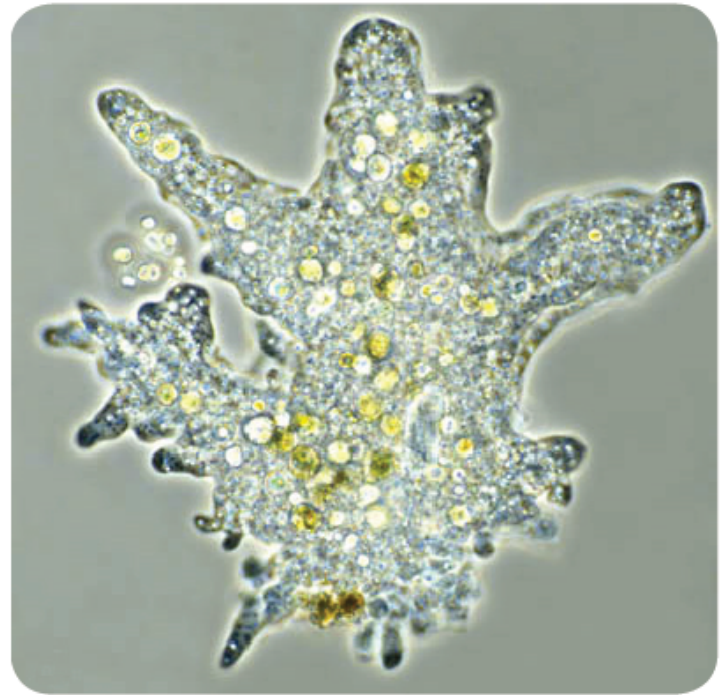


# AMOEBA

## *(Amoeba proteus)*

Take one look through a microscope at a drop of healthy pond water and you'll come across a lot of blobby cells creeping about and engulfing other cells by extensions of their bodies. These one-celled critters are known as amoebas, and they move and feed by extending bulges called pseudopodia (false feet). When an amoeba moves, it reaches pseudopodia away from its edges slurps to a new location.

One common amoeba is the giant amoeba, *Amoeba proteus*. Giant amoebas reproduce by binary fission, a fancy term that means splitting in two. When a giant amoeba begins to divide, it pulls its pseudopodia in to form a kind of ball. After its nucleus doubles, the amoeba constricts in the middle, as if a belt were being pulled tighter and tighter around the cell. Finally, the two new cells pinch apart, send out pseudopodia, and slink away from each other. In this way, two identical "daughter" cells are created from one. When conditions are right, this amoeba can divide every 48 hours.



*Amoeba proteus* with several green algae trapped inside food vacuoles.

# BLUE-HEADED WRASSE

## *(Thalassoma bifasciatum)*

Many animals are born male or female and stay that way for the rest of their lives. Not so with the blue-headed wrasse, a tropical fish that darts about amongst the corals and sponges in shallow Caribbean waters. Females of this fish can completely transform into males when the conditions are right.

Blue-headed wrasses, like many reef fish, are small and brilliantly colored. Juveniles and females whereas adult males are blue. Big blue-headed males defend territories around the reefs until a female finds them attractive. When this happens, the female swims with the male and spawns (releases her eggs). The male quickly fertilizes them before they float away into the ocean.

Of course, these big males can lose their territories because of nasty little things like death and rivalry. When that happens, the largest yellow female in the area may morph into a blue-headed male and begin defending a territory. So, some of the blue-headed males were born male, while others were born female!



*Adult male Blue-Headed Wrasse*



Virginia O. Skinner

*Adult female or young male Blue-Headed Wrasse*



Virginia O. Skinner

*Juvenile Blue-Headed Wrasse*

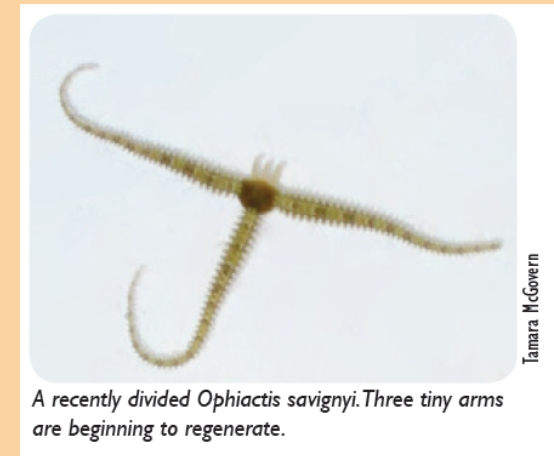
# BRITTLE STAR

## (*Ophiactis savignyi*)

These brittle stars are tiny—only an inch or two across with arms stretched. Brittle stars, like normal sea stars, have a central disk, which holds all the important stuff like the mouth, stomach and reproductive organs. Attached to this disk are long, slender arms. The arms are what give brittle stars their name. They can break off voluntarily and regenerate.

*O. savignyi* takes the ability to regenerate one step further and actually splits in half in order to reproduce. When fission happens, the brittle star fractures down the middle of its disk, creating two identical 3-armed brittle stars. These stars then grow new arms from their empty arm-spaces.

But this isn't the only way *O. savignyi* reproduces. Like all brittle stars, they also reproduce sexually. Sometimes females will send eggs out into the ocean and males will fertilize them. The fertilized eggs float away to new habitats. Fission is the main way that *Ophiocomella* reproduces, but since they don't move far or fast, this results in large groups of brittle star clones in one area. Scientists believe that the fertilized eggs might be a good way for the brittle star to populate new areas far away from their clone-filled sponge homes.



# DUCK LEECH

## *(Theromyzon tessulatum)*

This leech has the disgusting habit of attaching itself to nostrils, eyes, throats and even brains. Thankfully for humans, it only does this in ducks and other waterfowl. The duck leech does a fair job getting around and probably gets spread as ducks move from pond to pond. This leech, like all leeches, is both male and female—meaning that it can produce eggs and fertilize eggs. But that doesn't mean it can reproduce all on its own. The eggs of a leech must always be fertilized by a different leech.

Duck leeches will fertilize each others eggs and then place them in gooey cocoons for protection. The leech attaches the cocoons, which hold as many as 400 eggs, to a rock or other sheltered place. The parent then waves its body to pass fresh oxygen-rich air over the eggs. After 21 days, all 400 young leeches attach to their parent's belly until the parent finds a suitable bird for a meal. When that happens, the young bloodsuckers leave their parent behind and attach to the host for their first blood meal. The parent dies shortly thereafter, but not before giving hundreds of new eyeball-suckers a shot at the game of life.



Biopix.dk



Biopix.dk

*Young attached to the underside of a parent leech.*

# GRIZZLY BEAR

## *(Ursus arctos horribilis)*

Grizzly bears are enormous animals that require large territories, especially when food becomes hard to find. Males can weigh as much as 453.6 kg (1000 pounds), females can clock-in around 317.5 kg (700 pounds), and their territories can be as large as 906.5 square kilometers (350 square miles). Grizzlies spend most of their days wandering around alone but they come together to mate during early summer. Females delay growth of the fertilized eggs, so the embryos don't begin developing until the females are nestled into their warm dens in November.

Mothers give birth 8 weeks later to between 1 and 4 cubs. Until they leave the den in late spring, the cubs live off their mom's milk, which means mom has to eat enough in the summer and fall to survive hibernation and to feed her cubs, too! Cubs stay with their mother for 3 years or so. She won't reproduce again until they leave her side.



US Fish and Wildlife Service/Larry Aumiller



US Fish and Wildlife Service/Terry Tollefsbol

# LEAFY SEA DRAGON

## *(Phycodurus eques)*

Leafy sea dragons can grow up to 51 cm (1.7 feet) in length and have long leaf-like appendages sprouting from their bodies. This leafiness helps them blend in with their seaweed habitat, protecting them from predators and giving them an advantage while hunting for food. Like their cousins, the seahorses, leafy sea dragons have long tubular snouts they use to suck up tiny shrimp.

Leafy sea dragons reproduce in a way that's rare in the fish world: the males carry and hatch the young instead of the females. When sea dragons mate, the female finds a potential dad and deposits her eggs underneath his tail where he fertilizes them. Pregnant dads can have as many as 200 incubating eggs tucked tightly under their tails. It pays to have a dad that looks like seaweed, because the eggs are protected from predators there. The eggs cling for 4-5 weeks before they hatch. Many of them, sadly, will become snacks for larger fish, but the lucky ones who survive will grow up to be beautiful adults. Getting protection from dad when they were developing likely gave them one fin up in the vast ocean world.



Jeff Jeffords - divegallery.com



www.stuarthutchison.com.au

*Eggs attached under a male sea dragon's tail.*

# MEADOW GARLIC

## (Liliaceae: *Allium canadense*)

Long before European settlers came, Native Americans were likely spicing-up their cooking with a native plant known as meadow garlic or wild garlic. This plant, a member of the lily family, grows from bulbs like other lilies. The bulbs lie dormant underground over winter, storing energy for the burst of growth and reproduction that comes in spring and early summer. Bees buzz around pollinating its small, pink or white flowers. Although each flower has both male and female reproductive parts, it can't mate with itself. The bees are needed to move pollen from one plant to another. This produces fertile seeds that eventually disperse and grow into new plants that have a mix of genes from the two parent plants.

But meadow garlic doesn't only depend on pollinators to spread itself around. Perched underneath the flowers are clusters of little, nubby growths called bulblets. When dropped, the bulblets sprout into new plants identical to their parent. The ability of plants in the lily family to reproduce both with and without fertilization means they can spread easily. Some lilies have actually become pests by taking over pastures, gardens, and roadsides across the country.



Larry Allain @ USGS National Wetlands Research Center



# RED KANGAROO

## *(Macropus rufus)*

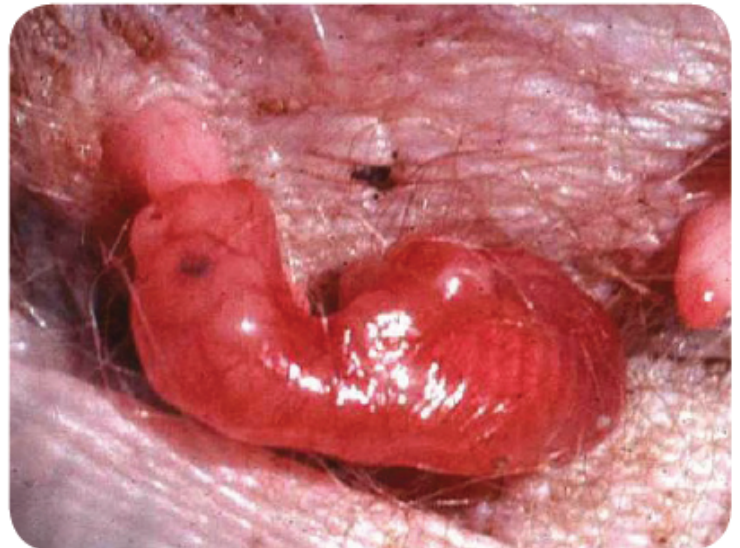
Red kangaroos are one of the largest marsupials. When they're really moving, red kangaroos can leap as far as 3.7 meters (12 feet) in one jump and reach speeds of 56 kph (34.8 mph)! They bounce about eating grasses and other vegetation. A group or "mob" of kangaroos is usually headed by the most mature female and includes lots of other females and young kangaroos, called joeys. When it's mating time, males will sometimes box each other for females with their powerful jumping legs. The winning male will mate with the female.

Females give birth to one baby kangaroo, which has only gestated for about 33 days. The young are very undeveloped after such a short time. Like most marsupials, baby red kangaroos spend a lot of time growing in their mom's pouches. When it's born, a young kangaroo is tiny, pink, hairless, and blind, but it knows to head straight for the pouch. It swims through mom's fur to get there, where it finishes developing. After about 7 months, a joey gets too big for mom's pouch and leaves. Once this happens, the mom gives birth to another tiny pink baby. Females can continuously give birth and usually have about 3 joeys every two years.



Chris Willis

*A mother red kangaroo with a joey in her pouch.*



Geoff Shaw - <http://kangaroo.genome.org.au>

*A newborn kangaroo in its mother's pouch.*



# SALMONELLA

## *(Salmonella typhimurium)*

There are times when we eat something and our stomachs hurt badly. When it hurts dreadfully bad, it could be from food poisoning, which leads to fever, nausea and diarrhea. The interesting thing is, it's not poisoning at all, but the result of a sinister bacteria known as Salmonella. This one-celled, rod-shaped bacteria is fairly common, and can be found naturally in raw eggs, raw meats, on the bodies of some reptiles, and in animal feces.

When Salmonella from infected food reaches our small intestine, it divides rapidly, producing copies of itself through simple division. This causes our immune system to respond, but Salmonella does a good job of fending it off. Our bodies can fight off some Salmonella infections, but we generally need the help of antibiotics to overcome them. Humans have adapted to Salmonella's existence by cooking, pasteurizing, and freezing our foods, which does a good job of killing the bacteria. Still, Salmonella infection is common enough and turns up where people aren't washing their hands or cooking meat thoroughly.



Rocky Mountain Laboratories, NIAID, NIH

*Salmonella* (rod-shaped) invading human cells.



# SAND SCORPION

## *(Paruroctonus mesaensis)*

Shine an ultraviolet light into the night of the desert, and the ground will come alive with glowing sand scorpions out devouring beetles, crickets, and even other scorpions. If it's the right time of year, glowing scorpions might also be dancing the night away. Yep, that's right, sand scorpions have a courtship dance. After dancing for a while, the male will fertilize the female. Then, the male usually skitters off to find more mates. But every now and then, the female rears back, stings the male, and eats him for her next meal!

Young sand scorpions spend about 12 months developing inside their mother before they are born live. After they're born, they quickly crawl onto their mom's back where they stay until they're big enough to leave the burrow. On average, a sand scorpion mom has about 33 newborns hitching rides on her back. But things aren't always easy there either, and sometimes the young eat each other or the mom eats the young. Clearly, stingers don't make life trouble-free for the sand scorpion, but they're still able to be a very successful organism in their dry, sandy habitats.



Philip H. Brownell, Ph.D.

Sand scorpion (*Paruroctonus mesaensis*) capturing a burrowing cockroach. Photo taken under UV illumination..



© T.C. van der Ende - scorpology.com

Scorpions (*Tityus trinitatis*) engaged in courtship dance.



<http://scorpion.amnh.org>

Mother scorpion (*syntropis*) carrying babies on her back.



<http://scorpion.amnh.org>

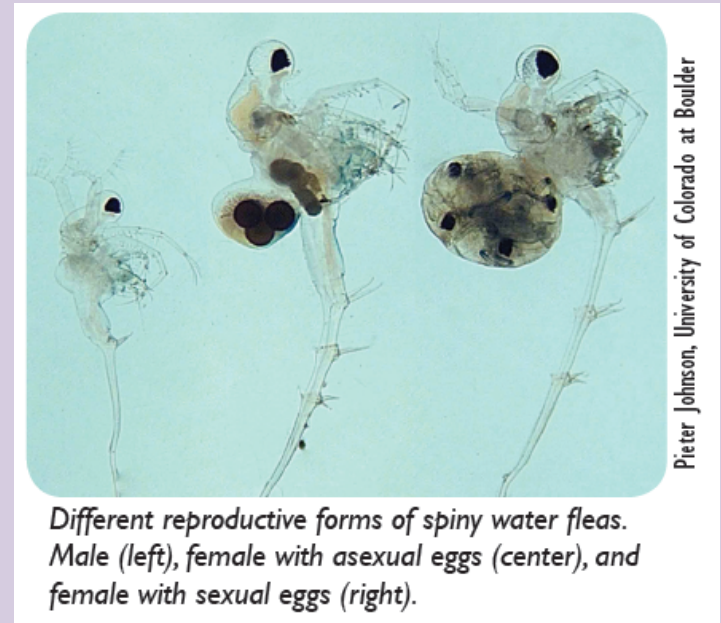
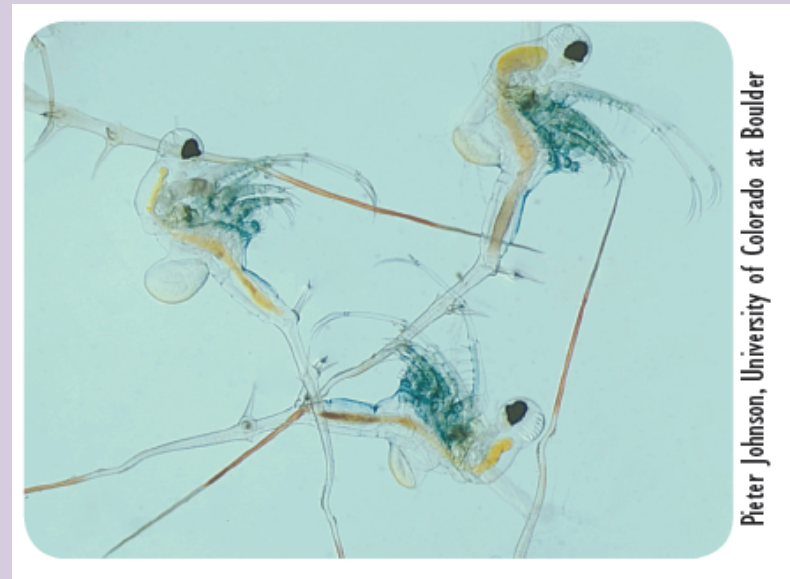
Spermatophor from a male scorpion.

# SPINY WATER FLEA

## *(Bythotrephes longimanus)*

There's a tiny, transparent crustacean that swims jerkily around in the Great Lakes. It's called the spiny water flea, but it's more related to crabs and lobsters than to insects. Spiny water fleas have the power to rapidly reproduce. Like all water fleas, this one alternates between asexual and sexual phases. Most of the time, a female produces eggs on her own, without fertilization. She releases about 10 eggs into the brood chamber on her back, where they develop into young clones within several days. During summer, females can produce clones of themselves every 2 weeks.

When food becomes scarce or temperatures change, some females produce little males. These males mate with other females that have produced special eggs used for fertilization, called "resting eggs." They're called this because after these eggs are fertilized, they leave the mom and remain dormant before hatching. Many water flea resting eggs can survive drying or being eaten by fish.



*Different reproductive forms of spiny water fleas. Male (left), female with asexual eggs (center), and female with sexual eggs (right).*