to breed this species in captivity. They lived for a number of months, fed on crickets, caterpillars and mealworms, but I was unable to provide suitable conditions for reproduction.



A specimen of the beautiful Ten-lined June Beetle (*Polyphylla decimlineata*) collected at lights in Hot Springs. Several years ago, the author witnessed a major emergence of this species at the Angostura Reservoir near Hot Springs; over 150 specimens had gathered on the pavement under the park office lights. This species has not reached southern Manitoba, but its close relative, *Polyphylla hammondi*, does occur here in sparse numbers.

Amblycheila cylindriformis is found in sparsely vegetated, short-grass plains from west Texas to extreme southwestern South Dakota, often on clay banks, sandhills, and ravines. Discovered in eastern Colorado in 1823 by Thomas Say (considered the founder of descriptive entomology in the United States), this species was extremely rare in collections prior to 1876, and the few specimens garnered prices of over \$400 in today’s dollars. In 1897 two entrepreneurs actually earned \$10,000 in one year by selling live specimens. However, not long after, other colonies were discovered and the price plummeted.

This and other species of tiger beetles have suffered from loss of habitat, and *A. cylindriformis* specifically due to agriculture. Paul J. Johnson published a thorough article on this species, entitled; “South Dakota’s High Plains Tiger (*Amblycheila cylindriformis* Say).

(<https://www.sdstate.edu/sites/default/files/ps/Severin-McDaniel/other/upload/High-Plains-Tiger-Beetle.pdf>). Although I just returned from a great night stalking this giant charismatic tiger beetle with Glen and my family, I am already looking forward to my next visit. Oh, and my chigger bites have already stopped itching!

During the day time of our visit, we enjoyed the wonderful landscapes and wildflowers of the Black Hills, the fabulous Mammoth Site and Museum exhibits of mammoths (located in Hot Springs), the Black Hills Institute Museum (Hill City), featuring a remarkable



View of the remarkable collection of fossils at the Museum at Black Hills Institute in Hill City, South Dakota.



Grandpa and the twins in front of a Columbian Mammoth (*Mammuthus columbi*) replica at the Mammoth Site and Museum in Hot Springs, South Dakota.

When the author first visited this site in 1983, the massive collection of Mammoths and other fossil life had just been discovered during excavation for a building. The digs was just covered with a plywood shelter. Now a spectacular Museum has been built where visitors may walk along a paved trail three stories deep to view a number of partly excavated adult Mammoths.

collection of dinosaurs and other fossils, and the wildlife park at Bear Country USA (south of Rapid City), where I had sent a number of Black Bear orphans while I was Curator at the Assiniboine Park Zoo. I came home with two superb fossil specimens -- a real, 27-cm-long Woolly Mammoth (*Mammuthus primigenius*) molar excavated from Siberian permafrost, and an exact replica of the skull of a Giant Short-faced Bear

(*Arctodus simus*), a species twice the size of a Kodiak Grizzly, and the largest predator in North America (extinct only 11,000 years ago) following the demise of the dinosaurs.

Thanks to: Glen and Elaine Anderson of Hot Springs for hosting our visit, and to my son Rob for taking the photographs. Luc, Aidan and Glen were great assistants in locating many of the beetles. I also appreciate Todd Lawton's kindness in directing me to this special *Amblycheila* site, and for permitting me to reproduce his great drawing of this charismatic beetle.

Incredible Creatures: Stick Insects: Phantoms of the Forest

By John Gavloski

There are masters of camouflage making themselves at home in some of the groves of oak trees in Manitoba. Finding them can be tough, because they can be hard to tell from a twig. While stick insects generally inhabit tropical forests, we do have one species that occurs in Manitoba. So stick with this month's Incredible Creatures, and we will explore the fascinating world of the northern walkingstick, as well as look at some of the incredible sizes and adaptations of some tropical species.

Masters of Disguise

Stick insects, sometimes known as walkingsticks, make up an order (called Phasmatodea) of about 2,500 species. The scientific name for this group of insects comes from the Ancient Greek word *phasma*, meaning an apparition or phantom. This refers to the resemblance of many species to sticks or leaves (making them not easy to see).



The one species of stick insect we have in Manitoba is the northern walkingstick (*Diapheromera femorata*). They are not common, but can be found in and around oak trees. They usually feed at night. Often when hiking I would check or tap the leaves of an oak tree to see if I could find a walkingstick, but with no success. But this past July, while collecting and observing some insects with the Miami Junior Gardening Club, one of the members found 3 walkingsticks under some oak trees. What a thrill to see.

Males and females of the northern walkingstick differ slightly in appearance. Females are slightly bigger and get to about 9.5 cm, while adult males average about 7.5 cm. Males are brown, whereas females have a hint of green to their brown colour. Nymphs (the young stages

before they become adults) are green and only become a brownish colour when they reach maturity. Nymphs become adults during the summer and fall.

Females of the northern walkingstick drop eggs singly on to the forest floor. Eggs overwinter in leaf litter and hatch in the spring. There are some interesting features of the eggs that protect them from predators and parasites, sometimes with the help of ants. Stick insect eggs in general resemble the seeds of plants. The eggs of the northern walkingstick resemble the seeds of legumes. The eggs additionally contain a tasty area called a capitulum, which makes them quite attractive to ants. The capitulum on an insect egg mimics a similar tasty and nutritious area called an *elaiosome* on plant seeds that depends on ants for distribution. Ants will take the eggs into their nest, thinking they are a seed. They eat the capitulum, but this does not damage the interior of the egg. The egg is then discarded at the bottom of their nest. This will provide protection for the eggs. When the tiny (a few millimeters long) walkingsticks hatch, they are allowed to exit the ant hill. Seed dispersal by ants is called *myrmecochory*, and plants and animals that enjoy a partnership with ants are called myrmecophiles.

Some birds, such as crows and American robins, will feed on northern walkingsticks. Northern walkingsticks have an amazing ability to regenerate legs that are lost from attack by predators. When attacked by a predator, the legs may separate from the body (this is called autotomy). Some species have the ability to regenerate lost legs at the next molt. But only the nymphs can do this (adults do not molt). These are the only insects able to regenerate body parts.

Hiding in Plain Sight

Walkingsticks are world-class hidiers that use camouflage and mimicry. In addition to their physical appearance, walkingsticks use “behavioral camouflage”. During the day they extend their front and rear legs to the fore and aft of their body and can remain motionless for hours. This ability would be the envy of every mime. If they feel threatened by a predator, or insect enthusiast, they may sway back and forth like branches in a breeze. As they search for leaves they may also sway slowly back and forth, mimicking the movement of a branch in the wind.

Walkingsticks are terrestrial (living on land). If you see a similar critter in the water, it’s an unrelated insect called a water scorpion. Not to worry though, in spite of the name they cannot sting you like a scorpion.

Record Breaking Length

And now, for some amazing facts about some of the tropical walkingsticks. Walkingsticks are the longest insects in the world. A species from Borneo called Chans megastick (*Phobaeticus chani*) can get to 56.7 centimetres (22.3 in) in total length, including the outstretched legs. That is nearly the length of 2 rulers placed back-to-back. It was long regarded as the longest insect in the world. But in 2016, a new species from China called *Phryganistria chinensis* (there is no common name for it yet) was measured at 62.4 cm. So there is a new record holder. Stick insects can be incredibly long. And new species of stick insect continue to be discovered. Just this year descriptions of 4 new species from Peru and Ecuador, and two new species from Vietnam have been published. Some lucky biologist may yet discover a new species that breaks the record for length.

Interesting, Bloody, and Gross forms of Protection

Stick insects have incredibly diverse ways of protecting themselves. Some stick insects have cylindrical stick-like shapes, but others have flattened, leaflike shapes. The body of some has further modifications to resemble vegetation, with ridges resembling leaf veins, bark-like tubercles, and other forms of camouflage. A few species, such as the Indian stick insect (*Carausius morosus*), are even able to change their colour to match their surroundings.

Some species, such as the giant prickly stick insect (*Extatosoma tiaratum*), have been observed to curl the abdomen upwards over the body and head to mimic scorpions. Females of this species are covered with thorn-like spikes, and can get up to 20 cm long. Newly hatched nymphs of this species are ant mimics, resembling the insects in whose nest they are born.

Some species are equipped with a pair of glands at the front edge of the thorax (middle part of an insects body) that enables the insect to release defensive secretions, including chemicals that produce distinct odors, and others that cause a stinging, burning sensation in the eyes and mouth of a predator. The defensive chemicals from one species is used as a treatment for skin infections by a tribe in Papua New Guinea because of its antibacterial constituents. Some species can bleed reflexively through the joints of their legs and the seams of the exoskeleton when bothered, allowing the blood (hemolymph), which contains distasteful chemicals, to discourage predators. Another ploy is to regurgitate their stomach contents when harassed, repelling potential predators.

Aside from being the longest insects in the world, stick insects have some interesting behaviours and ways of protecting themselves. Next time you are near some oak trees, watch for the incredibly interesting northern walkingstick. You may have to look closely though. Those “stick-like” things swaying in the breeze may not be what they seem. But stick to it and you may see one.

Ed's note: John Gavloski is an entomologist living in Carman, Manitoba. He writes a monthly article called “Incredible Creatures” for Pembina Valley’s local weekly newspaper, the Valley Leader. They are written at a basic level to introduce people to some of the common yet often not well known creatures in Manitoba, and hopefully enhance appreciation for wildlife. The following article was published in August 2018.

MEETING ANNOUNCEMENTS*



Open Call for Posters & Presentations

Location: Victoria Inn Hotel and Convention Centre, Winnipeg, Manitoba

Date: February 19 – 21, 2019

“Working Landscapes”

Attend the 12th PCESC to engage in addressing the latest issues, information, research, and trends in the conservation of prairie landscapes, flora and fauna, and Species At Risk. Participants will include decision-makers, researchers, fieldworkers, ranchers, producers, industry representatives, consultants, NGOs, Indigenous groups, government staff, community and farm-based organizations and interested individuals. Approximately 300 delegates are expected to attend.

The 2019 PCESC is currently accepting abstracts for poster and oral presentations. We encourage submissions from individuals with diverse cultural, working, and/or academic backgrounds. In addition to oral presentations, there will be a dedicated poster presentation session. The conference has three core themes that will be explored in plenaries and three concurrent sessions. These are:

1. Holism (Ecosystem Management Approaches)
2. Agriculture and Conservation (Policy and Implementation)
3. Collaborative Conservation (Coming Together for Grasslands)

This is an open call for abstracts; however, we wish to encourage oral presentations for these topics:

- Multiple Species at Risk Management
- Water Management on the Prairies
- Invertebrates, with Emphasis on Pollinators
- Grassland Restoration and Preservation
- Soil Health and Regenerative Agriculture
- Indigenous Rights, Consultation, & Collaboration
- Climate Change and Conservation
- Public Engagement Strategies & Success Stories

For your submission, please send an email titled “Abstract Submission” to pcesc2019@gmail.com with a Word document including the presentation title, type (oral or poster), abstract (max 200 words), list of authors and affiliations and contact information for the main author and/or presenter.

Oral presentations will be 15 minutes long, plus 5 minutes for questions. **Posters** will be displayed two to a board so the maximum size is 3.5 x 3.5 feet (42 inches, 105 cm). Posters will be on display for both days of the main conference program.

Deadline for abstract submissions is October 19th, 2018. You will be contacted with the results by early November. Please keep in mind that successful presenters will be expected to work closely with the Editor of the conference proceedings and adhere to their guidelines.

Learn more about the conference at:

Website: www.pcesc.ca

Facebook: www.facebook.com/PCESC16

Twitter: [@PCESC19](https://twitter.com/PCESC19)

MEETING ANNOUNCEMENTS CONTINUED

Entomological Society of Manitoba Annual Meeting: Invasive species: Impacts on forestry to managed pollinators (Keynote speaker: Daniel Simberloff, University of Tennessee)

Winnipeg, 19-20 October 2018

Joint Meeting of the Entomological Society of Canada, the Entomological Society of British Columbia and the Entomological Society of America

Vancouver, 11-14 November 2018

<http://www.entsoc.org/events/annual-meeting>

Prairie Conservation and Endangered Species Conference

Winnipeg, 19-21 February 2019

<http://www.pcesc.ca>

North Central Branch of the Entomological Society of America

Cincinnati, Ohio, 17-20 March 2019

Joint Meeting of the Entomological Society of Canada, the Acadian Entomological Society and the Canadian Society for Ecology and Evolution

Fredericton, 18-21 August 2019

26th International Congress of Entomology (Entomology for our planet)

Helsinki, Finland, 19-24 July 2020

<http://www.ice2020helsinki.fi/>

*If you have a meeting you would like listed in the next ESM Newsletter, contact Marjorie Smith or Jordan Bannerman with the details by **15 December 2018**.

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