Plastic bee hives create buzz

A new study reveals that some bees use bits of plastic bags and plastic building materials to construct their nests. The discovery shows bees’ resourcefulness and flexibility in adapting to a human-dominated world, says Scott MacIvor, a doctoral student at York University and graduate of University of Guelph, both in Ontario. Although researchers have shown adverse impacts of these materials on various species and ecosystems, few scientists have observed insects adapting to a plastic-rich environment.

Determining that bees are using plastics in place of natural materials was accomplished by Andrew Moore, supervisor of analytical microscopy at Laboratory Services. He analyzed grey “goo” discovered in the nests of one kind of bee, *Megachile campanulae*, which uses plant resins to build its nests. A scanning electron microscope identified the polymers. The bees also occasionally replace plant resins with polyurethane-based exterior building sealant, such as caulking, in their brood cells—created in a nest to rear larva.

Researchers also discovered that another kind of bee, *Megachile rotundata*, uses pieces of polyethylene-based plastic bags to construct brood cells. The glossy plastic replaced almost 25% of the cut leaves normally used to build each cell. Markings show that the bees chew plastic differently than leaves, suggesting intentional plastic collection. For more information: Scott MacIvor, jsmacivor@gmail.com, www.uoguelph.ca.

Chickens see new state of matter

The unusual arrangement of cells in a chicken’s eye constitutes the first known biological occurrence of a potentially new state of matter known as “disordered hyperuniformity,” according to researchers from Princeton University, N.J., and Washington University, St. Louis. Research in the past decade has shown that disordered hyperuniform materials have unique properties when it comes to transmitting and controlling light waves. These findings add a new dimension called multi-hyperuniformity, meaning that the elements that make up the arrangement are themselves hyperuniform. While individual cones of the same type appear to be unconnected, they are actually subtly linked by exclusion regions, which are used to self-organize patterns. Multi-hyperuniformity is crucial for the avian system to evenly sample incoming light, say researchers. It is speculated that this behavior could provide a basis for developing materials that can self-assemble into a disordered hyperuniform state. princeton.edu, wustl.edu.

Sapwood filters bacteria from contaminated water

Need a simple solution to make drinking water? Simply break a branch off a pine tree, peel away the bark, and slowly pour water through it. The improvised filter should trap any bacteria, producing fresh, uncontaminated water. A team at Massachusetts Institute of Technology, Cambridge, discovered that this low-tech filtration system can produce up to four liters of drinking water per day—enough to quench the thirst of a typical person.

Researchers demonstrate that a small piece of sapwood can filter out more than 99% of the bacteria *E. coli* from water. They say the size of the pores in sapwood—which contains xylem tissue evolved to transport sap up the length of a tree—also allows water through while blocking most types of bacteria.

To study sapwood’s water-filtering potential, branches of white pine were collected and the outer bark was stripped off. Small sections of sapwood measuring about 1 x 1 in. were cut and mounted in plastic tubing, sealed with epoxy, and secured with clamps. Before experimenting with contaminated water, water mixed with red ink particles ranging from 70 to 500 nm in size was used. After the liquid passed through, researchers sliced the sapwood in half lengthwise and observed that much of the red dye was contained within the very top layers of the wood, while the filtrate, or filtered water, was clear. web.mit.edu.