HABITAT AND LIFESTYLE CHOICES OF FRESHWATER MUSSELS (UNIONIDAE) IN WEST TENNESSEE

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ABSTRACT: During many grueling years of field research, some of which was conducted in the actual outdoors, we pursued the slimy trail of the freshwater mussel (Unionidae) across the trammeled wilderness of western Tennessee. We had brief yet surprisingly poignant encounters with 10,113 individuals of twenty-eight species in thirty-two ZIP Codes, and our lives were changed forever by communing with these brave bivalves whose quiet dignity belies their wretched poverty and unsanitary living conditions. But perhaps this abstract is becoming a little *too* abstract; we apologize. We seem to have developed a crippling inability to relate to *H. sapiens*. To summarize for the impatient, most of whom have skipped to the results section by now, we found a clear correlation between local environmental factors (i.e., water temperature, pollution levels and irritable cottonmouths) and the presence or absence of mussels.

The freshwater mussel fauna of the United States is among the richest in the world (Money Magazine, 2001). The noble class *Bivalvia* first arrived on this planet 300 million years ago, give or take an epoch, and they were doing just fine, thank you very much, until you showed up. Because of the greedy, cruel, selfish and essentially vile nature of human beings (Bible, ca 1600 BCE—90 CE), this century has witnessed a steep decline in freshwater mussel populations. Human attitudes toward mussels are largely either negative (Shakespeare, 1610-11), for which we may thank the divine injunction against aquatic biota that lack fins and scales (Bible, ca 1405 BCE), or purely culinary, for which we may thank legions of hungry heretics whose names have been, rightfully, cleansed from the history books.

Our research is an ongoing attempt to speak for the shellfish who have been silenced, to stand up for those who lack legs of their own, to help the mussels tell their heartbreaking story in their own burbles (Lofting, 1922). It is in pursuit of these simple goals that we find our purpose in life (Spurge, 2003). The bulk of our research is elsewhere described, in the scientifically incisive yet heartwarming film, *It's a Wonderful Mollusc!* (rated PG-13 for profanity and casual sex), but we also recorded a number of peripheral observations on the attitudes and lifestyles of our tiny subjects. These observations we now share with the world in the fervent hope that our work will shed the pure light of selfless science upon the shadowy suffering of shellfish (Poetry Techniques, 2002).

MATERIALS AND METHODS

In order to stalk, capture and identify the wily and elusive freshwater mussel, we employed a cornucopia of sampling methods (Smith, 1994). First we tried luring our prey with gravy-soaked biscuit crumbs and aromatic bits of fruit peel, which we placed at the water's edge atop a small red-checkered tablecloth. This method proved uniformly disappointing, as the frenetic pace of scavenging ants and beetles set an impossible standard of competition. We moved on to an escalating series of mussel snares that ranged from simple (tiny string noose) to complex (tiny mechanical "girly mussel," gaping slightly, waving plump superconglutinate in provocative manner). All of these seemingly foolproof traps ultimately failed to capture any mussels, for a variety of

reasons that we are unable to think about without feeling very silly (Horst, 1999).

Finally, in sheer desperation, we resorted to a technique that we had earlier rejected as "primitive and undignified" (ADG, pers. comm.) and "Yeah, um, I don't THINK so!" (TV, pers. comm.). To be brutally frank, we *groped* for mussels, and most of them seemed to enjoy it. This technique is best illustrated by the condition of our garments at the end of a day's work: sopping wet, permanently soiled with muck and botanical effluvia, and generally gross-o-rama. At one point we attempted to calculate the total mass of filthy socks we discarded on roadsides during the course of our research, but were daunted by the complexity of the equation (Guo, 1999).

Our materials consisted of endless changes of clothing (we later realized that nudity would have been more economical) and little waterproof notebooks in which we doodled potential designs for mussel-related tattoos whenever we got bored. We used a handheld GPS receiver to identify the precise locations of our sampling areas, except when the secret spy satellites were blocked by the alien space rays (Southern Baptist Reader, 2001). We also verified beyond all doubt the healing powers of chocolate and cheese (Pansy, 2001).

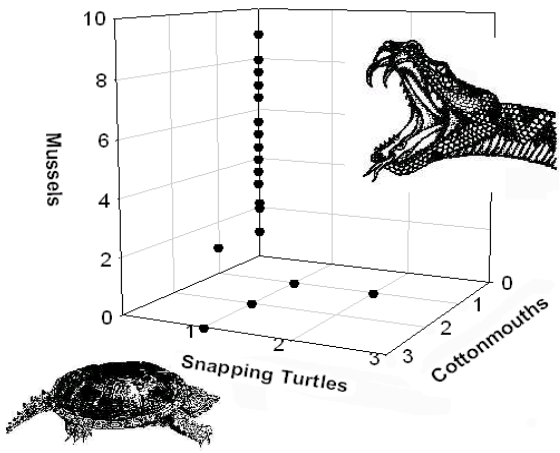
RESULTS AND DISCUSSION

Our results were statistically significant (Bulger, 1992) and somewhat surprising (Schmeerl, 1967). Through our intimate contact with 10,113 individual mussels of twenty-eight species in thirty-two ZIP codes, we formulated a multi-part hypothesis regarding the habitat and lifestyle choices of these enigmatic beasts. At first it may appear that our hypothesis is based on wild conjecture, but we promise that all of the really important bits are firmly grounded in accurate field observations and totally objective facts (Custer, 1867).

Most of the mussels we studied exhibited a strong preference for stable and relatively unpolluted aquatic habitat, with a notable exception being *Utterbackia imbecillis* which was found to survive and even thrive in such inhospitable habitats as exposed sand bars, drying puddles, and treetops. Fortunately for us, given our obsessive Calvinistic need to divide the natural world into tidy and predictable categories, the other species we studied were more tractable and quickly learned to play by the rules (Gazpacho, 1999). Our research shows distinct trends of behavior among these "good" mussels as follows.

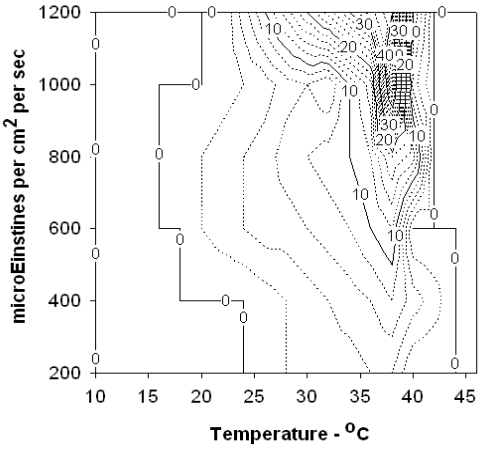
Trend 1: Mussels prefer to live in habitat that is free of leeches, snapping turtles and excessively active fish; mussels are *never* found in areas frequented by poisonous snakes (Fig. 1). This last "cottonmouth effect" is evidenced by the sharp drop we noted in the numbers of mussels collected in the vicinity of *Agkistrodon piscivorus*.

Fig. 1



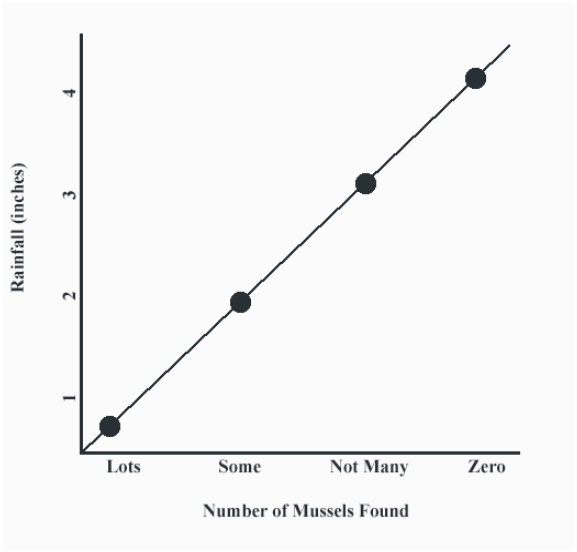
Trend 2: Mussels are highly influenced in their habitat choices by seasonal temperature changes, preferring air and water temperatures roughly equivalent to those preferred by the average human (Brody, 1974). Our data show that mussels actively seek comfortable temperatures by moving to the sunnier side of the river in cold weather and moving to the shadier side in hot weather (Fig. 2). When the weather is intermediate such trends become less clear, with some mussels (usually younger males) moving to shady areas, and others (usually older females) opting for sunny areas.

Fig. 2



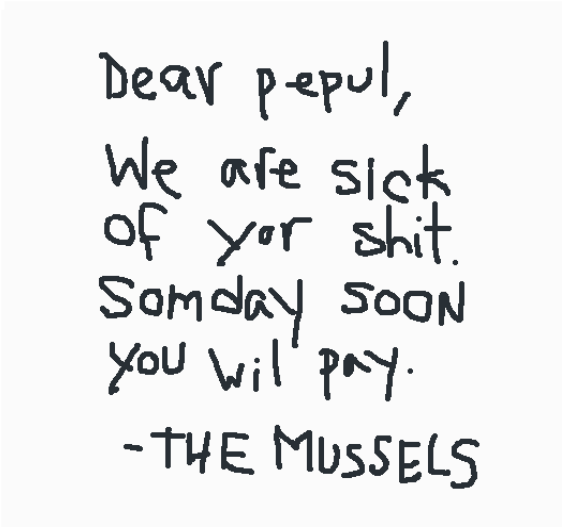
Trend 3: Mussels exhibit avoidance behaviors during inclement weather. When a light rain shower begins, mussels undertake a rapid migration toward the deepest portion of the sampling area, quickly moving out of reach of all but the most long-armed researchers (Cabbage, 1982). By the time a light rain shower turns into a thunderstorm, the local mussel populations have effectively disappeared (Fig. 3). At such times, we have found it best to seek hot showers and microbrews until the mussels choose to return to the surface. In a similar behavior not yet observed by us personally, it has been reliably reported that mussels in colder climates often migrate southward in wintertime by clinging to the backs of geese (Old man who lives under bridge, pers. comm., 2001).

Fig. 3



Trend 4: Mussels prefer to live in pristine, unpolluted water (Fig. 4) within five miles of a park, library, grocery store, and movie theater (Uvula, 1999). Mussels are seldom found immediately downstream of industrial or municipal wastewater outfall pipes. Our data also indicate that mussels have the ability to distinguish between types of wastewater discharges, possibly on the basis of smell, taste, texture, or official signage. For example, we found that large numbers of mussels will inhabit the area immediately downstream from the cooling water outfall for a chocolate factory, but mussels are seldom found in conjunction with the "chunky style" wastewater discharge of a large metropolis (Juniper, 1996). Mussels are never found immediately downstream from hog and chicken farms, metal-plating facilities or nuclear reactors (Jerkins, 2000).

Fig. 4



After taking a few minutes to analyze the clear trends outlined above (Klezmer, 1954), we reached the conclusion that freshwater mussels are capable of making complex choices regarding habitat and lifestyle (Cornball, 1997). Until now many scientists and normal people have assumed that mussels are without intelligence, free will, or emotional baggage, but we trust that our findings will open such closed minds to a pearly dawn of new understanding and empathy for this most maligned and neglected of creatures, this tiny glob of dirty mucus in a calcium-based casket, this shy voluptuous beauty with whom we have shared so many hours of silent, yet deeply passionate, joy.

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ERRATA

The authors are available for awards ceremonies, lavish dinner parties in their honor, or for any social function that includes free alcohol. Contact the authors via their amanuensis and factotum, Naomi Van Tol (naomi@spiny.com).