

An Amphibian Farm in Tennessee

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Some years ago in order to ensure a source of native pond-breeding amphibians for our researchers, we bought land in rural Tennessee and began putting in ponds with a network of connecting roads. Today, under state license, we maintain on two farms that together comprise some 240 acres about sixty fairly small ponds that are placed in fields or tucked into woodlines or hillsides. The farms are wholly dedicated to creating self-sustaining populations of some eighteen native species of frogs, toads, and salamanders. We now gather, as breeding and funding cycles dictate, eggs, larvae, and adults of wild-run amphibians for our customers. We focus principally upon adult newts, bullfrog and *Rana* tads, and most appropriately for this account, upon the clumps of eggs laid by tiger and spotted salamanders (*Ambystoma* sp.) during the winter.

Spotted salamander egg masses cohere strongly and contain about 100 embryos, while tiger salamander clusters contain considerably fewer embedded in a weaker jelly. As a female tiger may lay several small clusters, individual egg yield probably is the same. We believe that the jelly, which in a few days expands to a surprising extent, protects the embryos against predation by newts (*N. viridescens*), which migrate to our ponds in the early autumn. We know that in parts of the United States lying beyond the range of the eastern newt, tiger salamanders deposit weakly cohered clusters or even single eggs. Our newts, then, may be the reason that our *Ambystoma* egg clusters are easily gathered, handled, and shipped. Usefully, the individual eggs are two to three millimeters in diameter, and a young person can see with the unaided eye the early cleavage furrows. In contrast to the egg masses of frogs, those of the *Ambystomids* will develop slowly, in a process that can be further retarded by refrigeration.

In our ponds, amphibian breeding is year round. Right now, in early September, and since late August, southern leopard frogs are clacking. They will leave egg masses after each rain well into October. Stepping now into a grass-choked pool or into the grassy margin of a low pond certainly will kick up a leopard

frog, to be identified not by its field-guide profile, but by its flat trajectory into the water.

In mid-September the newts commence their migration to the ponds. The first coppery efts certainly will show up this next week, and their paths already have crossed those of this year's hatchout now enroute to the woods for a two-year adolescence, after which they too will be impelled back to the ponds. In the water, the newts will breed all winter. After the first good rain in December, tiger egg masses will appear. By now well-established on the farms, tigers will lay in all but our newest ponds. Spotted salamanders show up by the third week in January, along with the wood frogs. The spottedts will arrive reliably, the wood frogs only following a heavy rain. Along with the tigers, the spottedts may lay into the first week of March, but the wood frogs will be finished a few weeks earlier after two explosive runs.

All of these are the winter amphibians, and they now will be replaced by what we call the spring frogs, so styled because we cannot easily distinguish the egg masses or early tads of the pickerel frogs from those of the leopard frogs, which, uniquely, make semi-annual runs to the ponds. For the southern leopard frogs breed on our farms two times a year, and their appearance actually announces each season—in this business there are only two seasons, each of six months.

For us the advent of spring is not, as for others, an awakening. Rather, it signals the passing of the time that we most prefer and to which we most look forward, the winter. Then, our more interesting and elusive amphibian species are everywhere evident, the collecting is easier, and the weed, our principal adversary both in and out of the water, is tractable. Of course, pond-breeding will not terminate in the spring. Raucously and incessantly, an ever-changing catena of amphibian calls will activate our memories and charge our activities, in a reach across summer toward that more favored time when the clacking of the leopard frogs heralds the advent of autumn, and of now.

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