



## Pests and Pesticides in Child-serving Facilities: An IPM Newsletter

### Special Points of Interest

### *Muscina pascuorum* (Meigen) Invading Eastern Tennessee Structures

Karen M. Vail and Jackson Turner

*We've had an invasion of an uncommon fly into eastern Tennessee cabins so I thought I'd share with you a recent newsletter I wrote for the pest management industry.*

On November 4, I received a voicemail from Jimmie Murphy with All About Bugs in Sevierville, TN, about a significant infestation of flies in multiple cabins. We assumed it was cluster flies, but I asked for images or specimens. In less than one day, most of the hundreds of flies in the cabins were dead, but more would enter again. The flies gathered around upstairs windows but were not found in the bedrooms. He estimated 50 – 100 cabins were experiencing this issue. I inquired with Dan Hekman of PestTech in Chattanooga to get an idea of how widespread the problem was, and he mentioned they had a few structures with flies, but he hadn't looked at the flies very closely. Jimmie delivered a bag of flies, and Dan forwarded an image (Fig. 1).

### Preparing for Winter Break!



Crushed American cockroach remains under the recycle bin.

Remove contents of recycle bins and check underneath for pests and food debris before leaving for break.



Fig. 1. Flies from the Chattanooga area, early November 2022. Note the eyes are widely separated indicating this is a female. Credit: Dan Hekman and Stephen Grider, PestTech Chattanooga.

### This issue

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This fly had a slight light blue shiny abdomen which reminded me of a blow fly in the family Calliphoridae, but coarse bristles and stripes on the thorax resembled a large house fly (family Muscidae). The submitted specimens were 9.25-11 mm from the head to the abdomen (and 10-12 mm from head to wingtip). So definitely larger than a house fly which is 6 – 7 mm long. When I provide training for the General Pest and Rodent Control (GRC) Licensing Exam, I usually mention that cluster flies, blue bottle flies and face flies commonly overwinter in structures. However, I could tell these weren't cluster flies, *Pollenia* sp., because they lacked the golden hairs on the thorax. They also lacked the orange hairs under the eyes, which eliminated the bluebottle fly, *Calliphora vomitoria*, and they lacked a patterned abdomen which eliminated face flies, *Musca autumnalis* (Fig. 2).

Hmm, this was going to require a decent microscope and keys to determine family and species identification. Enter Jackson Turner. Jackson is a concurrent Master's/Ph.D. student in our department of Entomology and Plant Pathology at the University of Tennessee studying flies in the family Dixidae under the direction of Dr. Kevin Moulton. Jackson offered to key the fly to species.



Figure 2. Profile view of *Muscina pascuorum* adult (above) and wing (below). Note the fly is wet with ethanol and the blue coloring on the abdomen and black stripes on the thorax aren't visible. Credit: Jackson Turner, UT EPP

Jackson keyed the fly to *Muscina pascuorum* (Meigen), which was described in 1826 in Europe and wasn't discovered in the US until 1922 (Johnson 1923). Subsequent reports from Johnson and others a few years later, report this fly in the family Muscidae from New Jersey to Maine and into Canada. One hundred years later, I can relate to the surprise experienced by these earlier entomologists. Where did all of these flies come from, and why haven't I seen these before? I may have received these or similar flies sometime during the past decade, but we didn't identify them. Becky Nichols reported this species from the Great Smoky Mountains National Park, Twin Creeks Science and Education Center, on November 13, 2012 at 559 m (1834 ft) elevation (TIBLC, <https://www.gbif.org/occurrence/1415231552>), so I guess we shouldn't be surprised to see it here. DNA barcoding using the mitochondrial cytochrome c oxidase subunit 1 confirmed these flies collected from eastern Tennessee cabins in November 2022 as *Muscina pascuorum*. Its worldwide distribution is indicated in the map below (Fig. 3).



Figure 3. Worldwide distribution of *Muscina pascuorum* from the GBI, Global Biodiversity Information Facility Website, <https://www.gbif.org/species/1526160>

It's challenging to find descriptions of this fly's larval hosts. Johnson (1923) stated the larvae were found in mushrooms (*Amanita citrina*). Bajerlein et al. (2022) found them in pig carcasses but then indicated that they weren't commonly found in carrion (Grzywacz et al. 2017). References in Skidmore (1985) show it was reared from caterpillars, found in decaying vegetable and animal matter in the South Korean mountains, and that adults visit carrion and feces. Suffice it to say, we probably won't know what the hosts were for these flies. Did we have an unusual amount of mushrooms or decaying vegetable or animal matter this year? Maybe. No matter their larval hosts, they are now seeking overwintering sites in East Tennessee, and we will need to treat these adult flies like cluster flies.

First, seal potential entry sites around windows, doors and vents. Oh wait, did I say these were in cabins? As my research specialist, Jennifer Chandler, says, "A cabin is a crack and crevice." Good luck finding and sealing all entry points. Check that screens cover exterior vents in crawl space or attic/roof areas. Treat entry points around the exterior perimeter with fast-acting products such as pyrethroids (but remember the restrictions on band width) or others. Both pyrethroids and neonicotinoids have been reported to provide quick knockdown of these flies indoors. If harborage sites are located, these can be treated with dusts, foams or spray, but it's physically impossible to treat every crack and crevice in a cabin.

Since *M. pascuorum* is reported to gather at windows, light traps may provide another management option. Window curtains should be drawn to reduce competition with the light traps, and the traps placed away from the windows. And, in cabin rentals, the light traps will need to be placed where they won't distract the renters.

Another tricky part of managing flies in these cabins is the lack of attic space. Cluster or attic flies often gather in the attic. So placing a light trap in the attic is not an option.

So far, only a tiny portion of the *M. pascuorum* in the Pigeon Forge/Gatlinburg/Sevierville cabins have survived the perimeter treatments. The problem with flies overwintering in structures is that survivors of the perimeter treatment will find a crack and crevice to hide. On warm days, they may become active and move to the living space. As it cools, they move back into the gap. And repeat. This movement in and out of cracks may become a very frustrating experience for the renters, the owners and the pest management professionals. In the spring, when the weather warms, the remaining flies will eventually make their way outdoors again. But in the meantime, to keep complaints down, we may need to turn this into a competition to determine which renter kills the most flies and offer a bonus refund to the winner.

### References:

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- Grzywacz, A., M.J.R. Hall, T. Pape et al. 2017. Muscidae (Diptera) of forensic importance—an identification key to third instar larvae of the western Palaearctic region and a catalogue of the muscid carrion community. *Int J Legal Med* 131: 855–866. <https://doi.org/10.1007/s00414-016-1495-0>
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## Tick Dragging Updates

Karen Vail

We want to thank Monroe, Bradley and Hamilton County Schools for participating in our school IPM demonstrations this past year. We dragged for ticks on their school properties four times, approximately once per season. This month we hope to meet with these school systems via Zoom to discuss the ticks present on their school properties. We follow up the Zoom discussion with PowerPoints of each school indicating the location of the ticks on each property over the four collection dates and ask them to please share these with each school principal or whomever they think would find them the most useful.

Ticks seek moist areas that protect them from drying out, so it's not surprising that most ticks were found at the woods and school grounds interface. We suggest keeping these areas free of leaf litter and the grass mowed. Also, we ask the school systems to ensure that students and school personnel stick to the middle of trails so they are not touching vegetation when walking. And to inform students, teachers, coaches, athletes, fans and others on school property to avoid the forests or trees lining the edges of ball and other fields. If it's

necessary to go near these areas, tick repellent can help prevent bites. Checking for ticks after visiting these areas is essential to find ticks and remove them before they have a chance to transmit any pathogens.

Don't let down your guard because temperatures have cooled. *Ixodes scapularis*, the black-legged tick and primary vector of the pathogen that causes Lyme disease, is active as an adult now through the spring.

Tick removal techniques and more information on tick bite prevention can be found in our publication, *Managing Ticks on School Grounds*, at <https://extension.tennessee.edu/publications/Documents/PB1895.pdf>.

We are dragging for ticks on Warren and Cumberland County school properties from Fall 2022 to Summer 2023. Please let us know if you are interested in us dragging your school properties for ticks from Fall 2023 to Summer 2024.

## Preparing Classrooms for Winter Break

Karen Vail and Janet Hurley

I'm trying to get back into pre-pandemic habits. So for the last article in December's newsletter, I want to remind you to prevent pest conducive conditions when you leave for the holiday break. We don't want a surprise pest outbreak added to your return to the classroom!

### Solid foods

- Ensure an area is cleaned after eating.
- Ensure garbage cans are lined with plastic bags so food debris isn't left in the can when it is emptied.
- Don't let cans or bins overflow.
- Empty garbage cans and recycle bins often. These should all be emptied before the start of break or other times campuses close.
- Always keep snacks and other food items, whether for kids or teachers, in pest-proof containers such as sealed plastic, glass or metal containers. Yes, that means that package of crackers and emergency candy you keep in your top desk drawer.
- Look under furniture for food crumbs and remove them. Food-eating surfaces are often cleaned, but food debris under objects is often ignored.
- Food should be sent home and not left in the classroom overnight, over break or extended closings.
- Send the kids home with art and crafts projects made of food. We don't want pests nibbling on these while you're gone. Food-based art projects should have a limited duration in the classroom regardless of the time of year.



Remains of an American cockroach found under the recycle bin.

### Water and other liquids

- Use water as the preferred beverage in the classroom. It's better for the kids and doesn't leave a sticky, sugary mess when spilled for the pests to enjoy.
- Any spills should be wiped up immediately. Report spills of sugary substances on carpets to ensure they are cleaned quickly.
- Report leaking faucets and pipes ASAP. Cockroaches can only live a few days without water but weeks without solid food.
- Ensure water is in the p-trap of any sink or toilet and cover or plug drains to ensure American cockroaches don't visit your classroom through the pipes. We found this action essential in high schools converted to elementary or middle schools. Often, the locker room showers and some of the toilets are no longer required and p-traps dry up allowing American cockroaches easy access. Also, sinks in science classrooms may have the same issue if used infrequently.



An unused toilet lacking water allows American cockroaches easy access to the school.

### Clutter (i.e, pest shelter)

- Cardboard boxes used to bring in supplies should be sent home, recycled or returned to the owner.
- Transition from cardboard as a long-term storage container to plastic totes or similar items. German cockroaches love to hide in **corrugated cardboard** and are often transported into buildings this way. German cockroaches so enjoy corrugated cardboard that it's used for their rearing harborage in the laboratory. Crickets will also munch on it, mice build nests out of it and many pests may use it as a hiding place.
- Arts, crafts, and miscellaneous **supplies tend to accumulate in the classroom**. Ask yourself if you have used stored items in the last year. If not, is there someone else who could use it more?
- Please reduce clutter in the classroom. Not only does clutter provide a place for pests to hide, it is challenging to clean or inspect in, under and around it. Ask yourself why it is here and if you can do without it.

**Follow these steps to help keep your classroom pest free. Not only do pests disrupt the learning environment, they are also a source of allergens and asthma triggers.**

#### Modified from:

Vail, K. and J. Hurley. 2020. Prevent Pest Conducive Conditions when Preparing Classrooms for Winter Break and Shifts to Virtual Learning. Pests and Pesticides in Child-serving Facilities: An IPM Newsletter 14(3):2-3.

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Partial support for this newsletter provided by the USDA  
 NIFA CPPM EIP grant (# 2021-70006-35577) awarded to the  
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### NATIONAL IPM INFORMATION

eXtension's Pests in the Home  
<https://pestsinthehome.extension.org/>

National School IPM  
[schoolipm.ifas.ufl.edu/](http://schoolipm.ifas.ufl.edu/)

IPM in Schools Texas  
<http://schoolipm.tamu.edu/>

IPM Institute of North America  
[www.ipminstitute.org/](http://www.ipminstitute.org/)

School IPM PMSP—all schools IPM by 2020 [https://  
 ipminstitute.org/projects/school-ipm-2020/](https://ipminstitute.org/projects/school-ipm-2020/)

EPA schools  
<http://www2.epa.gov/managing-pests-schools>

For further information about the IPM program at your school or in your county, contact your county Extension Agent or the school IPM Coordinator. For county agent contact information, please visit <https://utextension.tennessee.edu/office-locations-departments-centers/>

## Precautionary Statement

To protect people and the environment, pesticides should be used safely. This is everyone's responsibility, especially the user. Read and follow label directions carefully before you buy, mix, apply, store or dispose of a pesticide. According to laws regulating pesticides, they must be used only as directed by the label and registered for use in your state.

## Disclaimer

This publication contains pesticide recommendations that are subject to change at any time. The recommendations in this publication are provided only as a guide. It is always the pesticide applicator's responsibility, by law, to read and follow all current label directions for the specific pesticide being used. The label always takes precedence over the recommendations found in this publication.

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