ROUND 1

1. In medical entomology, **what type of disease transmission** involves the disease agent replicating or developing inside the vector? This is in contrast to mechanical transmission, where the disease agent is simply transported by the vector without undergoing development.

**Biological transmission**

Sources: http://www.cfsph.iastate.edu/Infection_Control/Routes/vector-borne.php

2. **What four-word phrase** is the theme of next year’s International Congress of Entomology?

Entomology for our planet

Sources: https://ice2020helsinki.fi

3. Keye Luke, Jay Chou, and Bruce Lee have all portrayed Kato, the crimefighting partner of **what fictional vigilante**?

The Green Hornet

Sources: https://www.nytimes.com/2011/01/09/movies/09hornet.html

4. **What is the full scientific name** (genus and species) of the bacterium classified by IRAC as a microbial disruptor of insect midgut membranes?

*Bacillus thuringiensis*

Sources: The IRAC mode of action classification online. (n.d.). Retrieved from https://www.irac-online.org/modes-of-action

5. "Yoke-winged" is the literal translation of the name of **what insect suborder**, which can be distinguished from other members of its order by the presence of caudal gills on the aquatic immatures?
Zygoptera


6. The first sighting of emerald ash borer in North America occurred in 2002, when it was discovered attacking ash trees in Ontario, Canada and what US state?

Michigan


7. Colorado populations of the mountain pine beetle mainly infest limber pine, lodgepole pine, and what other pine? When Andrew Hopkins described the mountain pine beetle in 1902, he presumably used specimens collected from this same pine tree species.

Ponderosa pine

Sources: "https://csfs.colostate.edu/forest-management/common-forest-insects-diseases/mountain-pine-beetle/ https://pdfs.semanticscholar.org/81cf/7c6dffbde4299459c48ec0bfe27aec26b5b2.pdf"

8. The majority of Lepidoptera involved in ant-caterpillar symbioses belong to Riodinidae and what other butterfly family?

Lycaenidae

9. A worker honeybee has **how many pairs of wax glands** on its abdomen?

Four

**Sources:** "Collinson, C.H 2003. What do you know? Everything you’ve ever wanted to know about honey bees, beekeeping, beekeepers and the world they inhabit.et al https://americanbeejournal.com/beeswax/"

10. The article "40 Years of IPM Highlights" lists three important events from 1970: Celebration of the first Earth Day, formation of the EPA, and the Nobel Peace Prize being awarded to what **American agronomist**? His 'Green revolution' is credited with saving over a billion people from starvation.

**Norman Borlaug**

**Sources:** https://cals.arizona.edu/apmc/docs/IPM_Delivers.pdf

ROUND 2

1. Although this year's festivities were postponed due to COVID-19, the small town of Point Pleasant, West Virginia, normally hosts an annual festival that commemorates the 1966 sightings of what **paranormal figure**?

**Mothman**

**Sources:** https://www.mothmanfestival.com/

2. In the Old World, the disease leishmaniasis is commonly vectored by sand flies in the genus *Phlebotomus*. What **other sand fly genus** is exclusively responsible for vectoring leishmaniasis in the New World?

**Lutzomyia**

**Sources:** https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2889652/

3. The parasitoid wasp *Tamarixia dryi* is being evaluated as a biological control agent of the insect pest *Trioza erytreae*. This pest requires control because it is one of two species known to vector what **bacterial disease**?

**Huanglongbing / citrus greening**

**Sources:** https://ipm.ifas.ufl.edu/agricultural_ipm/asian.shtml

ESA member symposium: Synergy in Biological Control of invasive insects: Utilizing the Ecology and Behavior of Natural Enemies - Alejandro Tena: Classical biological control of Trioza erytreae, HLB vector, in Spain
4. Brown marmorated stink bugs, and other fruit-feeding insects with piercing-sucking mouthparts, are known for causing **what type of damage**, in which the growing fruit fails to expand at the site of injury, resulting in malformation?

**Cat-facing**

Sources:  
http://entnemdept.ufl.edu/creatures/veg/bean/brown_marmorated_stink_bug.htm

5. The name of **what insecticide** has been redacted from this IRAC diagram of neonicotinoids?

![IRAC Diagram of Neonicotinoids](image)

**Imidacloprid**

Sources: [https://irac-online.org/content/uploads/MoA_Group_4.pdf](https://irac-online.org/content/uploads/MoA_Group_4.pdf)

6. **What taxonomist** was named an ESA Fellow in 1924 in honor of her numerous contributions to the classification of Microlepidoptera? She has since had multiple species named after her, including an aptly-colored moth related to the fuscous species pictured here. [Image copyright © 2016 Patrick Clement; licensed under Creative Commons CC-BY-ND 2.0.]

![Moth Image](image)

Annette Frances Braun

7. A widely-publicized 2017 study reported a 75% decline in insect biomass over the past 27 years. This study was conducted across 63 protected natural areas in what European country?

Germany


8. What striking form of structural coloration involves color changes based on the angle of the observer, and was recently shown to help jewel beetles camouflage in order to avoid bird predation?

Iridescence


9. These specialty loaves of bread are labeled as 'kuwagata,' which is a Japanese word that refers to insects in what family?

Lucanidae

10. "Stimulo-deterrent diversion" was one of the earlier names for **what IPM strategy** that uses volatile cues from both *repellent* and *attractant* plants to reduce damage from insect pests?

**Push-pull**


ROUND 3

1. The megalopteran family Corydalidae is divided into two clades: Corydalinae (AKA dobsonflies) and **what other subfamily**, whose members are commonly known as fishflies?

**Chauliodinae**

**Sources:**

2. An October 2020 episode of Jeopardy! had a clue about the license plates of **what Mexican state**, which is home to many overwintering sites of the eastern monarch butterfly? [Image copyright © 2007 Javier Sanchez; licensed under Creative Commons CC-BY-ND 2.0.]

![License Plate](image)

**Michoacán**

**Sources:** https://www.britannica.com/place/Morelia-Mexico

3. Thaddeus Harris is often called the "father of economic entomology" in the US. **What other 19th-century entomologist** is known as the "father of economic entomology" in Canada?

**James Fletcher**

4. Bombykol and bombykal are components of a sex pheromone emitted by certain females in **what insect order?**

**Lepidoptera**

**Sources:** Syed, Z., Y. Ishida, K. Taylor, D. A. Kimbrell, and W. S. Leal. 2006. Pheromone reception in fruit flies expressing a moth’s odorant receptor. PNAS. 103: 16538–16543.

5. **What term** refers to a parasitoid that halts the development of its host shortly after the initial parasitization?

**Idiobiont**


6. *Paederus dermatitis*, also known as *whiplash dermatitis*, is a type of skin irritation caused by contact with the hemolymph of certain species in **what insect family?**

**Staphylinidae**

**Sources:** J Clin Aesthet Dermatol. 2011 Nov; 4(11): 44–46

7. The ESA member symposium "From Rum Stills to Cotton Gins and Head Lettuce to Head Lice" includes a talk that praises **what insecticide** as a "revolutionary change for IPM"?

**Spinosad**

**Sources:** https://www.eventscribe.com/2020/entomology2020/fsPopup.asp?efp=S0tPTU1SSFc5NTUy&PresentationID=762920&rnd=0.6740971&mode=sessionInfo

8. **What neuroscience laboratory technique**, redacted from this image, has been used to modify *Drosophila* so that their neurons express photosensitive proteins associated with vision? The individual neurons can then be triggered by shining a light on them, effectively "controlling the brain with light". [Image copyright © 2015 Andreas Prokop, Manchester Fly Facility. dros04schools: Online resources for school lessons using the fruit fly *Drosophila* — https://dros04schools.wordpress.com/]
Optogenetics


9. Even though this new wasp species is distinctively not fossorial, LSU grad student Ilgoo Kang elected to name it after what Heisman-winning quarterback? [Image copyright © 2020 Ilgoo Kang; licensed under Creative Commons CC-BY 4.0.]

Joe Burrow

Sources: https://zookeys.pensoft.net/article/56571/?fbclid=IwAR25eVFP5dps2zbs1J0kG8pQkc0KNyO1acwY5gJo-yzPXZES0l4yZNaZst8

10. Although it has not officially been classified as a plague, the Horn of Africa is currently experiencing a resurgence of large swarms of what orthopteran pest species? You may answer with the scientific name or a two-word common name.

Schistocerca gregaria (desert locust)

1. Bombardier beetles produce their well-known defensive chemical spray by mixing hydrogen peroxide and hydroquinone with peroxidase and **what other enzyme**?

   **Catalase**

   **Sources:** https://www.mcgill.ca/oss/article/bombardier-beetle-and-its-chemical-bombs

2. **What type of semiochemical** benefits the receiver and harms the emitter?

   **Kairomone**


3. **What sixteen-letter adjective** is most commonly used to describe fungi and nematodes that can potentially act as biological control agents of insect pests?

   **Entomopathogenic**

   **Sources:** https://nematode.unl.edu/wormepns.htm
   https://www.frontiersin.org/research-topics/15011/entomopathogenic-fungi-for-the-control-of-arthropod-pests

4. In 1893, Smith and Kilbourne published the first conclusive evidence of a disease agent being transmitted by an arthropod. **What is the scientific name of the tick-borne protozoan** they reported on?

   **Babesia bigemina**


5. Of the three types of lobes typically found in an insect brain, **which lobe** innervates the labrum and foregut?

   **Tritocerebrum**


6. **What Harvard professor** wrote the 1795 book *The Description and Life History of the Cankerworm* and is sometimes referred to as the first American entomologist?

   **William D. Peck**

   **Sources:** https://catalog.hathitrust.org/Record/009167943
7. A 2020 Ig Nobel Prize was awarded to Richard Vetter for collecting evidence that many entomologists exhibit **what psychological condition?** This condition is also the title of a movie that won the 1990 Saturn Award for Best Horror Film.

**Arachnophobia**


8. This year's conference features a memorial symposium honoring chemical ecologist Dr. Peter Landolt, who is known for studying yellowjackets' attraction to **what chemical?** This chemical attractant is an ester with the formula C11H22O2 that is found abundantly in fresh apples.

**Heptyl butyrate**


9. Most of you know that in 'IPM,' the letter 'P' stands for 'Pest.' But in the specific IPM strategy known as the 'PAMS' approach, the letter 'P' stands for **what other word?**

**Prevention**

**Sources:** North Central IPM Center  

10. **What twelve-letter term** was coined by entomologist Willi Hennig to refer to a derived character that is shared between multiple species and their most recent common ancestor?

**Synapomorphy**

[http://ib.berkeley.edu/courses/ib200a/lect/ib200a_lect02_Misher_Hennig_characters.pdf](http://ib.berkeley.edu/courses/ib200a/lect/ib200a_lect02_Misher_Hennig_characters.pdf)
TIEBREAKER

Gary Larson is known for using insects as a source of humor in his acclaimed comic strip "The Far Side." A survey of 4,300 "Far Side" comics revealed that exactly how many contained some sort of entomological reference?

359

Sources: American Entomologist, Volume 58, Issue 2, Summer 2012, Pages 74–77, https://doi.org/10.1093/ae/58.2.74