Please Note: Image quality will be much better if you download this file and view as a PDF rather than viewing within the browser window.

We thank the Of Pools and People team for contributing the science, photography, and figures for this presentation

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Spotted salamanders are the only large dark colored salamanders with *bright* yellow spots. These sturdy salamanders may live 15-20 years. Along

with blue-spotted complex and Jefferson salamanders, they are know as mole salamanders as they often live underground in small mammal burrows, especially shrews.

In the early spring they move from upland overwintering sites to breeding pools, often before the snow is completely gone and when pools are still partly frozen. Warm spring rains trickle into their burrows and lure them to the surface for the migration to breeding pools…..

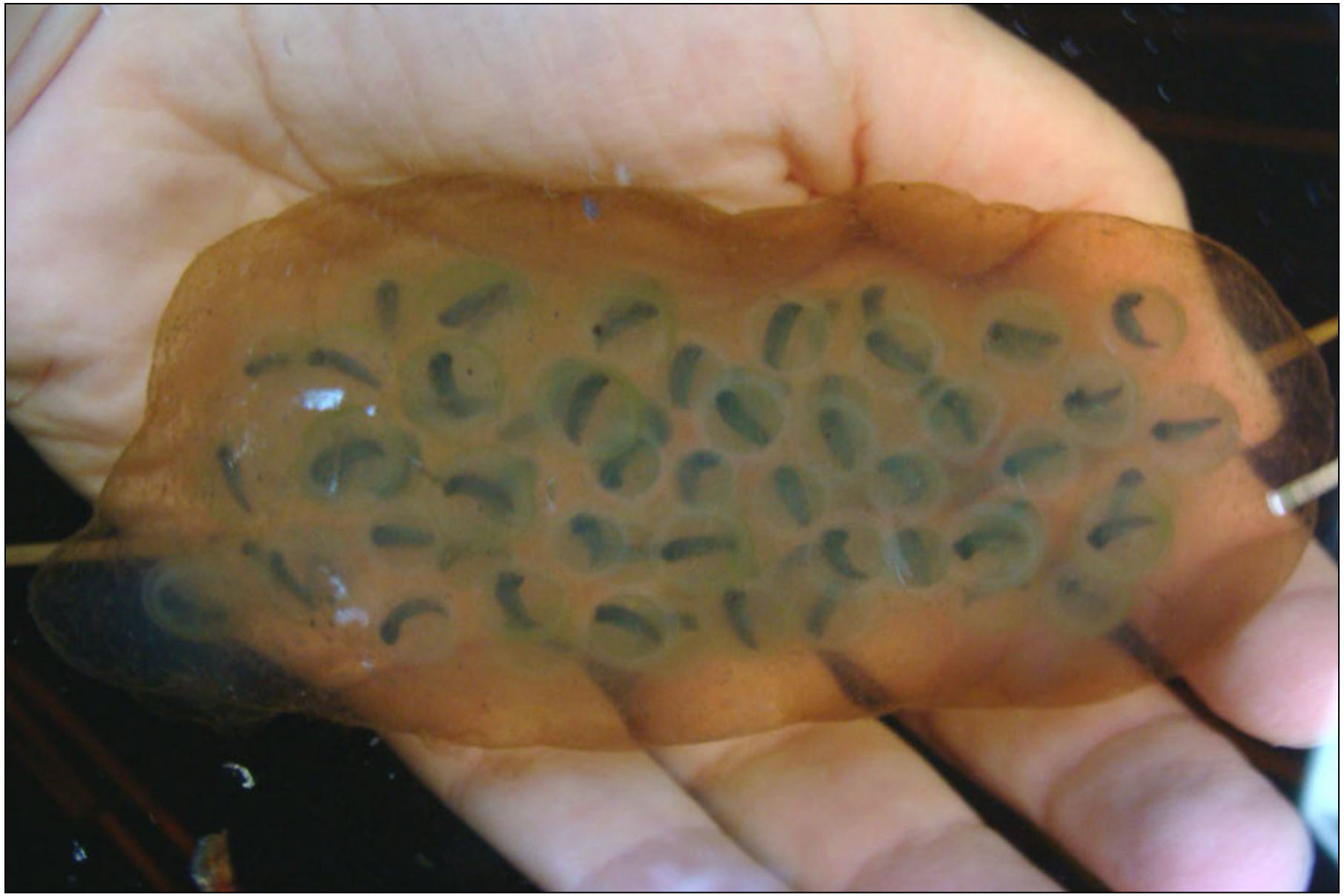
If you arrive at a pool and do not see any egg masses, look carefully at the substrate of the bottom of the pool. If you see what looks like tiny specks of paint, it is likely that you are too early to find egg masses. The presence of white specks indicates that the male salamanders have arrived and deposited spermatophores, but the females have yet to arrive and/or deposit their eggs. Return after a night or two and you will likely see egg masses.

Spermataphores may be directly on the leaf litter or pool bottom, but they are also often deposited along submerged twigs or blades of vegetation near the pool bottom.

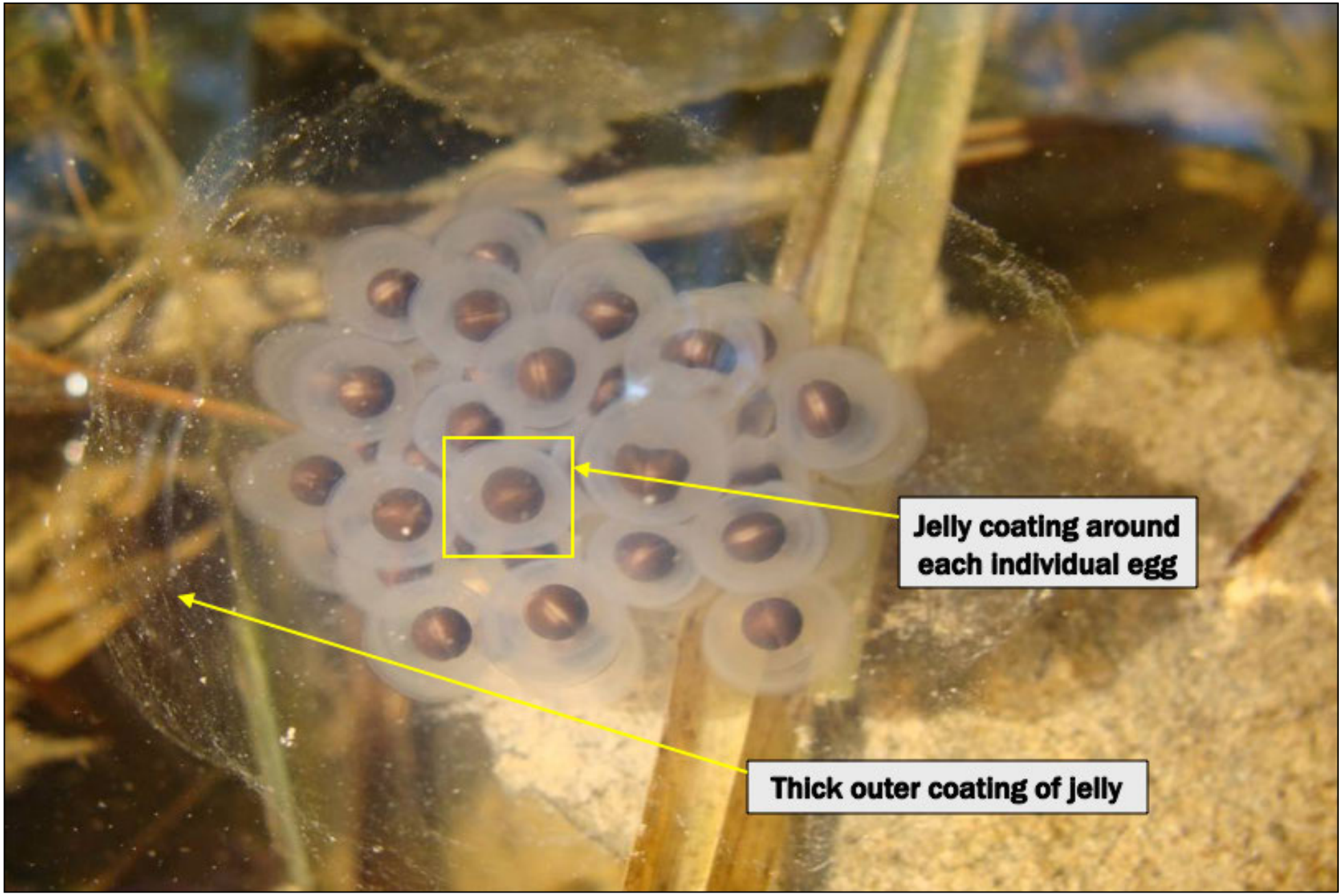
During the courtship ceremony, also known as a mating congress, male spotted salamanders deposit small jelly encapsulated packets of sperm (called spermatophores) on sticks or leaves at the bottom of the pool. Allured by a male, a female will collect a spermataphore with her cloaca (posterior opening that serves both reproductive and elimination purposes), leading to internal fertilization.

Once a female picks up a spermataphore she will find an attachment location for depositing her eggs, often on a submerged twig or vegetation growing in the pool, but sometimes directly on the pool bottom.

Spotted salamanders egg masses contain between 10 and 100 eggs. The size and shape of the egg mass is much more variable than those produced by wood frogs.



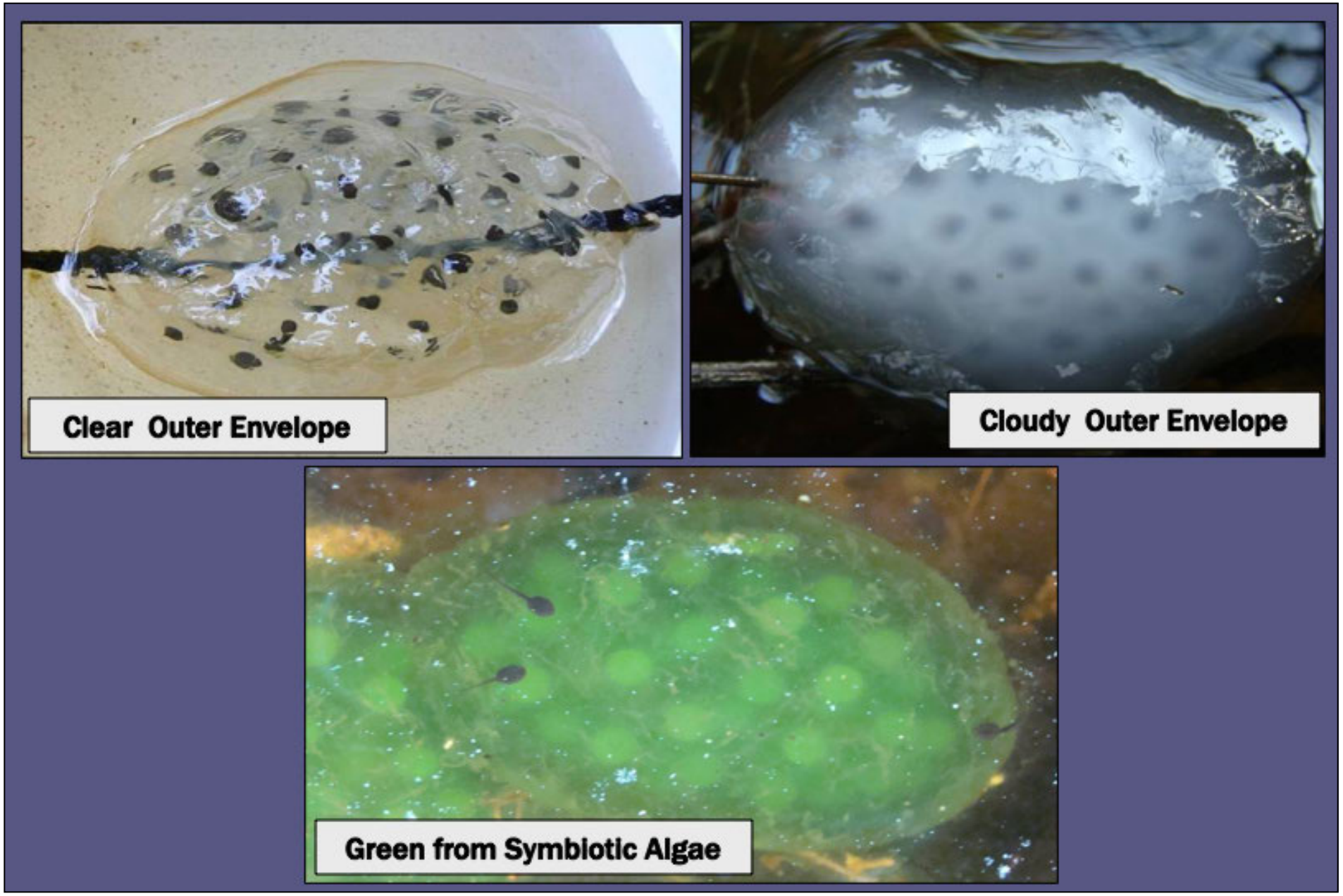
Although highly variable in size and shape, spotted salamander egg masses tend to be elongated and sometimes kidney-shaped.



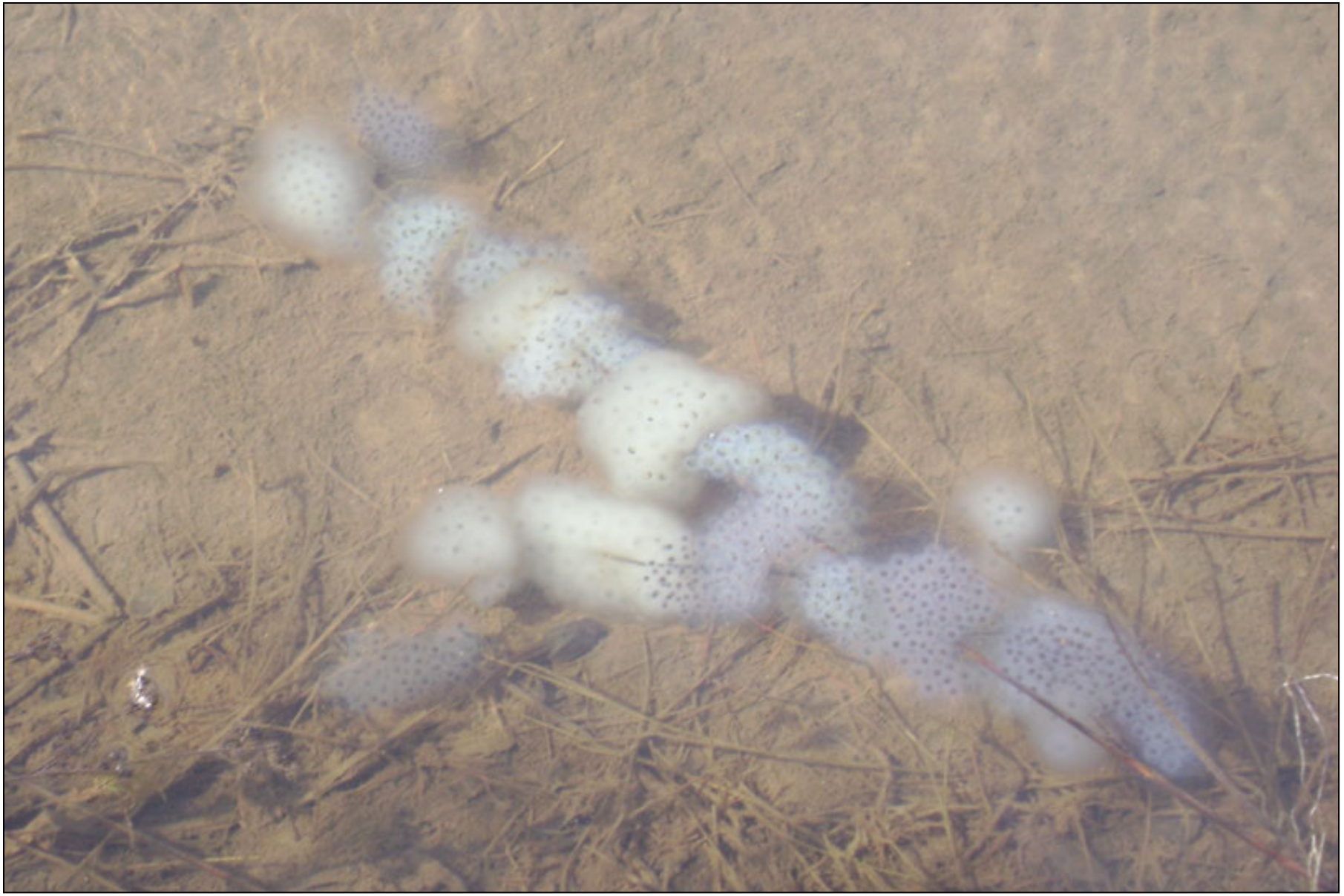
In addition to the jelly-like membrane around each individual egg, the entire mass is encapsulated within a thick outer jelly coating (this is a key

difference between spotted salamander and wood frog egg masses).

For comparison, the wood frog mass on the left has a lumpy appearance and lacks an outer gelatinous coating. The spotted salamander mass on the right has a more uniform outer surface which is due to an additional protective layer of jelly.



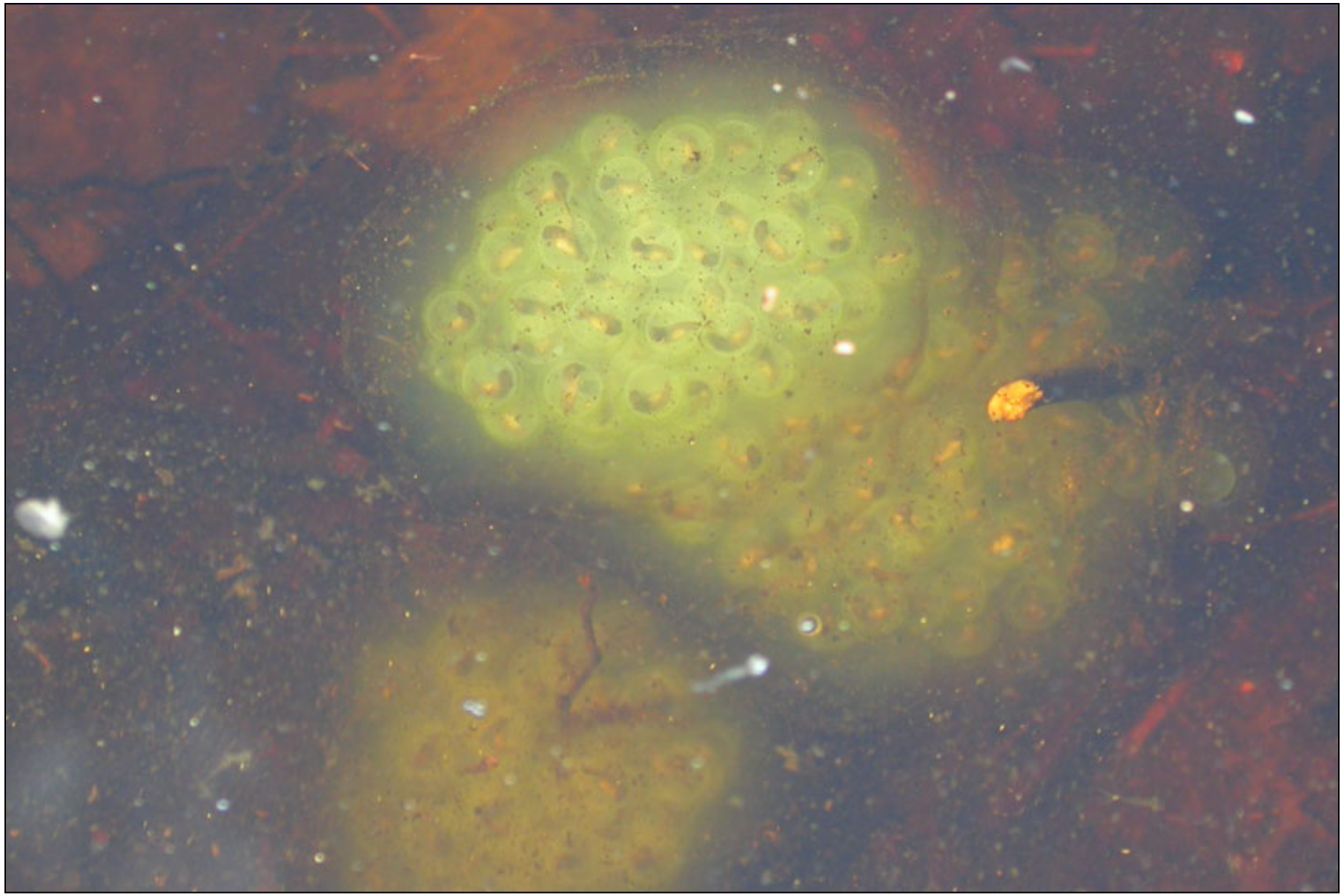
Genetic variation determines whether the outer gelatinous membrane of a spotted salamander egg mass is clear or cloudy. Green egg masses contain a symbiotic algae (*Oophilia amblystomatis*) that provides oxygen to the egg mass and in turn gains nitrogen and phosphorous from the developing embryos.



Within a given pool, both clear and cloudy egg masses may be found side by side.

The pool in this photo lacked adequate vegetation for egg laying attachment sites and all masses were deposited in one area where submerged sticks were abundant. However, unlike wood frogs, spotted salamanders do not typically deposit their eggs communally in large rafts. It is common to see individual masses and small clusters of masses widely dispersed within a pool. Also unlike wood frogs which often deposit their eggs near the water surface, spotted salamander eggs may be found much deeper in the pool, sometimes even on the pool bottom. Because of the potential for this extensive distribution, it will require careful searching to locate all masses present. Polarized sunglasses reduce glare and allow for easier viewing.

Unlike female wood frogs, spotted salamanders may lay up to three egg masses. If multiple egg masses are deposited, they usually consist of one larger mass and one or two smaller satellite masses. Even though they vary in size, and some masses may only contain a few eggs, count each individual mass separately.



In a symbiotic relationship the green algae, *oophila ambystomatis (*means salamander egg-lover in lat*in)* visible in this egg mass provides the embryos with oxygen and in turn uses the nitrogen from the embryos waste products.

Sometimes animals encounter ditches, road ruts, or shallow puddles after a rain event on their way to their breeding pools. If they lay their eggs in bodies of water that dry too soon their eggs will not hatch and/or larvae will not develop enough to the leave the water body. This is called a biological sink.

And sometimes during a particularly dry spring, breeding pool water levels may drop so much that egg masses deposited on submerged sticks become exposed and desiccate above the water surface. These eggs may still serve as a food source to the many animals that visit vernal pools to feed.

Egg mass characteristics

- Thick outer jelly membrane
- 10 to 100 eggs per mass
- Often elongate or kidney -shaped
- May be cloudy, clear, or green
- Masses may be widely distributed throughout pool
- One female may lay one large mass and one or two smaller masses

Once hatched from their eggs, salamander larvae have feathery external gills used for gas exchange in their low oxygen breeding pools.

Metamorphs of recently emerged blue-spotted salamanders. Note that you will not likely be able to tell the difference between very young spotted and blue-spotted salamander larvae or metamorphs.

Juvenile spotted salamander, yellow spots not yet well developed.

Spotted salamanders overwinter in dry upland forests, often in same summer burrows, often shrew burrows and sometimes burrows made by tree roots. They tend to sit at burrow entrance in the summer and tend to wait for prey to pass by.

Where they are active throughout the winter in underground within networks of small mammal burrows.

Spotted salamanders, their egg masses, and larvae provide a concentrated source of food in vernal pools during the spring and summer months, as well as once they have left breeding pools and have dispersed into adjacent upland.