WONALANCET OUT DOOR CLUB

Newsletter

April 2015

CARING FOR THE SANDWICH RANGE SINCE 1892

THE EVEN DARKER SIDE ISSUE

(FOR THOSE OF YOU WHO STILL THINK NATURE IS NICE)

The Beast

"Certainly a more bloodthirsty animal of its size I never saw." ~Theodore Roosevelt, 1876

Imagine you are a deer mouse. Not just any deer mouse, but a young male in his prime, a dashing and dapper mouse about town – or woods in this case. You are on your way to visit your girlfriend, Deloris, who lives in a basement apartment under a huge beech tree. You have just entered the tenement hallway, which is a long, twisting tunnel with various side tunnels from which ominous sounds and odors emanate. You've visited Deloris a dozen times before but you're still never sure of the route. Just when you think you've made a wrong turn and decide to retrace your steps, you hear a clicking sound coming from behind you. The clicks get louder, a putrid smell fills your nostrils and then, in the fossorial darkness, you sense a form charging toward you. You run but it's right on your tail. In fact, it has your tail. You kick at it, it bites harder and your tail is severed. You run again but it is on top of you again, sinking its fangs into your neck. You roll and kick with all the strength you have and you're off running again. But your legs aren't behaving properly. They're stiff and going numb. You're losing your balance, stumbling down the tunnel. It's on top of you again and you're too weak to do anything about it. As it tears the flesh from your face and eats your eyeballs it makes a rolling, churlish sound and your last thoughts turn to Deloris: "I bet she'll have a personal ad in the paper tomorrow morning."

So, what is this beast? You might be thinking it's an ermine or a least weasel, two voracious predators small enough to follow their prey into their own nests. But weasels make quick kills by biting at the back of the neck and severing the spinal cord. Our beast can't do that; it's no bigger than the deer mouse it attacked, weighing about 20 grams (less than an ounce). Our bloodthirsty denizen of the fossorial underworld is *Blarina brevicauda*, the northern short-tailed shrew.

Up until as recently as ten years ago, we could have defined exactly what a short-tailed shrew is. But through the magic of genome sequencing and phylogenetic classification, the systematists have served us a terrifying taxonomic tangle of terminology. Imagine my surprise when, looking up the taxonomic status of the shrews to refresh my memory, I discovered that the mammalian order of Insectivora no longer exists. In it's place, we have a smorgasbord of magna-orders, sub-orders, infra-orders, and super-families, all having unpronounceable names of exorbitant length. And the "experts" are still arguing over where the shrews fit in. I'm getting too old for this nonsense. For the sake of my mental stability, let's just stay old-school for now.

Regardless of the new order in which the systemic cabalists finally place the shrews, it appears that the moles will remain as their closest relatives. Furthermore, the moles and shrews are still insectivores; or, to be less precise but more accurate, they are "invertivores" – they eat invertebrates, which in addition to insects, include various other arthropods, worms, slugs and snails. They also occasionally munch on seeds and other vegetative matter but I doubt they would order a salad at a restaurant. When we consider this as the normal shrew diet, the short-tailed shrew stands out as an iconoclast. It will attack and devour any prey up to twice its size.

Nineteenth century natural history literature contains numerous accounts of "gentleman" naturalists experimenting with the predatory behavior of short-tailed shrews. John Morden, writing in *Canadian Sportsman and Naturalist* (December, 1883), described placing a shrew in an enclosure containing three "large meadow mice." In those days, a meadow mouse was what we now commonly call a meadow vole (*Microtus pennsylvanicus*). A large meadow vole weighs at least forty grams. I'll quote a few phrases from the article:

> *"The [shrew] pursued them constantly. The [shrew's] mode of attack was to seize the mouse in the region of the throat... ...in about ten minutes had it killed; but even before it was dead the [shrew] commenced eating its eyes and face. About ten minutes later the [shrew] had devoured all the head of the mouse and continued to eat."*

Other macabre investigations were performed with deer mice, jumping mice and even three short-tailed shrews pitted against each other. At the end of that experiment there remained just one very fat shrew. The young Theodore Roosevelt started with insects and moved on to mice, but it was only after pitting his study subject against a garter snake and reporting "during the next twenty-four hours [the snake] was entirely devoured" that he reached the conclusion quoted in the header of this article.

What makes the predatory behavior of the short-tailed shrew even more remarkable is that it is darn near blind. Just

how well or poorly it can see is up for debate but it certainly wouldn't be issued a driver's license. When Clinton Hart Merriam offered an account of his predatory shrew experiment in 1884, he wrote, "[The shrew] frequently passed within two inches of the mouse without knowing of his whereabouts." The accounts of others, including Mr. Morden's, also allude to the appearance that the shrew could not track its prey by sight. And when you consider the short-tailed shrew's preferred habitat, which is beneath the forest duff and in subterranean tunnels, it suggests that vision would not be the best way of locating prey.

So how does a short-tailed shrew find its prey? Some suggest that the sense of smell is used but observations and experiments have had mixed results. As for my opinion, I've live-trapped numerous short-tailed shrews while sampling other animals and these shrews really stink! If I were a shrew, I definitely wouldn't want to have a keen sense of smell and be obliged to tolerate my own stench. Be that as it may, the presence of three different types of scent glands found on short-tailed shrews indicates that they use scent for communication and possibly as a predator deterrent. But all observations indicate that if the shrews can use scent for detecting prey, it is not enough to pinpoint the prey's precise location. The shrew needs to depend on a sense other than sight and more than smell. The sense of touch has been shown to help shrews identify prey. Much like their close cousins, the moles, shrews have a super abundance of Eimer's organs on their snout. These tactile organs allow a shrew to identify exactly what it is touching. Great for grubbing for insects at close quarters; not so great for tracking down the big game.

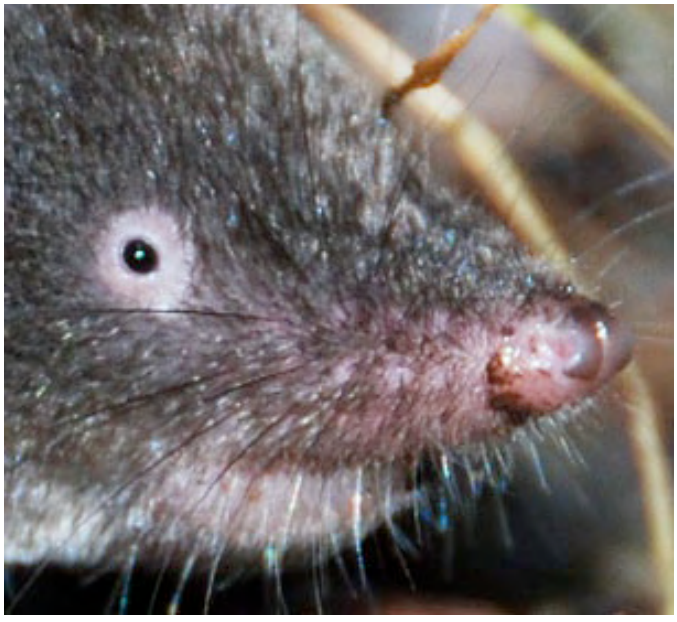


Photo: wildaboutnatureblog.com (Kenton& Rebecca Whitman)

Shrews are intensely auditory and vocal animals. According to Sara Churchfield's book, *The Natural History of Shrews*, they can produce at least twelve different vocal sounds. Eleven of these sounds are used for communicating with other shrews. One of the eleven – the click – is also used for exploring unfamiliar terrain and can be considered to be a rudimentary form of echolocation, such as many blind people have learned to use to keep their bearings. The twelfth sound is an ultrasound. There have been a handful of researchers who have investigated this ultrasound in various shrews, most notably in the common shrew (*Sorex araneus*) and the greater white-toothed shrew (*Crocidura russula*). The common conclusion in the studies of these species is that the ultrasound is an echolocation device that serves as a navigation tool but would probably not be sophisticated enough to be useful in foraging. Thomas Tomasi studied the short-tailed shrew and reached a similar conclusion. So, case closed; the shrew's echolocation ability is not useful for locating prey.

Hold on; not so fast. Let's think about this. First, common and white-toothed shrews are semi-fossorial; they do make and use underground tunnels but they spend much of their time as surface foragers. (Plus, neither are found in the western hemisphere so who cares about them?) Short-tailed shrews are primarily fossorial; they abhor daylight. They spend almost all their time excavating and cruising subterranean tunnels. Second, none of the researchers defined "prey" in their published papers. Most likely, they were thinking in terms of insects, millipedes, and other relatively small critters difficult to detect on an irregular substrate such as a tunnel wall. That's the standard bill of fare for shrews in general and, even in descriptions of the eating habits of short-tailed shrews, mice and voles only get mentioned as an aside.

This is what Tomasi actually observed: In the only test comparable to Tomasi's methods (artificial plexiglass tunnels), the short-tailed shrew's echolocation ability was as much as three times as sensitive as that of the common shrew. At a distance of two feet, a short-tailed shrew can differentiate between an open tunnel and a closed tunnel, even when there is a bend in the tunnel of up to 90 degrees. It can differentiate between a two inch opening and a half-inch opening. It can differentiate between tunnels blocked by plexiglass, rubber, and wadded cotton. Given that knowledge, someone please tell me how a short-tailed shrew could not differentiate between an open tunnel, a dead-end tunnel and a tunnel blocked by an inch-plus high and three inch long mouse, even if the mouse is two feet away and around a bend in a pitch-black tunnel. How could it not, at the very least, detect a nest constructed out of bits of leaves and grass? I rest my case.

Whether or not the short-tailed shrew uses ultrasound echolocation to hunt big game (of course it does), we have to acknowledge that it's a pretty neat trick. Of all the terrestrial animals (I'm considering bats to be aerial), only a few species of shrews and tenrecs have been shown to have this ability. But that doesn't explain why, even if the shrew can identify a mouse at a range of two feet in a dark tunnel, the shrew would be willing to risk potential consequences of wrestling with an opponent twice its size. As a general rule, the only mammalian predators that go after prey larger than themselves are those that either hunt in packs or are capable of making a surprise attack and a quick kill. Neither applies to our lovely beast. Perhaps the answer lies in another of short-tailed shrew's rare traits.

Short-tailed shrews are venomous. And they can pack quite a wallop. Before I had the opportunity to learn this the hard way (which I henceforth assiduously declined), I had the good

fortune to attend a small mammal ecology course taught by Joe Merritt, a nationally respected mammalogist. Dr. Merritt described (with a disturbing amount of glee) the effects of a short-tailed shrew bite on one of his less esteemed former students. For an entire week his hand was swollen and a line of discoloration traveled up his forearm to the elbow. The student was stoic (and embarrassed), so he refused to shed any light on his experience other than what was blatantly obvious. For a thorough description, I recommend reading naturalist Charles Maynard's personal account (1889. *Contributions to Science* Vol. 1, pp 57-59) that he published for the edification of posterity. Some of my favorite highlights:

> "*...burning sensation...greatly intensified...shooting pains radiating out in all directions... in half an hour they had reached as high as the elbow. ...pain and swelling reached its maximum in about an hour...I could not use my left hand without suffering great pain for three days*."

He goes on to say that the swelling and pain did not completely disappear until two weeks after the bite. Bad for humans; worse for mice. For small mammals, the effects are, in order of occurrence, irregular respiration, paralysis, convulsions, and death. Now we know why Deloris's boyfriend was stumbling down the tenement hallway. Don't mess with the Beast.

by **Chris Conrod**

Before 1850, there were perhaps a dozen species of insects that damaged trees. Now there are more than 400, some of which are terrifying. The Hemlock Woolly Adelgid is destroying this species in Massachusetts, and is kept out of NH only by temperatures well below zero (which, this past winter notwithstanding, are getting rarer). The Adelgid has two generations a year via parthenogenesis, and enjoys rapid dispersal. It has killed tens of millions of trees and threatens eight billion. The loss of hemlock -- a keystone species in much of the northern forest ecosystem -- has cascading effects on microenvironmental structure and function, wildlife habitat and hydrology. The Emerald Ash Borer feeds on white, green and black ash. It can fly half a mile and is considered out of control. The Asian Longhorn Beetle attacks maple, poplar, willow, elm, buckeye, horse chestnut and birch species, with larvae that tunnel into the trees affecting their integrity. It has (at least temporarily) been stopped in Mass. by cutting down every infected tree. While this didn't harm Boston (only six trees gone thanks to early detection); Worcester lost 30,000 trees. And beech bark disease (see Nat's article below) is moving fast. More photos of diseased beeches in living (wicked chuckle) color are on the wodc.org website. SG

Ugliness, decline and grave dancing: Forty years of change in the Bowl

by **Natalie L. Cleavitt**

A brief introduction to me as a contributor new to your newsletter: I love the woods. I particularly love Hubbard Brook Experimental Forest where I spend all the snow free weekdays every year since 2003 working in and thinking about the forest. There has been a long connection between Hubbard Brook and the Bowl. Wayne Martin first measured trees in the Bowl in 1974 for his Master's thesis. Wayne went on to become site manager at Hubbard Brook. Twenty years later in 1994, Ian Halm (now site manager at Hubbard brook succeeding Wayne Martin – coincidence?) led the crew who camped and measured trees in the Bowl. I first set foot in the Bowl helping (minimally) on the first tree re-measure in 1994. I went on to survey the bryophytes in the Bowl and other Research Natural Areas in 1995. Last spring, a chance meeting with Doug McVicar in the Ferncroft parking lot has led to this article, which includes unpublished results of the 2014 re-measure for tree growth in the Bowl.

I don't spend much time on trails, rather my office is the "pathless wood" such as Robert Frost describes in his poem *Birches*: "a pathless wood where your face burns and tickles with the cobwebs broken across it, and one eye is weeping from a twig's having lashed across it open." In fact, one of my crew members almost lost an eye in this second re-measure of the Bowl in June 2014. Of course, the "pathless wood" in the Bowl further includes some impressive rock ledges, boulder fields and impossibly dense spruce-fir thickets.

As you likely know, the western half of the Bowl has never been harvested and is considered old growth forest. In a comparison of the East and West sides of the Bowl using the 1994 re-measure data, Wayne together with Amey Bailey demonstrated that the two sides were not different from each other despite records of known logging on the East side up to 1888. Was this a case of the ability of the forest to rebound or a leveling of the playing field by the hurricane of 1938? In a comparison of change in the forest from 1974 to 1994, the big yellow birches got bigger and there was very little other change. *What would the trees tell us in 2014?*

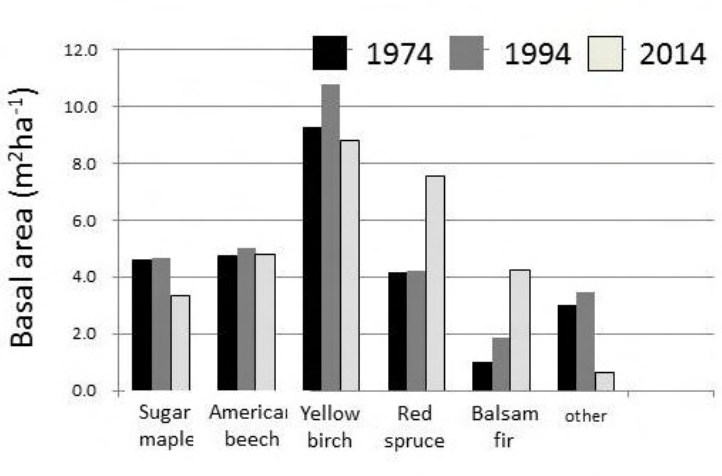
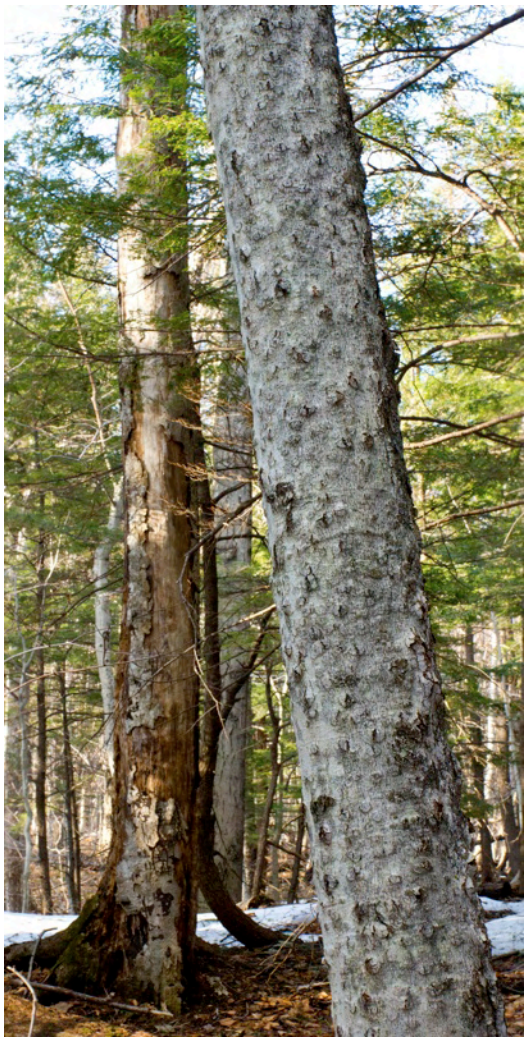


Figure 1. Change in basal area (the amount of cross-section area taken up by trees) of tree species in the Bowl over 40 years and three sample times. Notice the much greater change that took place from 1994 to 2014 compared to the first 20 years.

First message: Beech bark disease has come to the Bowl and it is Ugly. Ian had visited the Bowl with me in May 2014 and related the absence of beech bark disease symptoms back in 1994. Beech bark disease (BBD) is a nasty cooperation between an introduced scale insect and a fungus (*Nectria* genus: one species native and the other introduced). The scale insect opens up that beautiful silver, smooth bark and the fungus moves in for a slow death. American beech basal area (the amount of ground a tree covers in cross-section) has remained pretty stable over the 40 years (**Fig. 1**), but the number of dead beech trees measured increased 10% from 1994 to 2014. *How is this possible?* Recruitment of smaller beech saplings that are often sprouts from the dying larger trees. Of all the beeches measured, 42% were in our worst class for BBD with severity of BBD increasing significantly with increasing tree size. Beeches – mostly of sprout origin – dominate the understory at lower elevations. The Bowl has become a typical aftermath forest. **Second message**: The birches are in decline. The canopies of those big, old yellow birch were hard hit by the ice storm in 1998 and even more so were the paper birch. Yellow birch basal area is now below the 1974 value (**Fig. 1**). Paper birch losses are included in the "other" category, but also in the mortality rate increase from only 7.6% of measured stems dead in 1994 to 60.5% in 2014. *Why? What caused this 53% increase in mortality?* This is a question of some controversy among my mentors, Tim Fahey (Cornell) and John Battles (UC Berkeley, but Tim's PhD student at Cornell in the 1990s when I was an undergrad. Also one of John's thesis sites was the Bowl studying the gap dynamics of the spruce-fir forest).



Diseased beech in front of dead beech in front of slightly affected beech. Photo: Doug McVicar

Tim argues that the paper birches succumbed to effects of crown breakage during the 1998 ice storm followed by drought damage during the summer of 2001 resulting in widespread die off throughout the mountains of NH from 2002-2004. On the other hand, John's students took tree cores from paper birches over a range of environmental conditions at Hubbard Brook and the cores all show progressive growth decline more suggestive of aging. John believes the die off is more attributable to cohort senescence (trees of a very similar age all reaching natural death at the same time) of paper birch that all established in the wake of the 1938 hurricane. *My thoughts:* The truth, as usual, probably includes some of both sides. If the paper birches did mostly establish after the 1938 hurricane and were in decline when the bad weather hit in 1998 and 2001, then wouldn't this pre-dispose them to dying? Unfortunately, vulnerability to climate extremes caused by cohort senescence may not be a sexy enough story to stand on its own in the scientific literature.

Other messages: Red spruce and Balsam fir are dancing on the grave of Paper birch. Basal area of fir has doubled and spruce has nearly doubled in the past 20 years (**Fig. 1**) with spruce taking over the understory in the upper elevations. Thanks to improvements in the acid rain situation so prevalent through the 1980s, red spruce is making a run for it. The large old Sugar maples are dying and the species is not regenerating well (very few stems in the sapling class) accounting for the decrease in Sugar maple basal area (**Fig. 1**). At Hubbard Brook and elsewhere, this decline in Sugar maples is a legacy of both the primary effect of acid rain on soil chemistry and the secondary effect of BBD aftermath forest where beech sprouts dominate the understory. Beech leaf litter is an unwelcome blanket to seedlings on the forest floor. In one of our studies, I watched poor Sugar maple radicles (root of the seedling) failing time and again to penetrate this blanket of beech leaves to the soil below. While Sugar maple is sensitive to the acid rain changes, beech has been shown to be indifferent, thereby giving beech the advantage on several fronts.

Lastly, there has also been a marked decrease in the mortality of Striped maple and Balsam fir, which is, at least in part, probably due to the decrease in moose browsing since 1994. Change in the forest is a natural progression and there are many natural drivers of change such as moose, but human mediated changes have shaken up the forest with a legacy of acidic inputs, increasing number of exotic tree pests, and the looming interactions of climate change and more extreme weather events. How will all these factors play out in the old forest of the Bowl? What will the 2034 re-measure bring? Will I still be leading the crew? Let's all give a round of thanks to the fabulous and courageous 2014 Bowl crew (below), who risked life, limbs and eyeballs to gather the data relayed in this article.

Photo by John Battles of the 2014 crew: from left to right, Jamie Kellner, Maddy Montague, Charley Higginson and Noah Shephard, all Cornell undergrads. The crew camped in the Bowl. The white sticks are called DBH poles and are used not for martial arts, but to ensure that measurements around the tree boles are taken at a uniform height from the ground.

THE ZOMBIES ALL AROUND US

by **Susan Goldhor**

We, the living, appear to be fascinated by them, the undead, of which an ever increasing crop of novels, films and tv shows currently offer two varieties: vampires and zombies. Personally, I favor vampires who -- at least to my limited knowledge -- are good-looking (if pale), and pay for the blood they suck with out-of-this world (if rather low temperature) sex. In contrast, zombies are pure horror; their only benefit being the work they give to makeup artists employed by low grade film companies. That's because unlike vampires, who are "made" -- like Mafiosi or Yale secret society guys -- while still alive, zombies are human flesh eating predators raised from the dead and, at least in our current horror film embodiment, the more decayed the better, existing as they do in a formalin-free world.

As a biologist, I spend a ridiculous amount of time thinking about how to reconcile fictional creatures with anatomical and physiological reality. For example, if vampires have to suck blood, this must mean that their fangs lead directly into their circulatory tracts with a one way valve (like the one that keeps blood from going backwards in our veins) to keep blood from dripping out all the time. This simple and reasonable plumbing fix kept me happy until a fictional series came out featuring bottled synthetic blood that could be drunk by any needy vampire. Although this was a huge boost for bar culture (and human-vampire dating), it was much harder to rationalize; how did the blood get from their GI tracts into the blood stream without being broken down by digestion? I didn't bother worrying about vampires being alive at night and dead by day since 17 year locusts have an even more bizarre schedule, and I never thought about zombies at all -- partly because they're so disgustingly unsexy and partly because, unlike vampires, who seemed merely biologically implausible, zombies seemed biologically impossible. But here's the weird part: the concept of zombification, or what is increasingly called "parasite extended phenotype", is getting more and more attention in the biological literature.

We have yet to find any actual examples of reanimating the already dead. But real world zombification is actually more horrifying than the fictional version, and it turns out that despite the fact that it took scientists so long to see it, it's all over the place, requiring only what one expert has called "sidelong views of animal behavior". This is another way to describe looking at behavior through the eyes of the parasite rather than those of the host. since zombification refers to the ability of parasites to take over not only the flesh but also the brain of an animal which then behaves in a bizarre fashion, suicidal for itself, but adaptive for the increase and transmission of its parasite. In fact, referring to these doomed hosts as zombies is a reasonable use of the term; they are technically alive but their selfhood is dead. They are cadavers animated by their parasite puppeteers.

The first zombies I heard about were ants attacked by a group of fungi called *Cordyceps*. There are many fungi in this large family, and each attacks a different species of ant or other insect. But they all do more or less the same thing. A spore lands on an ant, somehow generating sufficient explosive energy to penetrate the insect's cuticle. Once inside, it starts to grow. For a while, the ant seems normal, scurrying about on the ground and attending to business as usual. But one day it climbs up a plant, grips it with its mandibles (which are designed so that the closed position is the default, requiring conscious energy to open) and dies, at which point the fungus springs out of the ant's cuticle, matures and releases its spores, one of which might land on an ant and so forth and so on. Although there are lots of ants that hang out on plants, those attacked by *Cordyceps* are ground dwellers who would never climb up on anything since that advertises their availability to predators. The creature who does this is no longer an ant; it's a fungus in an ant suit. What's amazing is how precisely the fungus directs its ant's behavior; for example, directing one species to climb up a particular side of a grass blade to a particular height at a particular angle at a particular time of day. As Matt Simon wrote, in *wired.com*, this makes the fungus "*a bit like GPS for the insect, only, you know, the ant never asked for directions*."

For a while, we thought *Cordyceps* infection only happened in the tropics but it turns out we have a species of our very own which uses a twig instead of a grass blade. This makes sense since blades of grass and leaves don't overwinter here, and it may take that long for the fungal fruiting body to mature. If you asked a mycologist if fungi had brains, they'd deny it, but these fungi have evolved a way to hijack an animal's brain and use it for their own reproductive success. How do they do this? Researchers are just starting to identify the chemicals that the fungus produces but -- unexpectedly -- these chemicals are different for each species. And, if you grow the fungus in a non-target ant species, the ant dies but doesn't exhibit the special behavior, nor does the fungus fruit.

One of our very own temperate (although southern) zombified ants, after invasion by *Ophiocordyceps lateralis sensu strictu*. Note fungal stem and fruit body growing out from behind ant's head. Photo: Kim Fleming

You'll be relieved to know that -- at least in the species most studied -- only a fraction of the fungal spores will survive, due to a fungus that parasitizes the parasite and castrates it. And kudos to David Hughes' lab at Penn State, which did the research.

Despite the dramatic spectacle presented by an infected ant, scientists didn't really think about zombification or parasitic control of animal behavior until very recently. Of course, ants are very very small and could easily escape notice. (The temperate species of zombified ant pictured here was only noticed because the woman who took the photos put them on her flickr feed.) But there are some larger and even weirder spectacles of parasitized behavior of which my personal favorite is a *Toxoplasma* which infects rats and causes them to lose their fear of cats, those being the animal the parasite *really* wants to get into. Carl Zimmer in his wonderful and readable book, *Parasite Rex,* wrote about *Toxoplasma*, *"Rats carrying the parasite are for the most part indistinguishable from healthy ones. They can compete for mates as well and have no trouble feeding themselves. The only difference researchers found is that they are more likely to get themselves killed."* Lots of humans also carry *Toxoplasma* cysts in their brains. Getting there is an error on the part of the parasite, since we're less likely to be eaten by cats, having passed the era of martyrs thrown to the lions. Nevertheless, Zimmer notes that, *"psychologists have found that Toxoplasma changes the personality of its human hosts. . . men become less willing to submit to the moral standards of a community, less worried about being punished for breaking society's rules, more distrustful of other people. Women become more outgoing and warmhearted. Both changes seem to break down the fear that might keep a host out of danger."*

If it's weird and scary that a fungus can affect ant behavior, it's downright terrifying that a protozoan can change rat behavior and human personalities.

It's hard not to be fascinated -- however unwillingly -- by truly horrific behavior. Most folks get their fix from the news, but those of us who are biologists prefer to look at other species, and the tiny parasitic wasps who lay their eggs in caterpillars are great exemplars of this. (There are other wasp species who lay eggs in other insects but I've chosen caterpillars, since they're the biggest and juiciest.) There are many species of wasps utilizing many species of caterpillars as baby food; some use venom to paralyze their hapless prey, while others inject their eggs incredibly quickly and leave the next generation to munch away in what might accurately be called a moveable feast. The infant wasps are smart enough to leave the host's vital organs untouched until the end; after all, who wants to eat dead rotten meat? But it's one thing to be doomed and eaten alive and another to be a zombie; to qualify as zombified the organism in question has to demonstrate alien behavior that benefits its controllers. There is at least one case where the wasp alters the behavior of the cabbage worm caterpillar in a way that would make a terrific horror movie. After the young wasp larvae have eaten their way through the caterpillar and exited its abdomen, they spin their cocoons underneath their host. The poor caterpillar, now literally gutless, recovers sufficiently to spin a protective web over the cocoons, and assumes guard duty, attacking any potential threats until the baby wasps have emerged. Then it dies. Even a gardener might feel some stirrings of pity.

And, just so I don't leave you with the belief that it's only the kingdom Animalia that gets zombified, plants also have parasites that force them to behave against their own interests in favor of the parasite's. One of the best known is a fungus (*Puccinia monoica)* that attacks mustard plants in the Rocky Mountains. In order to reproduce, this fungus must have sex with another *Puccinia,* so it takes over the plant, eating its nutrients and making false flowers in place of the plant's flowers. These flowers are strikingly good imitations of other local flowers (even in uv light, since bees see and are guided by this), being bright yellow, scented and offering a sweet sticky substance which the fungus forces the plant to produce. When researchers did tests, they found that bees actually preferred the false fungal flowers to the real thing. The bees enable sexual reproduction for the fungus; the plant stays sterile.

Richard Dawkins wrote, in his forward to a 2012 book, *Host Manipulation by Parasites*, *"If I were asked to nominate my personal epitome of Darwinian adaptation, the ne plus ultra of natural selection in all its merciless glory . . . I think I'd finally come down on the side of a parasite manipulating the behavior of its host - subverting it to the benefit of the parasite in ways that arouse admiration for its subtlety, and horror at the ruthlessness in equal measure."*

The zombie now evokes sympathy -- the puppeteer manipulating the zombie is the new star of the horror movie.

Have you heard about the zombie maples? These are trees that are living but not growing, named by Neil Pederson of Columbia University's Tree Ring Laboratory after he took cores and showed that they had stopped making rings. We all know that you age trees by counting rings but current research suggests that it (like everything else in the forest) is not that simple. Both diameter measurements and tree ring counts on maples (and others) at the Harvard Forest showed that a decade or more could go by without these tree forming a ring. This is pretty amazing since it's arboreal orthodoxy that a tree forms a ring every year; and that the new ring's tubes, which transport water and nutrients up from the roots, replace those of last year's ring. We don't know if the zombie trees are forming rings higher up on the trunk (although this raises interesting questions about tube geometry), and we do know that although there hasn't been a forest found composed exclusively of zombie trees, zombies can form a sizeable subset of a given forest. Why? Conditions for the years of missing rings were not particularly stressful. Prof. Pederson thinks that the zombies are small undergrowth trees getting beat out for access to nutrients by bigger trees. In the case of the maples, red oaks were grabbing the sunshine at the canopy. So the zombies are just hanging in there, waiting for a big tree to fall and give them their chance. Not exactly the living dead -- more like the barely living waiting in the dark and gloom to be reborn. . . sometime. . .maybe. . . And this is why one of those tiny trees, with a trunk the diameter of a pencil, might be close to a century old. And, now that I think about it, since they're being fed sugars by their fungal partners, who are sucking those from the bigger trees, maybe they're closer to vampires. SG

Bull Pine is not a pretty guy
The Bull's a working class hombre
The guy with big tattooed arms,
Beerkeg torso, plug ugly face,
The guy at the bar you don't mess with-

This is not your Ralph Lauren tree
Not your GQ gymnosperm posing
fashionably in a field
The Bull was born in the sweatshop
Of raw, moiled earth, the Hells Kitchen of
mineral soils
Acid soils good only for growing granite
But the Bull, along with its batty cousin
The candleabra pine (aka the Medusa Pine
Capable
Of turning casual onlookers into stone)
Can survive, yea thrive, in stone and sand
Together they're shaped by New England
weather
Primarily known for its fierce and chilly
sense of humor
The Bull's a loggers nightmare
Swallows chainsaws with scarcely a burp.

Now here in the kingdom of trees
You have your white collar types:
The stately American elm
Its survival in Dutch
The pointy Balsam Fir
Spruce budworm hard on its case
The wonderfully arched red oak
Number one on the gypsy moth hit list
The autumnly flamboyant Sugar maple
Threatened by the pear Thrip.
The pear Thrip!
The majestic Eastern Hemlock
Got a bad case of the shakes
The photographic paper birch
Short lived and besmirched by peelers
The red, white and black spruce
Susceptible to acid rain
The smooth and pleasing American beech
Ravaged by beech bark disease
And lovers carving their initials
The once proud American chestnut
Laid low a century ago by blight
These types remind us

That the Bull's not like them
The Bull is blue collar
The Bull takes 'em as he sees 'em
Insects, viruses, bacilli, road salt,
Toxic waste, acid rain, swedish chainsaws
Tree snippers, anti-ugly tree zoning
Hurricanes, earthquakes, glaciers -
The Bull's not goodbye cruel world
The Bull's not I'll see ya in acapulco
When the going gets tough -
The Bull has its place
On a thin plot of land, yes,
But grown more expansionary, more
visionary
By its occupation; its dominating form
announcing
I'm here and I'm here to stay.

Bull Pine
by **Dana Steele**
originally published in ***RIP City***

DAVID KING LOUGHRAN: 1939 - 2015

David King Loughran, a past President of the WODC and first Editor (and originator) of what would slowly morph into the WODC Newsletter, died in February, in Florence, Montana. Certainly, the first two newsletters on file on the website are his -- single page typed letters from 1972 -3.

Growing up in Illinois, he summered with his aunt Margaret (Peg) King of Tamworth, which instilled in him a love of wilderness, mountains and the rural life. His other passion was for Spain and all things Spanish; he traveled to Spain in his junior year at Dartmouth, followed bullfighters, learned flamenco guitar, got his Ph.D. in Spanish literature, and, as a Professor of Romance Languages at the University of Montana was widely respected as an authority on and translator of the Spanish poet Federico Garcia Lorca. He also published two books of his own: *Montana Poems from the Cabin* and *The Swale and Bitterroot*.

He and his former wife, Betsy, built a summer house in Tamworth in the 70s, and raised sheep, chickens, pigs and vegetables, as well as two children. The land exerts a powerful hold; one of those children, Margaret (Peg) Loughran, is still here and baking the bread that nourishes so many of us. As for Dave, after his divorce, he built a second cabin in Montana, which served as a base from which he traveled extensively in Central and South America and, closer to home, hiked every mile of Glacier National Park and much of the Bob Marshall Wilderness. wearing -- it has been claimed -- the same tattered shirt and shorts.

Dave Loughran resting after clearing the Rollins Trail.

PIERCE BEIJ: 1920 - 2015

Pierce Beij, "the Iron Man of the Granite State", died and was buried last week, as I write this, on his farm in Holderness. He was 95. The photo shows him as a stripling of 93. Jack writes sadly, " Pierce was a steward of the natural world and an appreciator of wild nature. WODC benefited mightily from Pierce's contributions. He was an exemplary volunteer trail worker, coming to WODC Trail Days (and a lot more!) until his mid-80's. (Ed: He started doing trail work at the age of 18.) Those who worked alongside Pierce know that in his 80's Pierce was outworking most of us, and always thinking carefully about what he was doing. Pierce devoted untold hours to the Forest Planning process and may be the only person who read every word in the 20 pound WMNF Forest Plan. He contributed to the lobbying effort that successfully increased the size of the Sandwich Range Wilderness. We will miss Pierce's presence on Trail Days, but he will be forever cherished in our hearts and minds." Pierce will be remembered not only for the amazing effort he put in to our trails, but for his humor, his laconic way with a story, his generosity and (to cut short a tribute that would have embarrassed him) his charm. For more about this force of nature, please look for the essay on Pierce in the *Elders Issue* of the Newsletter, one year ago, on our website.

Please note: There will be a memorial gathering at his farm on July 26th. All are invited.

Spring Trails Report

by **Jack Waldron**

Wonalancet is slowly melting out from a frigid Winter. There were 4 days between January 1st and February 28th when the temperature bottomed out at -21. February was more consistently cold with an average low temperature of -6, January was warmer, an average low of +1. Woodpiles shrank quickly, some disappearing before Spring's warmth arrived. The cold had a positive side: dry powdery snow. With 19" of snow in January and another 32" in February the skiing conditions were excellent. A question to ponder is whether the severe cold impacted tick populations? When Summer arrives we'll see how well both the trails and the ticks have survived. *(Editor's Note: Wanna bet the snow insulated those darn ticks from the cold?)*

There will not be a major trail reconstruction project this summer but we will hire members of Jed Talbot's crew to help us with Annual Maintenance. A section of the Bennett Street Trail washed out last Fall. This section was initially damaged in Super Storm Sandy, and it appears that Pond Brook is intent on reclaiming some of the trail/riverbank as river. We are also working with the USFS to determine the feasibility and advisability of relocating a section of the Blueberry Ledge Cutoff Trail to use switchbacks to climb the steep slope at the Wilderness sign.

WODC members responded to the request last season to perform Wilderness Monitoring stints in the Sandwich Range Wilderness. Maintaining that wilderness environment and spiritual refuge requires dedication and effort on our part. Thanks to Glen Woodard, Helen Gingras, and Doug McVicar for pitching in last year. We'll need volunteers again this season to spend a day monitoring the Wilderness for the values we

hold dear. If you'd like to help, contact Jack at 323-8913, jackw@g4com.com. And if you want more information on any of our trail projects, contact Jack or Fred (284-6919).

As usual we'll host 4 Volunteer Trailwork days on:

Saturday May 16 (WODC Spring Trails Day),
Saturday June 6 (National Trails Day),
Saturday July 18 (New Hampshire Trails Day), and
Saturday September 26 (National Public Lands Day).

We'll meet at the Ferncroft Parking Lot at 8:30AM on all our Trailwork Saturdays. Bring water, food, gloves, and clothing appropriate for the weather. Most of all, be prepared to spend a day outdoors deriving satisfaction from a job well done.

* * * * *

WODC Annual Meeting: Sunday August 16 at 6:30 PM in the Chapel. Potluck in the Grove at 5:00PM.

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And. . . don't miss the new exhibit ***Trail Clubs: Connecting People with the Mountains*** at the wonderful Museum of the White Mountains in Plymouth. Guess which historic trail club is prominently featured? www.plymouth.edu/museum-of-the-white-mountains/ And guess which two folks are finding that exhibit inexplicably humorous?

(*photo sneakily taken by Doug McVicar*)

WODC ORDER FORM

QTY	DESCRIPTION	PRICE	TOTAL
	1901 Guide to Wonalancet (Reprint)	$10.00	
	WODC Map & Guide (3rd edition) Members Non-Members	 6.00 8.00	
	Unfolded WODC Map & Guide	9.00	
	3 or more unfolded Maps - each	7.00	
	WODC Historical Collection (CD)	25.00	
	WODC Patch	3.00	
	Coolmax T-shirt ☐ gray ☐ blue ☐ Medium ☐ Large ☐ X-Large	18.00	
	New Memberships (not for renewals!) ☐ Pathfinder ☐ Steward ☐ Trail Blazer ☐ Five Year	 15.00 25.00 50.00 250.00	

PLEASE MAIL TO:

WODC MEMBER SERVICES
HCR 64. BOX 248
WONALANCET, NH 03897

NAME .....

STREET .....

CITY, STATE, ZIP .....

PHONE (.....).....

EMAIL .....

Editor's Ramble: While celebrating the 50th anniversary of the Wilderness Act in last fall's newsletter, I failed to take note of an important centennial: the death of Martha, the last passenger pigeon, *Ectopistes migratorius,* on September 1st, 1914. Martha had been captive in the Cincinnati zoo, sole surviving member of her species for the last four years. I had not realized how beautiful and richly colored these birds were until I saw one in the feather, if not in the flesh, a hundred years later, mounted in the ornithology department of Harvard's Museum of Comparative Zoology. (Martha was frozen in a block of ice and sent to the Smithsonian where she is still on display.)

In their book *Journey to the Ants*, Bert Holldobler and E.O Wilson say, "One ant alone is a disappointment; it is really no ant at all", and the same seems to have been true of the passenger pigeon which existed only in flocks; flocks that darkened the sky for miles; flocks that brought down branches and even trees with the weight of their roosting; flocks so enormous that it must have seemed impossible that they could be wiped out even by the wanton hunting of hundreds if not thousands of men and boys, firing over and over until the bodies piled up on the ground and they ran out of shot. (This is, incidentally, why we still shoot "clay pigeons"; "stool pigeon" referred to a live pigeon used to lure the others into nets.) There is no animal -- with the possible exception of locusts -- that lets us envision what those flocks must have been like. At least one experienced observor estimated that he saw a flock of over two billion birds. We may think of them as gorgeous winged visitors, but for contemporary Americans they could be terrifying and destructive, and the darkening sky and increasing noise as they approached could seem apocalyptic. They would leave behind denuded and broken trees, their droppings sufficiently thick on the ground to kill whatever grew. Their fertility and exuberance were in keeping with a wild continent, rich in seemingly infinite forests of big trees producing massive quantities of fruit and mast. How would they exist now, with the waves of disease wiping or weakening out one tree species after another, and the forest itself fragmented and diminished?

No one ever understood the reproductive needs of the passenger pigeon. It declined so rapidly that by the time it was an issue, it was too late. Kathryn Schulz in her review of Helen Macdonald's book *H is for Hawk* in *The New Yorker*, wrote, "When a species is endangered it suffers not only numeric but also semantic decline. The rarer they get, the fewer meanings animals can have. Eventually rarity is all they are made of." For the passenger pigeon, extinction is all it is made of. **S.G.**

Wonalancet Out Door Club
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Wonalancet, NH 03897