

# CAT-TAILS, INSECTS AND COWS

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## Introduction

Cat-tails (*Typha* L., family Typhaceae) are iconic plants of wetlands over much of the world. The large size of the plants and their characteristic form make them easily identifiable and their abundance and wide distribution, from cold temperate to tropical regions, mean they are present in much of the world's wetlands. Most cat-tail diversity is in the Old World, but the Nearctic has three species of which two — broad leafed cat-tail (*Typha latifolia* L.), a cosmopolitan species, and narrow leafed cat-tail (*T. angustifolia* L.), originally from the Palaearctic but now also widely distributed in eastern North America — occur in Canada.<sup>1</sup> Broad leafed cat-tail is the dominant species across the Canadian Prairie provinces whereas narrow leafed cat-tail is restricted to eastern areas, west to south-central Saskatchewan.<sup>2</sup> All observations reported here were made in southwestern Saskatchewan and adjacent Alberta where broad leafed cat-tail is the only recorded species, although the comments probably apply equally well to narrow leafed cat-tail as the two species are similar morphologically and ecologically and commonly hybridize.<sup>2</sup> The general structure and taxonomy of Canadian Prairie cat-tails has been described by Harms et al., and their biology and economic importance by Grace and Harrison.<sup>2,3</sup>

Because cat-tails are abundant, conspicuous and appear succulent with their thick leaves and roots, one would suspect that many animals feed on them. In fact, this is not the case. Only a few specialized insect species occur on the plants, and for the most part generalist

herbivores tend to either eschew or make limited use of them. Over the last 20 years, I have been casually observing cat-tail establishment and the fate of these plants in several small dams and dugouts in southwestern Saskatchewan near Maple Creek (SW 29 09 26 W3). This paper is a summary of some of these observations along with some thoughts on the position and significance of cat-tails in wetland ecosystems. Insects completely dependent on cat-tails are discussed first, then those more loosely or casually associated, followed by observations on cattle and cat-tails.

This is no attempt at a comprehensive list of cat-tail associated animals. Several studies of the insect fauna of cat-tails have been undertaken (notably by Claassen 1921), as well as there being references to various insects found in association with cat-tails.<sup>4</sup> Wildlife (vertebrates) and cat-tails have been discussed by Grace and Harrison.<sup>3</sup>

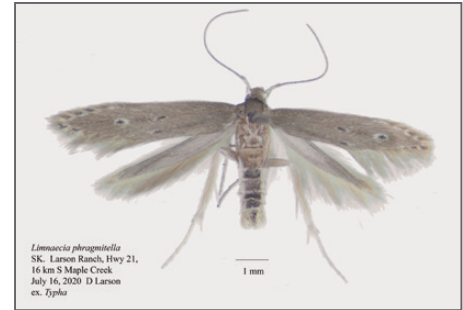
## Insects that feed only on cat-tails

**1. The Cat-tail Moth** (*Limnaecia phragmitella* Stainton) (Lepidoptera, family Cosmopterigidae). (British name - Shy Cosmet).

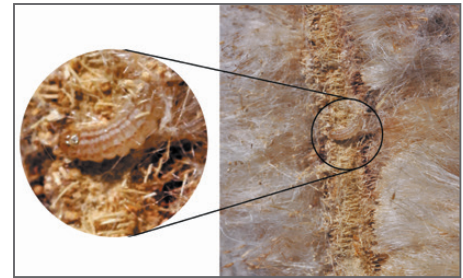
Description.<sup>5</sup> Adult (Figure 1): small, wing length 5.9 to 10.2 mm, wings slender or lanceolate, greyish to light brownish with a faint longitudinal stripe on fore wing.

Larva (Figures 2, 3): Whitish to very pale brown, with five slightly darker brown dorsal longitudinal stripes; feed only within the female portion of the flower spike but bore into leaf sheaths and the main stem for pupation. Pupae (Figure 4) usually in silk-lined tunnels in overwintered cat-tail stems and leaves, sometimes under the down of female flower spikes.

Ecology. Claassen gave a good account of the ecology of the larvae,



**FIGURE 1:** Adult cat-tail moth. (Specimen to be deposited in Royal Saskatchewan Museum Collection (RSMC)).



**FIGURE 2:** Cat-tail moth caterpillar, on female flower spike.



**FIGURE 3:** Cat-tail moth caterpillar, on cat-tail stem.



**FIGURE 4:** Cat-tail moth pupa in a silk-lined pupation tunnel in a dead leaf sheath.



**FIGURE 5:** Cat-tail patch on a small dugout, May 2020. The cat-tails are fluffed out but the pappus is still attached due to the silk webbing produced by cat-tail caterpillars.



**FIGURE 6:** Cat-tail patch in same dugout and time as Figure 5. Cat-tail caterpillars did not infest this patch so over winter the seeds detached and blew away leaving the bare flower rachis.

which is summarized here.<sup>4</sup> Larvae feed only within the pistillate (female) flower spikes of various species of cat-tail. Young larvae feed on the styles of the pistillate flowers, but as the flowers grow and become dry, larvae move inwards and eat the seeds of the plant. Several larvae may occur per spike. Half-grown larvae overwinter near the rachis of the flower spike, where they often eat away the basal part of the stalks that bear the seeds. As they feed and move the larvae spin silk which ties the down, or pappus, together, thus keeping it from being torn off or blown away although overwinter the heads fluff out (Figure 5). In the spring, larvae complete their growth feeding on the seeds, then most leave the spike and descend the stem to the leaf sheaths where they

bore into the dead stalk or leaves and transform into pupae within silk-lined tunnels. Adults emerge in mid-summer. The moths are extremely local and do not fly far from the host plant; this restricted movement is often evident as both infested and uninfested patches of cat-tails may exist around the edge of the same pond (Figures 5, 6).<sup>5</sup>

Nero noted that in the spring both red-wing and yellow-headed blackbirds pull the overwintered cat-tails apart, fluffing up and releasing down, in a search for overwintered larvae.<sup>6</sup> He suggested these larvae may be an important early spring food-source for these birds as well as chickadees and woodpeckers which he also reported attacking overwintered flower spikes. Later in the

season, adult moths may be eaten by birds catching flying insects.

Distribution: Europe, North Africa, Australia, New Zealand. In North America from NS to BC and south to VA and OK.<sup>5,7</sup> Powell and Opler noted the species “has been cited as natively Holarctic, but it was not discovered in England until 1851 and in North America until 1899 and is introduced in Australia and New Zealand”.<sup>8</sup> The species may not be native to North America. Records for US states west of Wyoming (e.g., New Mexico, California) have been since 1965 so it appears to be spreading westward. The Saskatchewan distribution has not been investigated but the moth probably occurs wherever cat-tails grow as I have made drive-by observations of shaggy flower spikes on overwintered cat-tails, indicating moth infestation, wherever I have been in the southern part of the prairies.

## 2. The Cat-tail Bug (*Chilacis typhae* (Perris)) (Hemiptera, family Artheneidae).

Description.<sup>9</sup> Adult (Figure 7). A small true bug. Adult length 3.8 to 4.5 mm, body shape elongate, oval, more or less flattened; dorsal color yellowish to reddish-brown, with large darker punctures, ventral surface darker; body smooth and without apparent hairs; antennae short, with four segments; wings present and functional in adult.<sup>9</sup>

Ecology.<sup>9</sup> All stages feed on seeds in the female spikes of cat-tails. The bugs have a fondness, perhaps even dependency, for those heads fluffed out due to attack by caterpillars of the cat-tail moth. The tunnelling of the caterpillars in the spikes allows the bugs access to the tightly packed flowers and seeds on which they feed, and the webbing produced by the caterpillars holds the seedhead together over winter providing overwintering cover and keeping the seeds available the next spring for the bugs to feed on. The bugs (mainly adults but also some large nymphs)



**FIGURE 7:** Cat-tail bug, adult, dorsal aspect. (Specimen deposited in RSMC).

hibernate in the fluffed-out seed heads as well as in leaf sheaths where they can be found in early spring along with some overwintering cat-tail caterpillars. Sunning and mating individuals have been observed on the sun-warmed side of overwintered female spikes as early as April. With the appearance of new flower heads, adults occur first on the new male spikes then the lower female spikes later. In warmer areas of Europe two generations per year have been reported with nymphs overwintering in the female spikes along with adults. In the prairie region, diapausing adults are the predominant overwintering stage, but small numbers of large nymphs also overwinter. The number of prairie generations per year is not known.

**Distribution.**<sup>9</sup> This is a European species that has been introduced into North America. It was first recorded from Pennsylvania in 1986 but is now widely distributed, from the Maritime provinces to BC and in northern parts of eastern and western US. The first

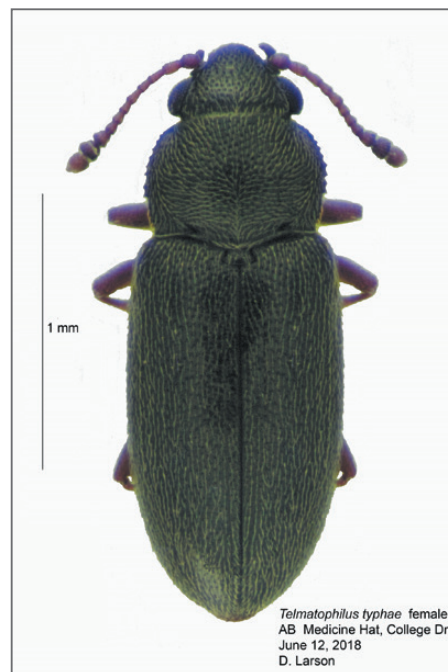
prairie record was from southwestern Saskatchewan in 2006.<sup>10</sup> A second species of the family, *Holcocranum saturejae* (Kolenati), also introduced into North America from Europe in the 1990s, has a more southerly distribution in the US and seems unlikely to occur in Canada.

A native species of seed bug, *Kleidocerys resedae* (Panzer) (Hemiptera, Ischnorhynchinae), has been recorded from cat-tail heads in eastern North America.<sup>4</sup> The species occurs throughout the Prairie provinces, but has not been seen on cat-tails locally.<sup>9</sup> This insect and other members of its family are called catkin bugs as they feed on the scaly catkins of trees such as birch, alder and bog-myrtle (*Myrica gale*). Bog-myrtle especially often grows in close proximity to cat-tails in eastern Canada and it is likely bugs from bog myrtle have been found on cat-tails.

### 3. The Cat-tail Beetle

(*Telmatophilus typhae* (Fallén)) (Coleoptera, family Cryptophagidae).

**Description.**<sup>11,12</sup> Adult (Figure 8). Members of the genus *Telmatophilus* are small, 2.4 – 3.0 mm, elongate, dark brown to black, with white pubescence. The antennae have a pronounced 3-segmented apical



**FIGURE 8:** Cat-tail beetle, adult, dorsal aspect. (Specimen to be deposited in RSMC).

club, and the lateral margin of the pronotum is finely serrulate. Two species of the genus occur in North America, but only cat-tail beetles feed on cat-tails.

**Ecology.**<sup>11, 13</sup> Most specimens have been found on male flower spikes. Shortly before and during anthesis, beetles congregate on and run actively over the male flowers, their numbers subsequently dropping as the flowers dry. The ecology of *Telmatophilus typhae* is not known but that of a similar European species is as follows: eggs are laid in clusters on the outer side of immature male spikes and on hatching the first two instars feed on immature stamens and pollen. The final instar (3<sup>rd</sup>) feeds on mature pollen grains. Pupation occurs in the flower clusters and the beetles overwinter in leaf sheaths. The beetles are active fliers and have been found in flight around cat-tail patches. Most Cryptophagidae feed on fungal hyphae, spores and conidia<sup>14</sup>, but as cat-tail pollen is often aggregated due to infestation by fungi<sup>2</sup>, the fungi may also be the food of the beetles.

**Distribution.**<sup>11</sup> Two species of *Telmatophilus* occur in North America. The Nearctic species, *T. americanus* LeConte, which occurs across southern Canada, does not feed on cat-tails but is on other marsh plants such as *Sparganium*. The cat-tail beetle, a Palearctic species introduced into North America, is smaller, lacks distinguishing male characters of the hind tibia and sternite of *T. americanus*, and occurs only on cat-tail where all stages<sup>2</sup> feed on the male flowers. The first North American records are from the Maritime provinces in 1986. Since then, it has been found west to southern Saskatchewan and Alberta, and north to at least the North Saskatchewan River. The spread across the continent has been remarkably rapid, probably enabled by a high tendency to fly and the continuous distribution of the host plant.

## Insects that feed on cat-tails but are not specialists

In addition to the cat-tail specialists described above, a number of insect species have been described as having various degrees of association with cat-tails. Some of the most prominent are caterpillars of the cutworm moth family Noctuidae (Lepidoptera). This is a large family of moths that is represented in almost all habitats. Some species typically occur in wetlands where their caterpillars feed on various plants, often without showing much specificity. However, species that occur in the Canadian Prairie provinces and have been mentioned by several authors as feeding on cat-tails are: Henry's marsh moth (*Acronicta (Simyra) insularis* (Herrich-Schäffer), Noctuidae, s.f. Acronictinae) which feeds on many low plants, especially grasses in wet places but will also feed on cat-tail; and the oblong sedge borer moth (*Capsula oblonga* (Grote), Noctuidae, s.f. Xyleninae) whose larvae feed mainly on cat-tails and occasionally on sedges (*Cyperus*), feeding near the water surface as leaf miners in the first instar then completing development as borers within the stem base of the host cat-tail, pupating within the stem and the adult moth emerging through a pre-bored hole.<sup>7,8</sup> Infested stems are stunted, and do not flower. The larva of the oblong sedge borer has the spiracles of the eighth abdominal segment enlarged and the longitudinal tracheal trunks large so that the caterpillar can breathe with its anterior body submerged; the larva of Henry's marsh moth shows no obvious modifications for semiaquatic life.<sup>4</sup>

Caterpillar feeding generally causes only local damage to stands of emergent vegetation in marshes and there are few cases of insects creating open-water areas in dense stands of emergent vegetation and this generalization holds largely for insects of cat-tails.<sup>15</sup> However, cat-tail destruction by mining by larvae of various unspecified moths has been

reported.<sup>16</sup>

Few beetles are associated with cat-tails. A few species of weevils (Curculionidae) of the genera *Sphenophorus* Schönherr and *Tournotaris* Germar and are known to feed on the rhizomes and stems. However, the species most specialized on cat-tail, *S. australis* Chittenden, occurs in eastern Canada (ON, PQ) and throughout the US except for the northern Plains states; it has not been reported from the Canadian Prairies. *Sphenophorus australis* larvae feed in rhizomes, at the stem bases, and stunt development of stems. These feeding sites accumulate starch and nutrients destined for stem and flower growth.<sup>17</sup> *Tournotaris bimaculata* (Fabricius) is a holarctic species and its larvae have been reported mining broad-leafed cat-tail stems in Europe. There are no North American host records. The species occurs in wetlands and moist meadows so cat-tails are a likely host, but it also commonly occurs in the absence of cat-tail so other wetland plants must also be used.

Sucking insects of the Order Hemiptera that feed on plant sap are very poorly represented on cat-tails. In a comprehensive list of the aphids of Canada, only two genera,



**FIGURE 9:** Several species of solitary bees (Haliictidae, *Lasioglossum* spp.) on male cat-tail flower spike.

*Macrosiphum* and *Rhopalosiphum*, were listed as having species feeding on cat-tail.<sup>18</sup> No species of the large family Cicadellidae (leaf hoppers) are reported from cat-tail. The diverse family of plant bugs (Hemiptera: Miridae) has no prairie species recorded from cat-tail.<sup>19</sup>

A review of the flower visitation and pollen collection records of North American Hymenoptera gives no records for cat-tail.<sup>20</sup> Cat-tail pollen, like that of other wind-pollinated plants, has low nutritional value for honeybees.<sup>21</sup> However, under some conditions, bees will collect pollen from cat-tail spikes (Figure 9). Over the course of the morning when this photograph was taken, a wave of dehiscence was passing up the male flower spike and bees were aggregating where the pollen was being released. Probably the low nutritional quality of the pollen was offset by its abundance and ease with which bees could collect it. However, this is not a regular occurrence for I have elsewhere seen cat-tail flowers in anthesis without attendant bees. Honeybee colonies were within 200 m of where the photograph was taken yet no honeybees were observed and *cat-tail* is not recognized as a significant source of pollen for honeybees.

## Cows and Cat-tails

Inclusion of cows in a discussion that deals largely with insects may seem out of place. However, the relationship of cows to cat-tails reinforce some of the patterns shown by insects.

Manning made some observations about the cattle breeds most prevalent on the Canadian Prairies.<sup>22</sup> These breeds of cows evolved mostly around the British Isles, that is in a wet climate that favored forbs over grasses, and their soft, fleshy bodies and bovine dispositions are best seen as adaptations to eating broad-leafed, marsh plants. In the dry western prairies, these cows gravitate to

water and concentrate their grazing in its vicinity, damaging and altering moisture-loving plant communities as their first action in the landscape. But cows do not like cat-tails. I have watched four Galloway cows, the epitome of British cattle breeds, in a diverse grassland environment. During the growing season most of their activity was near water and they did eat some cat-tail — although never more than a few stalks at any time. However, they did destroy many cat-tails as their hooves flattened stalks and leaves and, on sinking into the soft mud, sliced and churned up rhizomes. In fact, this was why the cows were allowed into the wetland, to knock back cat-tails that were taking over the pond margin. The cows were quite successful. For this reason, prairie ponds exposed to prevalent prairie grazing intensities lose their cat-tails. In southwestern Saskatchewan cat-tails are usually seen only in sites protected from cattle or in large, deeper marshes that cattle find difficult to negotiate.

Ranchers are always looking for food sources for their cattle and cat-tails have often been looked at as a food for livestock. However, nutritional analysis reveals that that

the food value of the above ground portion of the plant is poor. Lardy et al. concluded “Cat-tails have little feed value but can be fed in an emergency. Cat-tails cut at a relatively young age may be equivalent to straw in feeding value. Mature cat-tails are a poor feedstuff, having energy values similar to or lower than straw and may best be used as bedding.”<sup>23</sup> This is almost certainly why cattle feed so lightly on them, they have no food value.<sup>24</sup> Supporting this is an observation that the most intense cattle feeding on cat-

tails is on the developing female spikes before they mature. Cows relish these and will pick and eat those spikes they can access (Figures 10, 11).

In selectively eating cat-tail flower spikes, cows reflect the insect’s habits. For the most part, cat-tails are unsuitable food, of too low nutrition for animals. It is only by focusing on those parts of the plant in which nutrients are concentrated can herbivores survive. Structural tissue and sap are not sufficient.

Cat-tails require full light. They



**FIGURE 10:** Cows eating immature female cat-tail flower spikes.



**FIGURE 11:** A cat-tail patch on a small dam where cows have been eating female flower spikes. The arrows point to broken stalks that had probably had their flower spikes picked by cows. The broken stalks are to the left side of the photo which is the land-ward side. The cat-tails to the right are in water too deep for cows and most of the flower spikes are intact.

colonize newly open soil surface and compete with other vegetation by overgrowing it. When successful they produce a monoculture that precludes most other plants as well as reducing animal diversity and abundance and they do this by producing large quantities of nutritionally poor body mass.<sup>25</sup> Even their reproduction involves quantity over quality in propagules, but these do offer a richer reward to those animals capable of accessing them for the seeds, although tiny, are starchy and oily.<sup>2</sup> The rhizome and basal stalk feeding caterpillars and beetles have their own tricks for surviving on cat-tail, such as galling tissue to concentrate nutrients in the feeding area, or mining and feeding in the stem base where they can intercept nutrients being translocated to the stem and leaves. They may possess a microbiota that assist in digesting otherwise refractory plant material, or the lack of specialization on cat-tails shown by many herbivores allows them to obtain necessary nutrients from a broader range of sources.<sup>26, 27</sup> Cat-tail rhizomes are where the plant stores starch and other nutrients to support the rapid summer growth. However, they occur in an environment that is difficult for animals as water levels fluctuate. Animals accessing these stores may have a difficult time colonizing and existing in the rhizome but by boring in the buds and basal parts of stems they can get these nutrients but from a protected feeding site. All the larger insect herbivores use this strategy.

## Discussion

The cat-tail community has some unusual features, especially the lack of diversity in the macrofauna. Nutritional limitations may be the answer as described above, but there are also historical factors involved. There is a consensus in the literature that broad leafed cat-tail is indigenous to North America at least to the extent that it existed here prior to arrival

of Europeans. However, this should be checked carefully for if based on palynological evidence, it should be recognized that the pollen of cat-tail and bur-reed are so similar that they are usually not differentiated and together are used as indication of wetland environments. It seems unusual that an indigenous plant has only one morphologically specialized indigenous herbivore feeding on it (oblong sedge moth caterpillar). Narrow leafed cat-tail is more likely an introduced species which, within a century or so, has spread across the continent and formed stable but sterile hybrids with broad leafed cat-tail.

Wide distribution and abundance are not indicators of how long a species has occupied an area as shown by the specialized cat-tail insects. Among the cat-tail specialists, the cat-tail moth has the longest history with the first North American record being 1899. This was late in the great period of discovery and description of the American Lepidoptera fauna, and although the moth is small, and undistinguished, it was hardly likely to be overlooked by early naturalists because of its distinctive habits. It was described 50 years earlier in England so the existence of such a species was not unknown to the English-speaking naturalist community. It may not be an indigenous species, but rather an early immigrant from the Old World that is still spreading into the west and northwest parts of the continent. Certainly, the cat-tail bug and the cat-tail beetle are recent introductions with first North American records for both species being 1986 in the northeastern US and Maritime provinces, respectively, and first prairie records being 2006 for the bug and 2017 for the beetle. Both species spread across much of the continent and through various biomes in 30 years or less, the spread possible due to the abundance of cat-tails and perhaps facilitated, at least for the bug, by an earlier expansion of the moth which prepared the habitat for the bug.

Thus, we see the familiar and iconic cat-tail community may not be the stable and enduring community we take for granted. It is in a state of revolution and change. The center of world cat-tail diversity, Eurasia, still contains many cat-tail specialists that may show up here at any time for with globalization and rapid mass transport many unexpected, exotic species are turning up in our ecosystems.

## Acknowledgements

I thank Cory Sheffield, Royal Saskatchewan Museum, for identification of the bees. Margaret Larson, through her patient observation and interest in cows, showed me there is more to them than simply grass-eaters and cud-chewers and that they are very adept at learning their way around the range. Figures 7 and 8 were previously published in Canadian Journal of Arthropod Identification, No 34 (Figure 7) and Newsletter of the Biological Survey of Canada, Volume 37 (Figure 8).

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## POETRY

### Harris Sparrow

Harris Sparrow, cross my path,  
 And tell me all is well in Warden's Grove,  
 The Thelon River clear and lush,  
 And still beyond the poison  
 Of my reach.

Harris Sparrow, cross my palm,  
 And hear what is to come from fear and greed.  
 My mind obsessed and numbed by here and now,  
 I'll dig the ends of all the rainbows,  
 Until the rain is gone.

Harris Sparrow, cross my heart,  
 And hope to live forever if we can.  
 Teach me your wise path across this earth,  
 A narrow trail - enough, not less, not more.  
 An imprint, light as a feather.

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