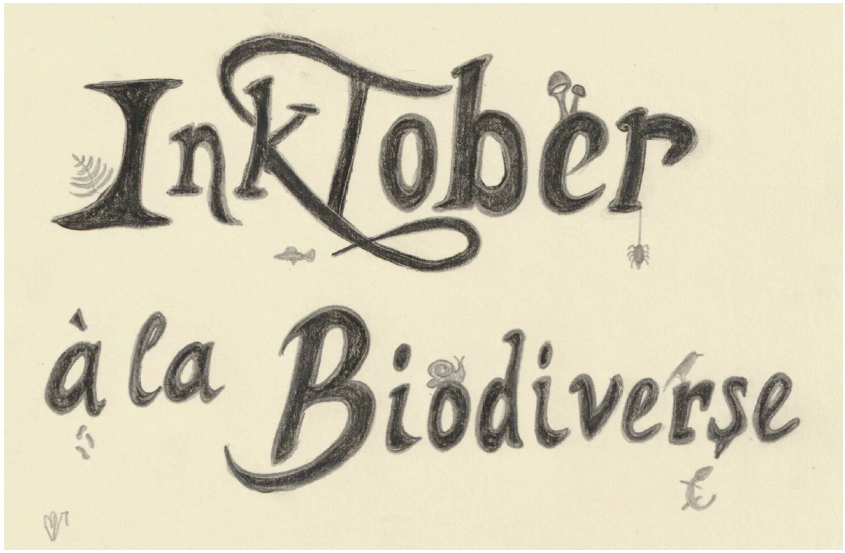
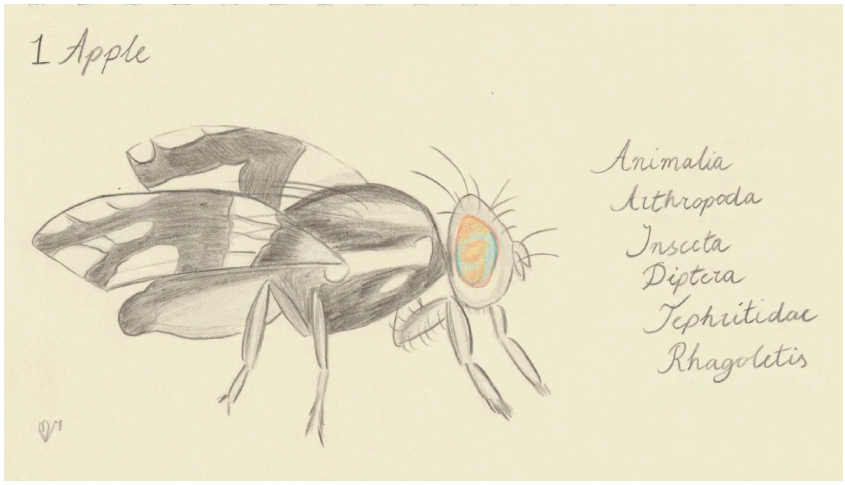
CREATURES

Inktober à la Biodiverse, day 1 to 7

Biodiversity covers the daily drawing prompts.



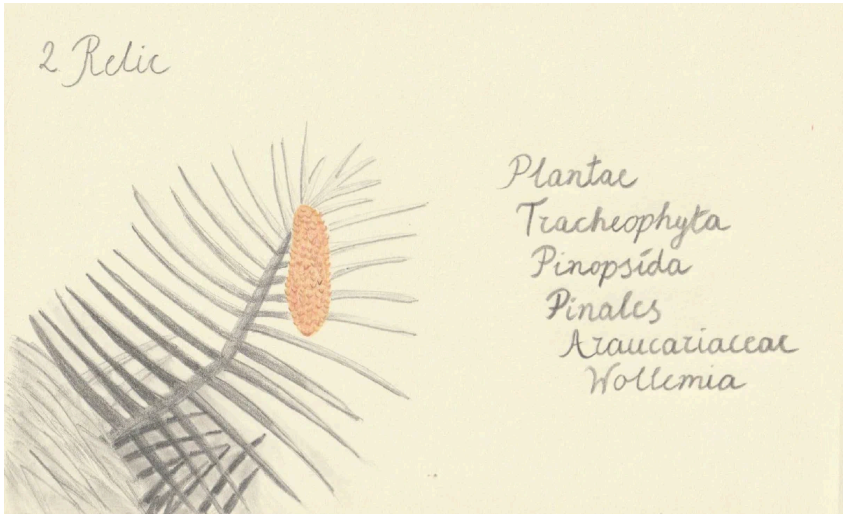


Based on 'Rhagoletis pomonella' by Joseph Berger, Bugwood.org. Licensed under CC BY 3.0 US.

1. Apple - Apple maggot fly

Flies in the genus ***Rhagoletis*** are an example of speciation in action[1]. These flies were first seen to have switched from hawthorn to introduced apple trees in the USA in 1865. After only about a hundred years, the apple and hawthorn flies already differed in timing: the apple flies emerged four to five weeks earlier,

matching the earlier ripening of apples. Interestingly, the two groups also differ slightly in other traits, such as body size and the length of the ovipositor, the tube used to lay eggs. Flies that are active at different times of year meet and mate less often, which is how one species can start to split in two.

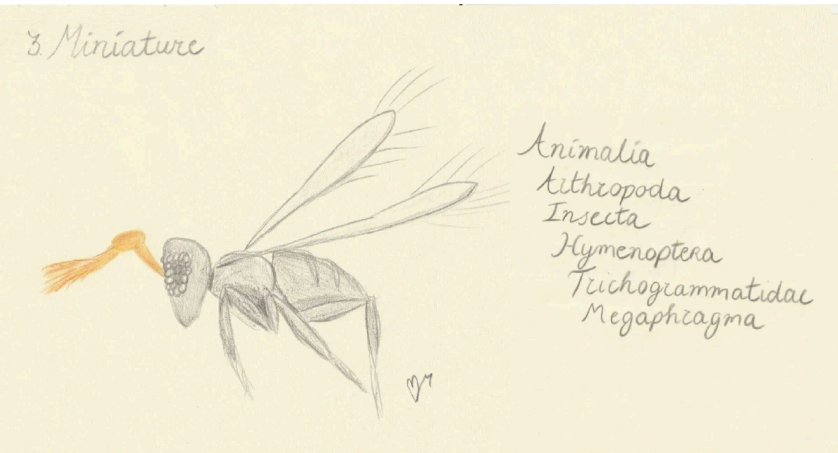


Based on 'Wollemia nobilis M2' by Adrian198cm. Licensed under CC0 1.0.

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2. Relic - Wollemi pine

The **Wollemi pine** is a living fossil[2]. Despite its name, it is not a true pine. The species belongs to the araucaria family, alongside the monkey puzzle tree and the kauri. It is the last survivor of an ancient conifer lineage that was once widespread across the Southern Hemisphere and thought extinct, until living trees were found in a remote Australian canyon in 1994. Less than a hundred trees remain there, with very little genetic variation, while facing threats including introduced root-rot pathogens, fire, heat and drought. Conservation efforts focus on strict site protection and new plantings to keep the species from truly going extinct.



Based on 'Megaphragma mymaripenne-SEM' by Alexey A. Polilov. Licensed under CC BY 4.0.

3. Miniature - Fairy wasp

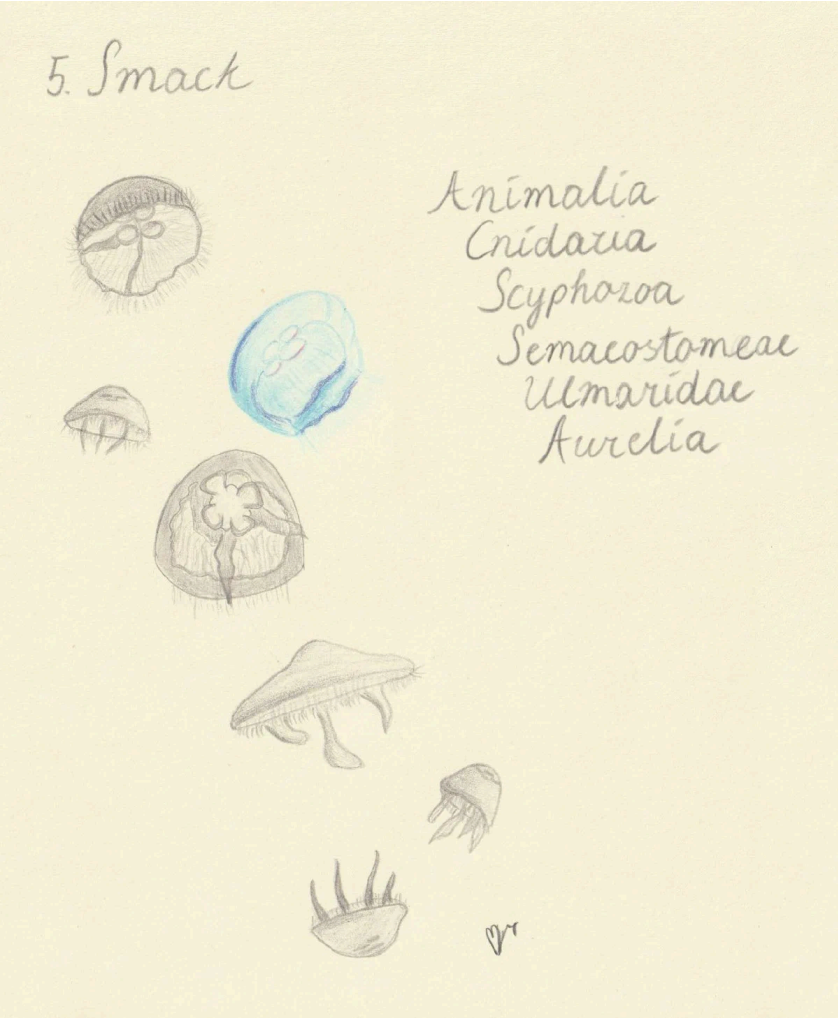
The **fairy wasp** is one of the smallest known insects: about the size of a small grain of salt[3]. The wasp is a parasitoid that lays its eggs inside the eggs of other insects, such as thrips[4]. Fairy wasps have a unique nervous system with the smallest number of neurons known in any flying animal[3]. When insects evolve to become really small, the brain can become too big to fit in the head, and in many species the brain partly shifts from the head to the thorax. This is probably not possible for tiny hymenopterans like fairy wasps, due to the narrow connection between the head and the thorax. Instead, most nerve cells of the adult wasp lose their nucleus, the part of a cell that holds the DNA. Despite the small brain and anucleate cells, the wasps can still fly, feed and find hosts to lay eggs in.



Based on 'African Milk-Barrel (Euphorbia horrida) (3103259217)' by Cliff from Arlington, Virginia, USA. Licensed under CC BY 2.0.

4. Cactus - Cactus-lookalike Spurge

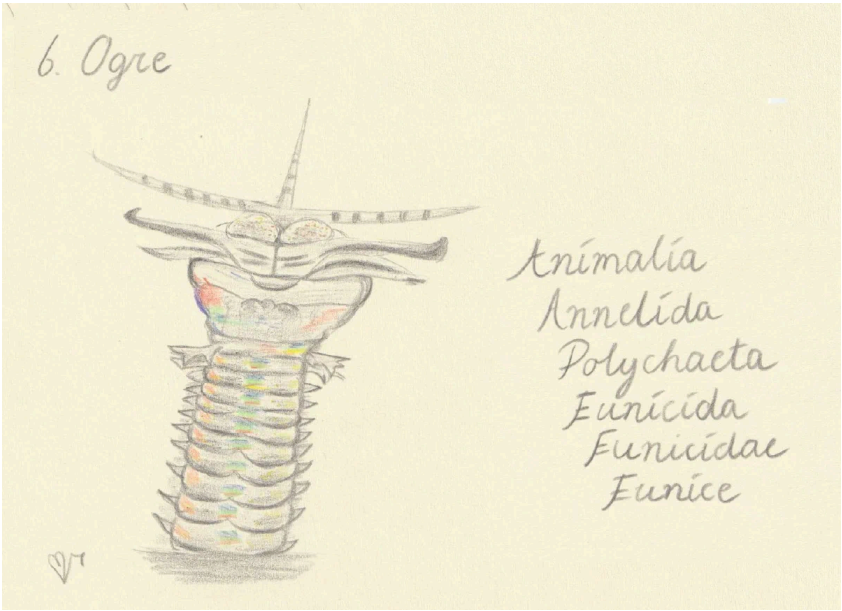
Some plant species in the genus ***Euphorbia*** look like cacti but are not true cacti. These plants evolved a cactus-like appearance independently, not sharing the same ancestor, which is called convergent evolution. In *Euphorbia*, photosynthesis takes place in leafless stems, which evolved at least 14 times throughout the genus. Cacti only made the transition to leafless stems once[5]. A likely reason is similar to that in cacti: Leaves lose most water, so in dry environments it pays to reduce or lose leaves and perform photosynthesis in the stem instead. Leafless *Euphorbia* were indeed found to grow in places with roughly half the rainfall compared to their leafy relatives[5].



Based on '21 Underwater world - jellyfish in Valencia Aquarium, Spain - moon jellyfish (Aurelia aurita)' by Marek Ślusarczyk (Tupungato). Licensed under CC BY 3.0. Based on 'Moon jellyfish at Sämstad 4' by W.carter. Licensed under CC0 1.0. Based on 'Aurelia aurita' by Jeanne Warner. Licensed under CC BY 2.0.

5. Smack - A smack of moon jellyfish

Moon jellyfish are an example of creatures that swarm or bloom. A swarm means that many individuals are in close proximity of each other, and a group of jellyfish is called a smack. A bloom is a rise in numbers. Both are natural phenomena that often occur seasonally in spring and summer, and may help jellyfish find each other to reproduce[6]. Jellyfish have two body forms: the free-swimming jellyfish that reproduce sexually, and the polyp. Jellyfish larvae settle on the seafloor as polyps, which reproduce asexually and in turn produce young free-swimming jellyfish.



Based on 'Eunice aphroditois' by Jenny. Licensed under CC BY 2.0.

6. Ogre - Bobbit worm

The **Bobbit worm** is an ambush predator. As an adult, a Bobbit worm builds a burrow in the seafloor and waits inside, out of sight, for a suitable prey to pass by. Some worms wave an antenna that looks like a small worm to attract prey. When the prey, like a fish or clam, comes close, the worm lunges out at great speed, seizes the prey, and drags it back down alive to eat it in its burrow. These worms can grow up to three metres long. Little is known about all that happens inside the burrow. Fossil burrows about 20 million years old were found and likely belonged to a worm like the Bobbit worm. Ambush hunting of this kind is a behavioural strategy that has thus existed for a very long time[7].



7. Panic - Panic grass

Panic grass is a perennial that grows during the warmer months. Switchgrass, one of the panic grasses, is relatively tolerant to drought and is, as such, an interesting model system for research on biofuels[8]. One reason for switchgrass's high drought tolerance, aside from having deep roots, is that the plant is involved in a mutualistic relationship with arbuscular mycorrhizal fungi. In a mycorrhiza, a fungus lives in and around the roots of a plant, to the benefit of both the fungus and the plant (which is what mutualistic means). The arbuscular type forms tiny, tree-like branches inside the cells of the root, where the fungus and the plant exchange nutrients, while thin threads reach out into the soil. The fungi provide important nutrients to the plant and help it reach more water in exchange for carbon. It is an iconic ecological interaction, and most plants are in a mutualistic relationship with mycorrhizal fungi to obtain more water and nutrients.

Dr. Bertanne Visser, Research Associate of the Fonds de la Recherche Scientifique at the University of Liège, Gembloux, Belgium.

1 Bush GL. 1969. Sympatric host race formation and speciation in frugivorous flies of the genus *Rhagoletis* (Diptera, Tephritidae). Evolution 23: 237–251.

2 Mackenzie BDE *et al*. 2022. Ecology and conservation of a living fossil: Australia's Wollemi Pine (*Wollemia nobilis*). In: Imperiled: The Encyclopedia of Conservation. Elsevier: 884–894.

3 Polilov AA. 2012. The smallest insects evolve anucleate neurons. Arthropod Struct Dev 41: 29-34.

4 Polilov AA. 2017. Anatomy of adult *Megaphragma* (Hymenoptera: Trichogrammatidae), one of the smallest insects, and new insight into insect miniaturization. PLoS ONE 12: e0175566.

5 Dorsey BL. 2013. Phylogenetics and morphological evolution of *Euphorbia* subgenus *Euphorbia*. PhD dissertation, University of Michigan.

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7 Pan YY *et al*. 2021. The 20-million-year old lair of an ambush-predatory worm preserved in northeast Taiwan. Sci Rep 11: 1174.

8 Basyal B & Walker BJ. 2023. Arbuscular mycorrhizal fungi enhance yield and photosynthesis of switchgrass (*Panicum virgatum* L.) under extreme drought and alters the biomass composition of the host plant. Biomass Bioenergy 177: 106936.

HOW TO CITE THIS ARTICLE

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