

VOLUME 10 • SPRING 2018

# OZARKA REVIEW

a student-led journal



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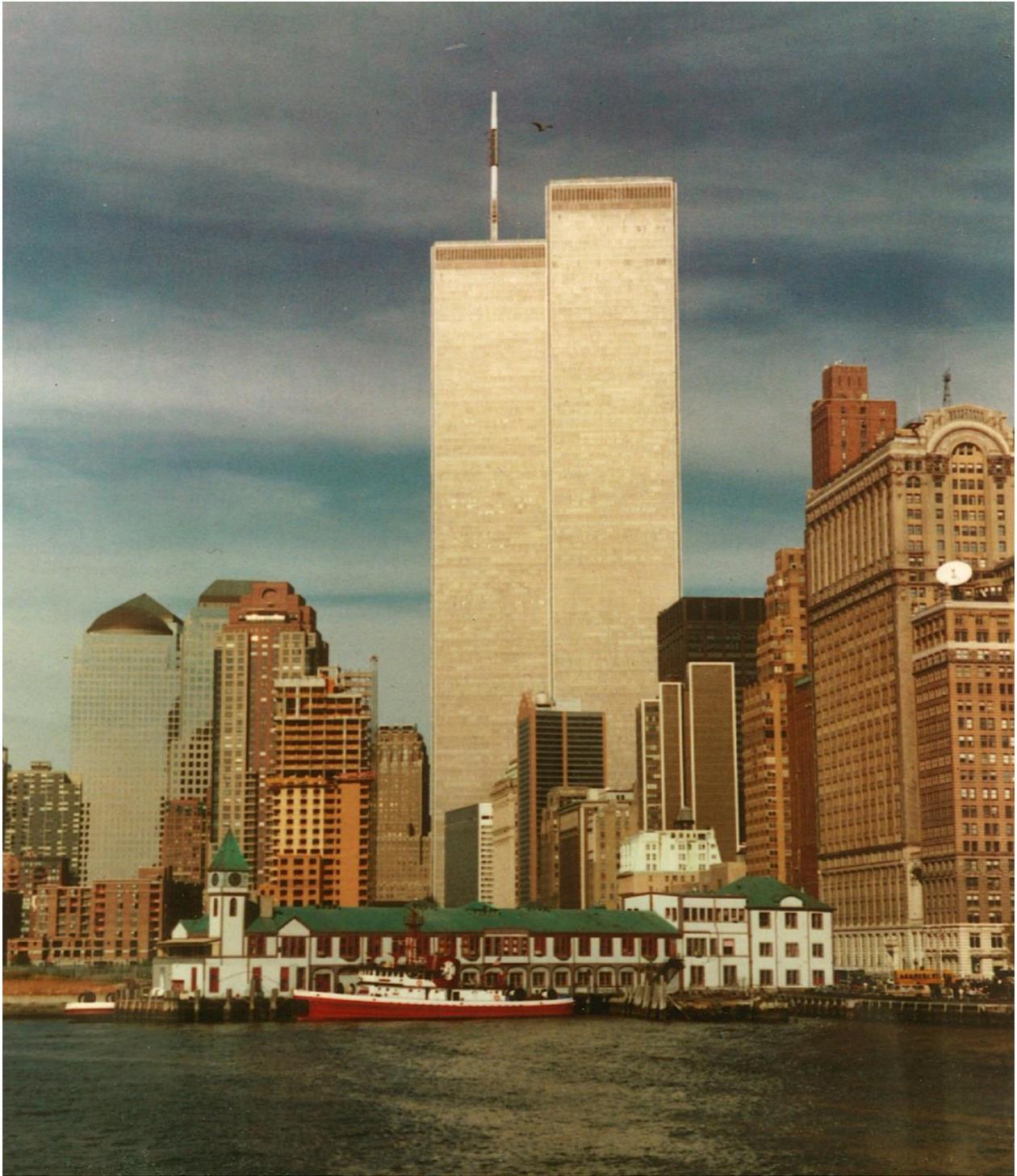
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**Mammoth Spring State Park**

Photo by Haley Mullaney, 10.2.17

Mammoth Spring, AR



**World Trade Center**

Photo by Maxine Jordan, 1991

New York City, NY

## **Iridescent Blues**

by Stephen Paulson

creatures

Butterflies with blue  
On wings glistening in sun  
Flutter around us

Peacock fans his tail  
Many eyes to frighten foes  
A mate to regale

Rain forest spider  
Tarantula blue and black  
Brilliant legs and back

Indigo bunting  
A tiny little bird shows  
Colors change in sun

colors

Northern lights aglow  
Move shimmering across sky  
Winter's coldest nights

Irises blooming  
On a sunny Spring morning  
Velvet textured falls

feelings

Vivid sounds, colors  
Psilocybin adventure  
Fading [consciousness]

Lover's departure  
On the brightest sunny day  
Leaves a darker tint

music

Piano intro  
Duke Ellington's orchestra  
Plays "Mood Indigo"

"Rhapsody in Blue"  
A George Gershwin master piece  
Busy pianist

A heartbreaking loss  
Moves Eric Clapton to compose  
"Tears in Heaven" song

sports

Skates fly over ice  
Sticks and pucks crash, men clashing  
St. Louis Blues hockey

In memory of Sue Chasteen (1948-2018),  
beloved student and community member.

### **Exploring**

by Sue Chasteen

As I drive I feel alone.  
Encased in my car, the world outside, a separate place  
Yet near, reaching out with pleading hands  
It begs me to seek the treasures it has for me.

The world has changed. The storms have come.  
The winds and rain rip apart the land. Trees fall.  
Creeks rise.

Empty and silent the world cries out in pain.  
The end of life lays ravaged and broken on the ground,

But over there a flower lifts its head  
In silent honor to the sky  
Ravaged and bent with head held high,  
A piece of life returning, smiling upward to the sun.

The woman walks out her door  
Surveying the damage.  
With tears creeping down her face,  
She seeks the things that used to be.

Memories now lost in earth's quagmire,  
Life with its changes, filled with pain, begins again.  
Seeds lay hidden in the earth start to grow,

Beginning again, the world, we know.

## Words

by Megan Moxley

Understand.

To comprehend is to teach oneself to listen intently  
to the sounds and syllables behind  
the meaning of the mystery  
of the words and phrases from another's mind.

Read.

Eyes will strain and tire  
from looking at the curves and dots that leave  
themselves an abstract until a long-awaited hour  
when unsure letters become easy to read.

Speak.

Barely a phrase at first, but slowly volumes will roll out  
of the lips of one who is willing to attempt  
with an uncertain tongue, sense of humor, and determined mouth,  
and who absolutely refuses to quit.

Write.

One sits with a dictionary and grammar book never far away  
and carefully forms the curls and dots  
that once were a migraine,  
but now black ink spells out pages of thought.

Geiriau. Mots. Focail. 話 Woorden. Las Palabras. Λόγια Wörter.

言葉 Woorde. Parole. शब्दहरू Palavras. Ord. 말 Focail. Words.

## Walls

by Hannah Worsham

I'm a wall.

I see the way you step quicker when you're angry and stomp when you're furious.

I'm a wall.

I know the way your voice cracks when you're close to breaking and beginning to let the pain slip out as lonely teardrops.

I'm a wall.

I watch the way you portion your dinner as if you were merely a bird.

I'm a wall.

I stand silently as I listen to you both lash back and forth and back and forth.

I'm a wall.

I hear you, nearly frothing at the mouth, screaming at the top of your lungs for him to leave; to "just go."

My darling, push as you do, love doesn't leave you.

We are walls.

Try as you might to push us down, but we are the ones holding the roof over your head.

We are walls.

Repaint us to your liking, if you please.

We are walls.

Do not try to break us for your own gain; we are only here to help.

We are walls.

We cannot fight you back.

We are walls.

We will not abandon you.

We are walls.

We will surround you and do our best to support you when you're falling.

We are walls.

Let us stay. For we are strong to a point, but you must remember, we are only walls.

## The Fog

by Mary Anne Hayes

The fog was so dense that it shrouded everything in a gray blanket. The cold dankness surrounded him, seeping through his jacket and smothering him in its icy clutches. Oh, how nice to be sitting in front of the fireplace, sipping coffee or, better still, apple cider. Instead of dwelling on the fog and his misery, he must concentrate on his mission. He pulled his jacket closer and plunged forward into the grayness. One foot in front of the other. Nothing looked familiar. Was he even going the right way? Finally, right ahead of him was his destination - a bright green container although now it looked deceptively gray. Although he could not see it, he knew that the gully lay just ahead. He carefully lifted the container lid. It smelled decidedly of rotted leaves. He lay the heavier of the packages he carried at his feet and carefully put the contents of the lighter one into the container, being careful to place it under the decaying leaves. Closing the lid, he reached for the larger package. Using all his might, he hurled it into the abyss beyond. He heard it land with a thud. Mission accomplished. He had put the garbage in the composter and thrown the bag of used cat litter into the gully just behind the back fence.

Like a beacon in the gloom, the light from his kitchen window called him back to the breakfast that awaited him.

## **Mrs. Ida's Good Heart**

by Alisha Galloway

Ida May Rhodes was an elderly widow who lived in a one-bedroom house at the end of Ash Street in a small town in Arkansas. She was a small, plump lady who always kept her hair dyed a bright shade of auburn. Even though Mrs. Ida was in her early seventies, she had a fiery soul and did her best to keep the whole town in line. Last year her oldest son, David, invited her to go to Washington with his family on vacation. Mrs. Ida stayed home because, "Pastor Burge is going to be gone to a seminar for two weeks, and if his wife doesn't lose some weight while he's gone, he is going to leave that woman and never come back." Never mind that Mrs. Burge was five months pregnant at the time or that the pastor loved his wife very much just the way she was. Mrs. Ida stayed home from Washington and did her best to help poor Mrs. Burge lose some weight. Mrs. Ida had a good heart. Everyone in town knew that. Sometimes Mrs. Ida's good heart just lost control of her sharp tongue.

Mrs. Ida was one of those people who always had the answer for everything. Not only did she always have the answer, she always had the *right* answer. Mrs. Ida would sit on her front porch drinking Dr. Pepper from an old, metal cup, and use Facebook to share her advice with the town. Yes, Mrs. Ida had

Facebook. She used to give advice over the phone, but after David bought her Wi-Fi and a new laptop for Christmas (so the grandkids would have something to do when they visited), he never dreamed she would become so attached. Mrs. Ida began sharing her opinions on Facebook. Mrs. Ida saved her most important advice for phone calls, but she liked Facebook better. She could gossip with the ladies from her quilting circle on the phone and still help the town's people avoid making any tragic decisions.

Mrs. Ida was always worried about her heart. She took a teaspoon from a bottle of herbal medicine every day. No one knows for sure what was in the bottle, but Mrs. Ida believed it was a miracle cure for anything. If someone in the town was sick, Mrs. Ida would be the first one over bringing a casserole and her bottle of herbs. She claimed that bottle of herbs was the reason her heart was so healthy. Mrs. Ida was recently diagnosed with Alzheimer's and had to be admitted to a nursing home. Her first action, after the doctor told her the diagnosis, was to dig the little bottle out of her purse and hold it up for him to see. "I may have Alzheimer's, but you can't tell me there's anything wrong with my heart." Then she put the bottle back in her purse and marched out of the office.

When Mrs. Ida moved into the nursing home, she only asked to take these things: a slightly withered Poinsettia (her husband's last Christmas gift to her), a dusty radio, old Frank Sinatra cassettes (the music she and her husband danced to when they were first married), a silver locket with the inscription "I love you, Mom" (the first Mother's Day gift her son ever bought her with his own money), and a stack of fortune telling cards (a souvenir her husband brought home from his days in the Vietnam War).

Mrs. Ida was always known as a bit of a pack rat, so this short list surprised everyone. When she was asked about it Mrs. Ida unknowingly gave some of the best advice she had ever given, "When I wake up every day and I can't remember who I am, I want to see these things and ask what they are. That way even if I can't always remember the people I love, I can be sure that I will always hear stories about them. When you get to be my age, you realize that what matters in life isn't the things, it's the people who made the things matter."

After Mrs. Ida was settled in the nursing home, David had the job of clearing out her house. It was a big job because Mrs. Ida had a lot of stuff that needed to be cleared out. She liked to say she was "thriftier" than most people; in reality, she just liked to collect junk. One day while David and his family

were clearing out the house, they found a shoebox in the bottom of Mrs. Ida's closet. David opened the box, and to his surprise the box contained hundreds of charcoal sketches. The dates on the sketches ranged from the time when Mrs. Ida was just a teenager up until the last few months before she was diagnosed with Alzheimer's. In the box, Mrs. Ida had left a box of freshly sharpened charcoal pencils and a letter addressed to David. The letter was long and full of shared memories, but these were his favorite lines: "My biggest regret in life is never showing anyone the sketches in this box. I even have a business card for the art gallery I was going to send them to in my dresser. I know what people think of me: that I'm just the town gossip who can't mind my own business. Well, I just want you to tell them that if they had made better decisions, maybe I wouldn't have had to get involved so much. I did it out of the goodness of my heart, David, because I love these people, and someone had to keep them in line." When Mrs. Ida died, David made sure each person who came to her funeral got one of her sketches and heard the story of Mrs. Ida's good heart.

**Emery (chapter 7 of *Silent Awakening*)**

by Kayla Buenrostro

I didn't have any girlfriends to help me get ready for the Full Moon Dance. I had basic clothes. I'm pretty sure I was the only one in the entire walled city who didn't have a single girlfriend. My only friends were Sven and (maybe) his parents. Other than that I was alone. I rifled through my closet trying to find a dress that would fit for me. I spotted a sparkling white dress hidden deep in the corner of my closet. Reaching in I grabbed the fabric and gently took it out. I held it out at arm's length inspecting it. This was. . . my mother's dress. I remember the one time she wore it. She had worn it on my fourth birthday. We had gone to a party for me. I almost put it back but stopped myself. I decided to try it on. The dress fit perfectly on me, like it was made for me. I collapsed on my bed covering my face as I started to cry. I hardly knew her, but I loved her so very much. I shook my head and continued to get ready before Sven wondered why I was taking so long. I grabbed a few curlers and began to curl my hair. I normally wouldn't go to such lengths, but I was going to for once. For Mom. After getting my hair done I found my mother's old makeup pouch, (something I normally didn't wear either). Applying the makeup, I created a wing at the end of my eyes making them look exotic.

Deeming myself ready I made my way down stairs. I knew Dad wasn't home because he was at the prison, and I'm sure Lea was telling him what Sven and I witnessed last night.

I made it out onto the street looking at all the smiling and laughing couples. Groups of girls and guys passed me laughing about the day's events. Walking alone made me think about why I didn't have many friends, probably because I kept to myself unless Sven was with me. Instead of being sad about not having friends I kept my head held high. I spotted an older man leaning against Stensia's inn. He was wearing a suit with golden buttons threaded onto the material. He held a cigar in one hand and was combing his hair with the other. I blinked then jumped in surprise. He was still the same man, but his face was elongated like a rat's and he was balding. I shook my head then glanced back at him. He looked normal. By the time I started walking again he had noticed me. Ditching his cigar, he started walking toward me. The dance wasn't far away, so I knew I could make it without having the man bother me. Quickly I started to walk faster hoping he hadn't quickened his pace also. He hadn't. I reached the safety of the dance. Lights were spread out among the dance floor with bodies dancing to and fro. Hay bales were set to the side for people to sit down and talk and relax before dancing again. Sven noticed me before I noticed him. His mouth

was open and his eyes were big, round saucers. "You. . . you look beautiful Em," Sven stammered.

I blushed. I couldn't help myself. No one had ever called me that before, not even my own father. At least I don't think he had. "Um. . . thank you. No one's ever told me that before." He reached his hand out to me, a cocky smile on his face. I smiled back at him before taking his hand and letting him direct me toward the dance floor. I hadn't ever danced before, so I wasn't sure just how well I would do out there. Sven seemed to understand that I was nervous because he kept my shaking hand in his. Once we were on the dance floor he placed a hand on my waist and took my hand, leaving the other one to rest on his shoulder. Slowly we twirled around the floor, letting the music take us. I was surprised at how well he could dance. He kept guiding me around the dance floor, making sure I didn't step on his toes. We did another twirl, and I saw a girl sitting on a hay bale with her arms crossed over her chest. Her eyes were flashing purple, and her mouth was set in a fierce snarl. Her dreads hung behind and swayed with the wind. She gave me the death stare, keeping her eyes trained on my face. Quickly I averted my eyes so she wouldn't see the way she scared me. I looked up just as Sven looked down. Our faces were inches apart, his mouth opened slightly. He moved closer just as a shrill

scream tore through the crowd. Sven and I sprang apart just as people all around us started running in different directions and screaming. I glanced around frantically. Several people fell to the floor crying in pain. Then I saw it. I saw them change. I saw people *change*. Sven fell on his hands and knees, his back arching and muscles popping. He looked to be in pain.

"Sven!"

The girl with the dreads raced over, falling to her knees beside him. I heard another scream and turned as this huge brown wolf came bounding forward. The wolf pounced on a poor woman, biting her in the throat. The wolf brought its head up, blood and drool dripping from its maw. The wolf growled then stood up on *two* legs. On the wolf's chest was the backwards "y" just like the one I'd seen on the man in the cell. Another wolf came bounding into the fray; this one's fur was black with blood and dirt matted into its fur. There was the brand on this one's chest as well. What. . . is going on? I saw many more people start to turn. I saw one man fall to the ground and transform into a creature I didn't know. They. . . they were turning into the. . . the *Mythical*. Standing in the middle of the chaos was the same man I'd seen walking to the dance. He was standing in the middle of the dance floor with his arms crossed over his chest, a cigar hanging from his fingertips. He saw me staring at

him and grinned like the Cheshire cat. Just like before, he was balding, and his face was elongated. I stood frozen in place as a woman came walking into the mix. She wore the robes of The Divine Church, the church that had built the wall and told us to never venture beyond it without an escort. She held a small, white pigeon in both her hands. I couldn't see her facial features under the hood that was pulled low over her face. She stopped a few feet away from the man, her robes rustling in the wind. The woman glanced up, her eyes flashing green in the dark.

"Sven!" the girl with dreads shouted. "Sven control yourself!"

Sven's head whipped to the side, his eyes flashing amber. I took a step back as his body convulsed and huge, wolfish features consumed his normal handsome ones. Shaking his head, Sven stood up, ears turning into long fluffy ones. He noticed me, amber eyes turning to slits. He lifted up his lips, his teeth growing longer and sharper. His ears flattened as he took a step closer. The dread-locked girl slid in front of me, arms spread out wide. Her hair hissed at me causing me to step back. Sven stopped walking, teeth bared.

"Sven, it's me, Cierra," the dread-locked girl said. "Remember what you told me back at the inn? You told me that you wanted to save Emery. You can't save her if you're turned."

Sven's head whipped to the side, ears slowly returning back to normal. He blinked back to blue eyes. He put a clawed hand on the top of his head, shaking it once more. Cierra's shoulders sagged in relief, almost slumping to the floor.

"Sven! Emery! Cierra!"

We all turned as my father, the night captain, and a . . . woman (who was oddly familiar) stood. Her hair was flying in her face, a woman who resembled the woman in my dreams, the woman my mother had taken me to, to erase my memories. The woman from the Divine Church let her pigeon fly away from her outstretched hands. The man smiled, lips stretched showing two very sharp canines. I felt hands on my shoulders, felt a hand on my forehead. I heard my name being called, heard hundreds of people screaming in pain and horror at what was unfolding during the Full Moon Festival. "Emery? Emery baby can you hear me?"

I shook my head getting back into the present. Dad was in front of me, hands on my shoulders, his face scrunched up in worry.

"Emery, you need to leave. You need to go beyond the wall. Sven, Cierra, and Lana will take you beyond the wall. They'll protect you," Dad said.

I shook my head. "You...you told me that I can't go beyond the wall." My eyes expanded. "Dad! They're real, the *Mythics* are real!"

Dad placed a hand on my face, his thumb gently rubbing my cheek. "I know baby girl. I know. I'm sorry you had to find out this way."

"You need to go. Now!" the Night Captain exclaimed. "Before more *Mythics* turn."

Sven took my hand, giving my father a nod before tugging me towards the gate that loomed above the foggy night. Wait, fog? What happened to the beautiful night? The full moon? The streets of my city were bright with flames. Both humans and *Mythics* alike were running through the cobbled street running from each other. *Mythics* were. . . real. We made it to the gate which was crawling with guards, Lea being one of them.

"Halt! What say you?" Lea stood in front of the other guards. "Sven? What are you doing here?"

Sven stood in front of me. "Lea, father told us to leave. To go to the next town."

Lea gazed around inspecting the company he had with him. She frowned. "You can go but only because the *Mythics* are running loose around the city."

The huge wrought iron gate, rusted with years of rain, creaked as it began to ascend. Cierra cocked her head to and fro, her muscles creaking like the gate. Before another word was spoken and before I could turn around to look at my home, Sven tugged me out beyond the wall.

## **The Journal**

by Jasmine Grace Jensen

Parker was not a normal person. If someone were to describe Parker as having waist-length, silver hair and icy eyes, you might think of someone's strict grandmother; Parker was, however, far from it. Parker Merchant was a twenty-one-year-old man who stood about six foot and was terrifying. Any one of his striking features might make a normal person shiver: his height, his cold demeanor, or that he wore black clothes that could only be described as Goth when combined with his unusual hair. His intimidating and cold demeanor, however was a misdirection--a sort of protection mechanism.

Parker had a long history of being outcast; his family, having the perfect family idea in their head, had rejected him just because of what he liked. When he first tried to grow his hair out in middle school he had been ridiculed. When he had finally gotten out of school and into the real world he started to explore a little more and then upon realizing what the world was really like, developed a bubble of frigid ice to protect him. Despite not having very many friends and rarely engaging people in conversation on a regular basis, he deeply enjoyed

studying the human mind; in fact, he hoped that one day he would be a therapist.

That's why when he found a small personal journal in the public library that had been accidentally left behind; he couldn't resist one little peek. The book was plain, nothing special about it, half-sized and about an inch thick. He could tell just by looking at the edge that it was about halfway finished. When he opened it he was greeted with plain black ink on cream-colored paper. The writing was in cursive and very hard to make out. On some parts of the book, the handwriting got better; the author had slowed down and was contemplating their thoughts. In other parts, however, the writing became faster. The words grew bigger and were spaced farther apart.

Parker was having a hard time trying to make out actual words, but he could make out a few key phrases. There seemed to be a lot of action, a little bit of violence, and a dash of controversy. Reading the first few pages took quite a while because of the terrifyingly bad handwriting. But after those first few pages, he was hooked. After making sure that there was no name in the front or back covers, he took it to the front desk to determine if the librarian on duty recognized it. She was a rather judgmental lady who gave him a curt answer. No, she did not know whose journal it was.

After exhausting all the normal ways of finding the owner, Parker gave up trying to find them and brought the journal home with him. Later, he was furiously scribbling down bits of things he had learned about the author while desperately trying to decode the writing. The author was most definitely a girl as all the stories were from a girl's point of view. She loved both science fiction and fantasy, and she tended to get excited and write terribly.

Parker had gone as far as to chart the different sloppy substitutes for regular lettering and words. The author was fond of action and fighting in addition to running or generally anything athletic. The descriptions of the fight scenes were more than just the type of brawl you would see in a normal book; the action was in perfect detail, down to the joints, tendons and nerves each strike affected. The author was most likely an experienced fighter.

This girl he now referred to as Luna, after the most prominent character in the journal. Luna was also fond of companionship and a lot of her stories involved, at some point, the main character being helped by a secondary character when she was in emotional trouble. Parker suspected that Luna wanted someone to help and understand her but was not comfortable

sharing her emotions. *Dang*, He thought to himself. *I'm a regular Sherlock Holmes!*

Parker became inseparable from the journal; he took it to work, to his college classes. He became quite adept at deciphering the writing. One quiet night he was relaxing on his worn but comfortable couch reading the graceful cursive when one story ended and he discovered a gem in the journal. It was a personal note from the author; she was ranting about stress and anxiety. She was describing an instance when she was trying to complete an essay while sitting in the student commons while a rowdy group of students were talking loudly. She was starting to stress; they were talking louder and louder and she started to panic. She felt like she couldn't breathe. Parker felt empathy for her; he had been in similar situations. He read the description of the student commons; it sounded eerily similar to the commons in his college. He attacked his list of descriptions of the author with new vigor, putting several details together so he could more easily recognize the girl if he ever saw her. The only problem was he still didn't know her name, and he only went to college for a few hours once a week; she might go on a completely different day.

Working on the assumption that she was mostly like her characters, she would be wearing black, sitting at the table in

the corner of the room, alone. She would be about average female height or a little shorter and have long hair. He couldn't figure out what her hair color might be as the hair color of the characters in the stories varied quite a bit. First she admired black hair, then red, then his favorite, silver.

She had an interesting and complicated mind. He was looking forward to meeting her. He was certain he would; Parker was more than determined enough. Monday was tomorrow; he would check the commons at eleven-thirty or noon(ish) when there weren't that many classes and most of the students would be in the commons eating lunch. It should be fairly easy to spot her, or so he thought. When he entered the commons the next day he realized that it wasn't going to be like that.

Two-dozen students packed the small area, all talking and eating their lunch. They all looked contradictory with their full faces of makeup and wearing sweats. He thought that Luna's tastes were more refined; in her stories, all the characters wore proper dresses or dress pants and button-up shirts. She also made a point to say her clothes were all black.

She described, in her brief personal story, that she had been sitting at one of the small tables next to the window where the sun would hit her skin and warm her in the freezing commons.

She made note of the fact she was constantly cold and often wore her hair down to keep her warmer.

He had an image of a lady of class in mind; it was a college and very few of the students actually took the time to dress themselves in proper work attire. He lingered hoping that she would show up, but no one fit the description.

The next day he returned. After the previous day's failures, his faith was lacking. When he entered the commons, a little earlier this time, at ten thirty, there were only three people in the commons, another sweatpants and lipstick girl eating skittles and researching something on one of the computers, a lanky lazy boy, hanging out on one of the couches engrossed in his iPhone, and a young woman of short stature sitting at a small table in the northwest corner next to the large window, just as he predicted. Also as he predicted, she wore a plain black dress with modest leggings and flats. She had no makeup, but her distant eyes and pink lips still stood out on her pale face. Her hair, the mystery he had yet to pinpoint, was surprisingly diverse in color, looked ashen at the top but had red flecks toward the bottom, with the occasional glint of gold and slash of vibrant brown, all cascading and tumbling together down her back, some falling in her face and shielding her from the outside world.

She looked deceptively in her own world; however, every now and then her eyes would dart from her book and around the room, keeping an attentive eye on everything. Parker quickly averted his eyes when he realized he was starrng, but not before she noticed. The girl, however small, was incredibly intimidating. In her presence he felt guilty, like he had invaded her privacy. He had read her journal after all and to most people that was a terrible offense.

Her eyes turned back to her work but kept glancing his way. He tried to keep up the battle of trying to look whenever she wasn't, but that inevitably failed. He tried not to remember that he had speculated Luna was a martial artist and started to approach her. His boots were loud against the tile floor, and he wished that the room was louder so his approach wouldn't be so noticeable. He wanted suddenly to veer off his path and sit at one of the lower tables, but he stayed his course till he was standing right in front of her. Throughout his approach Luna had been glancing up, getting more and more nervous as she realized he was heading for her. She slipped one hand underneath the table and uncapped a ballpoint pen, a useful defensive tool.

"Excuse me?" Luna jumped a little when Parker spoke.

"Yes?" She timidly asked when Parker paused awkwardly. He shifted from foot to foot, tugging on the strap of his messenger

bag, before getting up the courage to lift the flap and take out the little black journal. "Does this, perhaps, belong to you?" He inquired hopefully, offering the book to her. The expression on her face was more than enough to answer the question. Wonder, surprise, and relief bloomed on her features as she momentarily forgot herself and took the book from him, flipping it open, confirming it was hers. Parker was a little sad to let the book go and piped up trying to fill the silence as she examined the book.

"I found it at the public library; when I didn't see a name, I started to read it. You are a good author. . . ." He was about to say more when her head shot up, eyes blazing.

"You read my Journal!?!"

## The Quitter

by Les Mood

It had been a long day and wasn't anywhere near over yet. Teaching PE classes all day to seventh and eighth graders would wear down a younger man than me, and in half an hour I'd have to coach soccer practice, which I wasn't ready for. I sat in the teacher's lounge with a cup of bitter coffee trying to make some decisions about the team when Bill Herd walked in.

"Hey Bill," I said, "how's everything in the English Department?"

"Sometimes I wonder if the kids and I even speak the same language. How 'bout you? I heard you tried out a new goalie at the soccer match yesterday. How'd she do?"

"Pretty good for her first time in the box during a game. They scored a couple of goals on us, but it wasn't her fault. Our defense still has a lot of work to do. I thought the girl had real potential, but . . . ."

*When Dr. Helen Conner walked into the house the first thing she did was kick off her shoes. "Ah," she murmured. "That's so much better." She'd had two graduate seminars in the morning, one on micro-economics and one on marketing and then a faculty meeting that afternoon that went on and on and*

on. She was beat. What she really wanted to do was put her feet up and sit back with a nice glass or two of wine. What she had to do was start on the papers she'd brought home that needed grading. What she didn't need was the little girl standing in the doorway.

"Hello Mother."

"Hello. Mother's got a lot of work to do. Do you need something?"

"I wanted to tell you about our soccer match. Coach put me in as goalie the second half."

If Helen had been watching her daughter she would have seen the hopeful smile on the girl's face, but she was still thinking about the papers in her briefcase and the students who expected them to be handed back soon.

"That's nice," Helen said.

"Coach said I could be the starting goalie someday soon."

That got Helen's attention. If the girl was a starter would she be expected to go to the games? That wasn't going to happen. She was busy enough already. "And how do you think you did?"

"Well," the girl said hesitantly. "The other team scored two goals. But I blocked a lot of shots."

"And did your team win?"

*"No. We lost again, but only by one."*

*"So, you let in two goals and the team lost by one. Doesn't that mean you lost the game for the team?" The hopeful look on the girl's face was completely gone.*

*"I guess," she said, looking down at her feet.*

*"Maybe you should try something you're good at. Surely there's something you can do well," Helen said. "Now, Mother has work to do. Go help your sister with supper."*

*"Okay," the girl said as she walked away with her shoulders slumping. "I'll find something I can be good at." Helen was already getting the student papers out and didn't hear her daughter leave the room.*

*"But she told me today she doesn't want to be on the team anymore. Said she wasn't good enough. It's too bad. I never would have taken the girl for a quitter, Bill."*

## **The Breeding Pond**

By Sean T. Miller

Sometimes with the right set of circumstance, wildlife can be observed in the wildness of a backyard. We all have seen waves of semi-organized flocks reaching high in the sky, HONKING, North in the Spring, and then the exit South in the Fall, passing over without any chance of layover. These migrating Great Northern Geese, going or coming, are another of our signs for the changing seasons, and we seem to never know how these fowl-travels have ended.

There was a late March-morning snowfall, followed by an overcast, steady drizzle that was able to rub out much of the snow-covered streets. By nightfall the Mountain View street lights had become a mere glow suspended in a foggy abyss. We, never seeing, only hearing wings in flight and the cry-honking of these birds, observed just how they were boxed in by the surrounding mountains, caught in low-level fog, flying in wide, circular patterns, over and over, forced from one side of town to the other, calling out from above for guidance from others who may have found refuge below--temporarily fixed here in Arkansas.

Then it was June, and it looked like some of the great geese had found a bountiful new summer retreat in a pond nestled in the hills of the Ozarks. They seemed, at times, to leave early for the day, going off sightseeing? More likely pond-hopping and eating their fill, routinely returning pre-evening to the breeding colony--their new home. Their broad wings coasted over the tippy-top of trees, pulling with their proportionally-longer, solid black necks and heads with white, chinstrap-like cheeks. Wings holding up their well-fed sleek bodies, swooping and flapping and splashing down upon their watery landing with joyous goggling, often repeating honking goose vernacular, some made their way out of the water to start preening and bedding down on the grassy banks known as Breeding's Pond.

Mr. Joel Breeding, retired U.S Park Ranger and a joy of a man, passed the time by keeping a relaxing, entertained eye on his new water attractions. I, too, enjoyed these visitors; he and I share common property, tree and fence lines. His side keeps a field with a pair of easy-going, retired, well-groomed horses, and a year-'round, spring-fed, four-acre pond; my side of the fencing has the occasional piece of hung-up, wind-blown trash from my four-acre rental trailer park and has a crossing point for folks who want to fish the pond.

Several months had passed, and one day Mr. Breeding came to me during business hours at my pizzeria asking for a moment of my time. Joel proceeded to inform me that he'd been "tighten'n up the fence line" and that he'd put up some "No Fishing" signs because he had some wild geese that might be trying to take up residence and would like to encourage them to stay--said he'd observed a few nests with his binoculars and that he also set out a feeder in hopes that they'd winter here. I said that was great and that I'd keep a watchful eye to see to it that no one crossed.

The arrival of another winter started the fourth year of their being here, and all was well with the flock; it really felt like the great birds had made this pond their home and that it suited their feeding and nesting needs. The count was up as high as 45 geese at a time; some seemed to have been staying year 'round.

As a trailer park landlord/ groundskeeper/ maintenance man/ housekeeper/ chief toilet-scrubber of all vacancies, I see 'em come and I see 'em go--some good, some bad, some who pick up nothing, leaving everything in piles, never boxes. It's the last-ditch effort to abandon unsold yard sale items: sun-rotten plastic and the uncovered remains of whatnots, weathered and worthless now, and up to me. "Do I keep. . .? I keep too much.

Do I trash. . .? I don't trash enough." So when I came across these assorted and ill-kept, mangy-looking 'taxidermed' birds, I wasn't sure if I could justify keeping them. One of the tom turkeys, with his tail feathers fanned out, looked like the boss, forever stuck in strut mode. "Well, spring is coming; maybe I'll pick up hunting again," I thought--figuring to use the tom as a decoy. But there was this other, fairly-together, ceremoniously-standing, long-neck Canadian goose. Then there were the three mangled, broken-wing ducks: Huey, Dewey, and Louie? They were mounted in flight to a piece of nice driftwood. Just so--the goose was the keeper; the ducks got tossed (wish I'd kept the wood).

I somehow knew already what to do with the goose. Two or three months passed--long enough for me to have forgotten what dirty deed I had done. When Joel finally did walk into the pizza shop, I wasn't as ready as I had planned to be; I just greeted him from my side of the counter: "Hi, Mr. Breeding, what can I do for you?" I's almost thinking he had a pick-up order. He stood just inside enough for the door to close behind him and smiled and looked at me. Now somehow knowing, he asked, "It was you, wasn't it?"

It came to me in a flash what he was referring to. He stepped up to the bar as he repeated himself: "It was you,

wasn't it? Who else?" I had no plan but to tell the truth. I said "yes," and I smiled big knowing exactly what he had discovered. He laughed and leaned against the bar. "You got me; you got me pretty good there! Yep, I knew it had to be you. Let me tell you what. I've been watching that bird stand at the water's edge for two weeks."

Joel was telling me how he used his binoculars to watch the geese and how this one had him worried something awful, at first thinking it was only the habit of a mother at her nest. But the curious stillness of this bird and its undiscerning features had Joel standing and studying through his bay window--harder and harder until he convinced himself that it wasn't a goose at all. Then he thought he was seeing white tail feathers--that maybe it was an eagle? He hoped the odd and ugly eagle would be gone by morning; early morning had him again with his binoculars to his face. He saw that the eagle-geese still had not moved and that there was now another goose that'd swum up and joined at the water's edge, only to move on as though enough had been communicated to the a-social bird.

At some point Joel'd said to his wife, "I don't think that's an eagle anymore," handing the binoculars to her. "What do you think?"

"That's a goose? Why isn't it moving? Is it hung up on barbed wire or fishing line?" She handed back the binocs and gave a parting guess: "Could be molting?"

Joel returned to looking: "No, it's too early. I think it's ill. I'm calling someone."

Joe said he called his neighbor first to see if they could see it from their house; they looked and then were worried too. They thought it best he call Game and Fish (which was along the same lines of Joel's thinking) to inform them that he had a sick bird. Upon calling they said, "We have no one readily available in that area as of right now, but stay away from it; wild birds can be pretty dangerous if they feel threatened. Maybe try calling the sheriff's department."

It seemed silly to Joel, but he did that too. The dispatch took his name and address and conveyed the message to the sheriff. After a moment's thought, he called the one other person that he knew could help--his friend, Fred, a retired specialist in biological and ecological sciences for 25+ years. Fred came over early the very next morning; they both watched from the bay window with Fred's bigger, better binoculars. Fred said, "Yep, there's definitely something not right-looking about that goose. It's missing some key feathers, and it might be blind too."

The doorbell rang. The unexpected dog catcher was at the door-- animal control holding a cord and rod.

"Mr. Breeding Sir, you left a message with the S.O.; you have a stray, sick dog?"

Joel said "No, not a dog--a sick goose. Come on in." The door hadn't been closed five minutes when the bell rang again. The Game and Fish were there to see after the report of possible rabid wildlife. As the two officers stood in the doorway, the neighbor walked up and said, "Hey Joel. Are these guys going to see after your sick eagle?"

The Game and Fish guys' interest peaked. "An eagle? We better grab the net launcher!"

"No I don't think it's an eagle any more--just a goose, maybe. Y'all come on in." Joel waved them in. Joel's wife asked him why he hadn't gotten the National Guard in on this. They stood at the window watching the two game wardens, his friend, Fred, the neighbor, and one dog catcher walk their way slowly down and around the large pond in hopes of not spooking the bird in question. Joel could see, as the men stood around taking photos of the bird and then group pictures of themselves *with* the bird, that this was a mistake--an error on his part. Joel watched the thing fall over as they poked at it and then picked it up by its base; everyone looked up to the house to see if he

yet knew that he'd been had. Trying to be serious as they carried the victimized goose back up the hill to Joel, they said: "Mr. Breeding, we suspect *fowl play*.

How well-done do you like your goose?

This one is pretty dried out.

Sorry to say, your yard decoration has seen better days, Joel."

"You want me to put it out with the trash?" asked the neighbor.

The dog catcher said, "We shouldn't need to write up a report on this one. . . crying wolf on duck-duck GOOSE."

"Sorry Joel, I really thought we had something there, said Fred, but it's just a mounted goose that's pretty weather-beaten. Think you done got goosed. Know who?"

## How Smart

by John Lawrence Ketchum

Back in the early part of the 1900s, my maternal grandfather left his birth place of IZARD County, Arkansas in quest of a future not involving cattle, cotton, rice or poultry. After several attempts of finding a vocation of his liking, he happened upon acting. He became an excellent actor, and in the process, he met a beautiful young lady who had just arrived in this country from France. He convinced her to leave the Can-Can Show that brought her here. She became his wife, and the Repertory Theater of the John Lawrence Players was born.

His traveling theater was popular from Indiana to Georgia in the thirties and into the early forties. It was also the beginning of a show business career for stars such as Red Skelton, Arthur Lake, and Penny Singleton (Blondie and Dagwood), and Phil Harris—and oh yeah, for my mom and me also.

That's how smart he was.

My dad left high school and started out life as a comedian. His looks and ability graduated him into leading male roles. He became an extraordinary dancer as well. He progressed in the business to the point that he picked the

roles and shows in which he performed. He soon became a director as well as a dancer and actor. This led to the occasion of meeting John Lawrence and his gorgeous daughter, Marigold. It was love at first sight for both of them, and they married after a brief engagement.

It was five years later when they decided it was time to expand the family unit, and I was born. Six years after that, they both sacrificed their careers and settled down in a little town in Georgia to put me in school. Since my father had never experienced any work other than show business, he was restricted in his search for work. He approached a radio station and auditioned for a job. They were more than happy with his voice but told him he didn't have any experience. He told them to give him a week and he would be experienced. He was hired and a few years later became the manager of that station.

That's how smart he was.

My mother began her acting career as a child and was tutored on the traveling repertory theater. She also entertained thousands of people in her time as a tap dancer and ballet dancer. She gradually grew from child acting parts and teenage acting parts into a beautiful leading

lady. She and my dad were billed as the Dancing Armonds. That was their stage name.

When they had to leave the business to put me in school; like my dad, she was restricted in her work history. It is hard to find a job as an actress or dancer in a small town. They lost no time in opening a dance school. In less than a year, children, by the day, were not only coming from our small town but from counties around it. At night, with the studio music, my parents also taught hundreds of adults to ballroom dance over the years.

That's how smart she was.

Of course, with my parents, I was acting and dancing on stage as a child, like I had a choice. When it came time to settle down and put me in school I thought my life had ended. All of a sudden, I was surrounded by children. I grew up with adults, and these kids weren't right bright. And to make matters worse, these teachers, as they called themselves, were totally void of humor. My life, as I knew it, was totally over.

I had many visits with the gal that ran the place; they called her the principal. I just couldn't help entertaining the kids in class with some of the comedy routines I had picked up from the past. The teachers called

me the class clown. My parents dreaded showing up at P.T.A. meetings. "Oh you are Larry's parents; we have heard so much about him."

I tried to teach the teachers as much as they taught me. I think I was somewhat successful. Though school was a drag, I was good at running up and down those dirt and rock roads barefooted. I was king of the pinecone battles and could smoke rabbit tobacco with the best of them.

Then came high school. I had heard stories about this level of education, and like my teachers and parents, I couldn't believe I made it. Georgia only had eleven years of school at that time. I was a proud freshman-eighth grader and actually made the Junior Varsity Football Team. I think my experience in my early years of dancing helped. All of a sudden I could see the light at the end of the tunnel.

The tunnel's end took a twist before the year was out. My dad decided to move out of our little country town in North Georgia and manage a radio station in Chillicothe, Ohio. I had finally learned to talk southern and run barefooted down dirt roads, and now we were going to a state where people talked funny and all the streets were paved. Talk about traumatized.

I was told that I would be placed in the eighth grade since I was in the eighth grade in Georgia. I bellowed like a stuck hog. "No you don't! I'm a high school freshman in Georgia, and I should be a freshman here, like in the ninth grade." After some heated discussion, my dad agreed to have me tested, and I would go into the correct grade. I wasn't afraid because I knew I could do it. The next day I started school in the seventh grade.

That's how smart I was.

## **Tragedy**

by Jeana Carter

As I stood outside with my little brother, shivering, I stared at the large brick building. I tried very hard to brace myself for the inevitable. It was always the same--always. The adults acted like they cared, like they were glad you were there, like you mattered. I knew different. The school principal walked me down the hall to my new classroom. I'd taken this walk so many times before, but it hadn't gotten easier. My heart was pounding so hard I could feel it in my ears; I was almost light headed by the time we reached our destination. I knew what was coming next. No matter how many times I'd gone through this I was still terrified. They smiled as they put me on display and introduced me. Every time the teacher would say, "Please welcome our new student," as if it was grand to be introduced. I could feel everyone staring at me; I didn't look at any of them. I knew how differently I dressed. Not only were my clothes from the secondhand store, but our church had strict guidelines on how we could and could not dress. I was not allowed to blend in; I couldn't be like everyone else. There were no choices for me in this. After I was placed in the front row, where I did not want to be, I could feel the others staring at my back. I just knew they were wondering where I'd come from as they plotted how

to humiliate me. I knew how this would play out. I'd been through this enough to know.

I didn't raise my hand. I didn't volunteer. I tried very hard to become one of the pieces of furniture in the room. The desks looked pretty much the same everywhere; the only difference was how much hard, crusty gum wads were underneath or how much scribbling was on top. Once I found a large, dead bug inside one of the desks. I wondered if it got there by itself or if it was put there for my benefit. Not only was I the new kid, but I was the last one left when teams were picked. I was the odd kid.

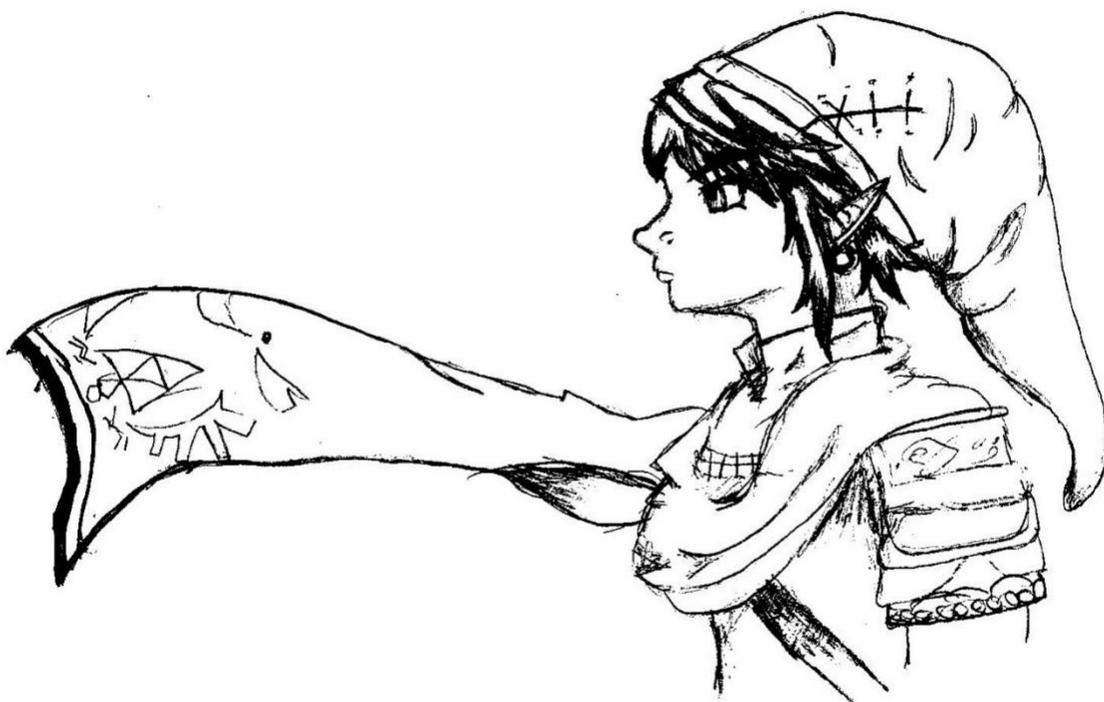
I wondered what it would be like to dress like everyone else. What would it be like to go to the same places? What would it be like to be popular? What would it be like to stay somewhere long enough to find someone to be my friend? What would it be like to be one of them, staring at me, instead of being me? The first day in a new school repeated itself over and over for me. I never understood why we moved every few months. I was not looking forward to eating lunch in the cafeteria all by myself. I'd hoped that maybe someone would take pity on me and sit with me. I ate alone. Soon after lunch there was commotion all over the school. One teacher who was crying came into our room and spoke to our teacher who began to cry. People were in

the halls talking and crying. We could hear some of the teachers almost screaming, crying out stuff like "Why him?" and "Our world is shattered." One teacher let out a blood-curdling scream that had all of us in the classroom looking around. There was total mayhem throughout the school. Students were trying to figure out what was going on. I'd wished someone would let us in on what was going on, but all our teachers said was to talk to our parents when we got home. School let out early. Buses began to arrive, and students like me, who walked to school, were sent home. I found my little brother through all the commotion, and we walked home. It was so cold; we had snot running down our faces by the time we got there.

When we arrived home my mother had the television on the news which was something I'd never seen before during the daytime. We usually watched news programs in the evening when dad was home. My mother gathered us kids all together and began to pray, as she did when anything bad was happening. She spoke of the evil man. Who was the evil man? And why was he evil? There was a baby shower that evening for my mother (my new baby sister had been born two weeks earlier). None of the ladies at that shower seemed to be enjoying the festivities, including my mother, even though she received so many beautiful things for the new baby. Mother's best friend said she felt like the world

had come to an end. My mother agreed. There was a heaviness pervading the entire event. For weeks after the tragedy, everyone we knew seemed to be in shock. It's all anyone talked about. Eventually, the trauma of being the new student, as it continued, got somewhat easier as I faced it repeatedly. I guess I got a thicker skin. I learned how to make fun of myself which helped me make some friendships.

I don't even remember the name of the school I was attending then, nor do I remember the name of my teacher, but I will always remember that day. It was November 22, 1963--the day President John F. Kennedy was assassinated.



**Untitled**

Sketch by Ashley Gosser, 2017

Community Structure and Microhabitat Preferences  
of Macroinvertebrates in a Headwater Stream

Anna L. Mickler and David Mitchell

Ozarka College

### **Abstract**

In headwater streams macroinvertebrate community structure is influenced by a suite of both abiotic and biotic variables. We studied community structure and microhabitat preferences of macroinvertebrates in a first order stream in the Ozarks. We found that differing microhabitats had very little impact on the dispersion of macroinvertebrates in the stream. However, the community structure of the macroinvertebrates played a major role in their dispersal patterns. Principal components analysis (PCA) indicated that macroinvertebrates grouped together spatially by functional feeding groups and according to predator-prey relationships. Taxa falling under the same functional feeding group classification tended to group together. Furthermore, scraping and filtering taxa grouped in close proximity to each other but at a distance from the predator taxa. We also noticed the same predator-prey pressure influencing the spatial distribution of the four most abundant taxa we collected with the non-predator taxa Ephemerelellidae, Baetidae, and Chironomidae congregating away from Amphipoda, a macroinvertebrate predator. Studying macroinvertebrates allows us to accurately determine stream health and also develop baselines for healthy streams in a particular region, in this case the Ozarks.

### **Introduction**

Headwater streams are classified as first through third order streams and are very unique and diverse (Vannote et al., 1980). Even two headwater streams located in the same watershed can vary widely across many factors including the biological life that inhabits them (Meyer et al. 2007). All larger streams and rivers originate from these streams. Thus, headwater streams have a major impact on the larger streams and rivers they drain into. Even though headwater streams

are a vital component of the watersheds they are a part of, they are a very understudied part of the stream system, especially in the Ozarks.

In studying headwater streams macroinvertebrates are an instrumental tool. Unlike higher order streams, headwater streams may not have substantial numbers of fish or many different species of fish. Some streams may not have any fish whatsoever, but even in those streams macroinvertebrates are a thriving and abundant source of life. Macroinvertebrates are easy to collect and study and also make good indicators of stream health with many species of macroinvertebrates labeled as indicator species. For example, mayflies are very sensitive to pollution in streams (U.S., 2011). On the other hand, chironomids are tolerant of pollution in streams (U.S., 2011). The U.S. Environmental Protection Agency (EPA) samples and studies macroinvertebrates to aid in determining stream health (U.S. Environmental Protection Agency, 2006). Studies need to be done in the Ozarks to determine and develop a base line for healthy streams. This will aid in assessing and monitoring the health of headwater streams in the Ozarks.

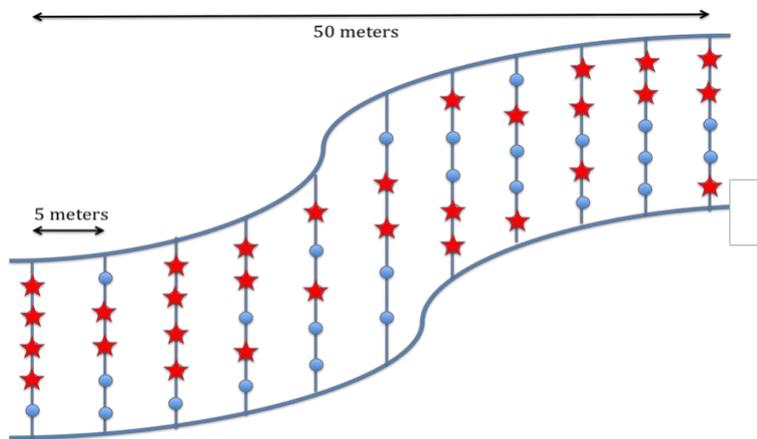
With this in mind we sought to accomplish three objectives in our study: to determine stream health based on known indicator species of macroinvertebrates, to determine substrate and/or water hydrology preferences of dominant taxa, and to examine community structure of macroinvertebrates in a headwater stream. We hypothesized that microhabitat variables and stream hydrology would play a major role in the spatial distribution of macroinvertebrates with community structure possibly playing a secondary role.

## **Methods**

### **Study Stream**

We chose to study the Partee Spring branch of West Livingston Creek, a first order stream in the Ozark National Forest approximately 13.5 km north of Mountain View, Arkansas, in North

Central Arkansas. It is a perennial stream approximately one hundred meters long from its beginning at Partee Spring to its confluence with the main stem of West Livingston Creek. It is surrounded by dense riparian vegetation consisting mainly of mixed oak-hickory forest and scattered pine with dense underbrush. No houses or farms are currently located in its watershed, and it has not been considerably impacted by humans for many years. We selected a fifty-meter



reach of the stream, primarily composed of riffle habitat. We established transects every five meters along the length of the reach and five points equidistant from each other on each transect.

**Figure 1: Illustration of stream reach with randomly chosen sample points marked**

points along the reach. We used a random number generator to select thirty points from these fifty-five to be our sampling points (Figure 1).

This generated a total of fifty-five

### Microhabitat Measurements

At each of our thirty sampling points we measured percent canopy cover with a handheld spherical densiometer, water depth (cm), and water velocity (m/s) at 60% depth with a Marsh McBurney<sup>TM</sup> flow meter (Bovee and Milhous, 1978). We also quantified approximate percentages of different substrate types and organic cover for each point using a grid measuring 30.5 cm by 30.5 cm divided into twenty-five 6.1 cm by 6.1 cm squares. At each point we placed the grid over the sample point and counted the number of squares filled by each substrate type. We then multiplied those numbers by four to find the approximate percentages of each substrate type for each point (i.e. 16 squares x 4 = 64%). We classified inorganic substrates by size using a

modified Wentworth scale (Cummins, 1962). We also measured four categories of organic substrates, bryophyte cover, leaf litter, small woody debris, and large woody debris. Water and sediment samples were taken from the stream to test for Ammonia and Nitrite. A total of thirteen sediment and water samples were taken, one sediment sample and twelve water samples. The water samples were taken periodically at 1.4, 2.8, 5.2, 11, and 13 meters from the downstream end of the reach, six from midstream and six from near the bank.

### **Macroinvertebrate Collection**

Macroinvertebrates were sampled using a modified kick net with a mouth 30.5 cm by 30.5 cm and an attached dolphin cup. This net was placed directly downstream of each sample point (.09 m<sup>2</sup>). We manually disturbed the substrates for thirty seconds per sample point allowing any macroinvertebrates and debris disturbed in the process to be washed into the net by the current. Each sample thus collected was then placed into a labeled collection cup and immediately preserved in ethanol.

### **Laboratory Work**

We took twenty-nine samples back to the laboratory for analysis. Originally, we had thirty total samples, but we experienced data loss at one of our sample points thus giving us a total of twenty-nine samples. For each sample we separated the macroinvertebrates from the debris, counted them, and identified them to family using a dissection microscope. We also classified the macroinvertebrates into four functional feeding groups (shredders, grazers, collectors, and predators) using *An Introduction to the Aquatic Insects of North America* (Merritt, Cummins, & Berg, 2008).

### **Statistical Design**

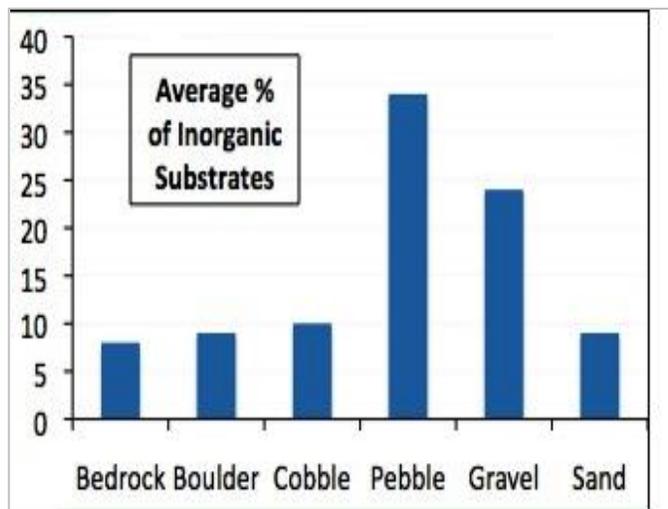
For data analysis, we used linear regression analysis to determine if and how microhabitat variables and macroinvertebrates were related to each other. We also used principal components analysis (PCA) to analyze the community structure of macroinvertebrates and how it was affecting the macroinvertebrates' spatial distribution in the creek.

**Results**

Our study stream was composed of a very heterogeneous mixture of microhabitats. As depicted in Table 1, the habitat data we collected showed a very wide range of values for all of the microhabitat variables we measured with the exception of canopy cover. The average percentages of inorganic substrates were particularly interesting. Pebble and gravel are common substrate sizes in headwater streams in the Ozarks. In our stream, however, we not only had significant average percentages of pebble and gravel but also of all four of the other sizes of inorganic substrates as well: bedrock, boulder, cobble, and sand (Figure 2). This allowed us to be more confident that our data would accurately represent all six different sizes of inorganic substrates.

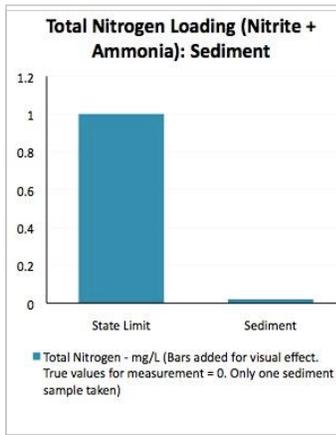
	Average	Maximum	Minimum
Bedrock	8%	100%	0%
Bolder	9%	68%	0%
Cobble	10%	36%	0%
Pebble	36%	88%	0%
Gravel	24%	80%	0%
Sand	9%	76%	0%
Bryophyte Cover	33%	100%	0%
Leaf Litter	4%	24%	0%
Small Woody Debris	2%	32%	0%
Large Woody Debris	1%	24%	0%
Water Depth	16.7 cm	42.6 cm	1.7 cm
Water Velocity	0.14 m/s	0.58 m/s	-0.04 m/s
Canopy Cover	97%	98%	95%

**Table 1: Average, maximum, and minimum percentages of microhabitat variables**

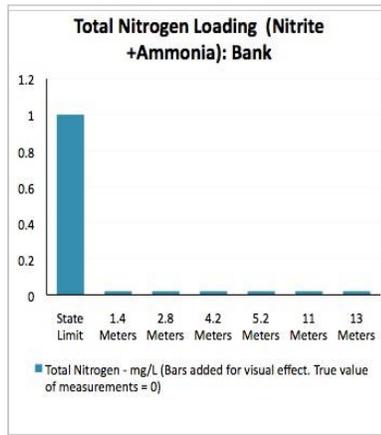


**Figure 2: Average percentages of inorganic substrates**

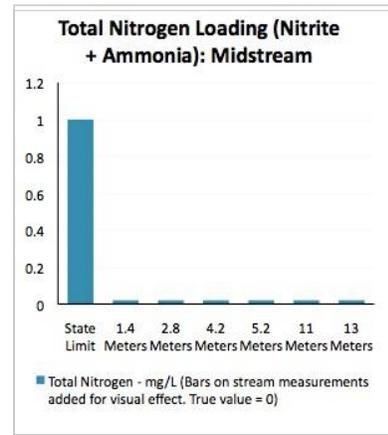
The sediment and water samples that were collected were tested for Ammonia and Nitrite. In the State of Arkansas the state limit for Ammonia plus Nitrite (Nitrogen Loading) is 1 mg/L. Both the one sediment sample and all twelve of the water samples were tested and found to contain 0 mg/L, indicating a stream with no Nitrogen pollution (Figures 3-5).



**Figure 3: Total Nitrogen loading of 1 sediment sample compared to Arkansas state limit**

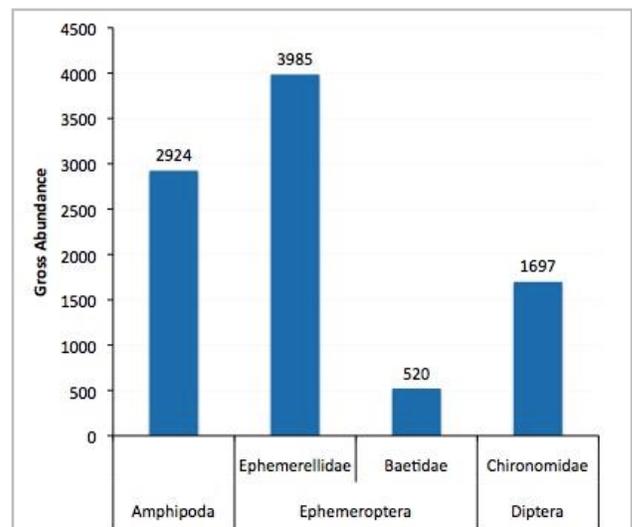


**Figure 4: Total Nitrogen loading of 6 water samples from near the creek bank compared to Arkansas state limit**



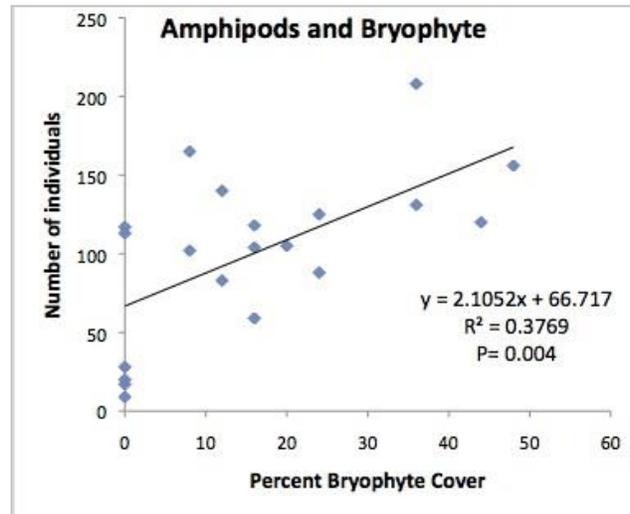
**Figure 5: Total Nitrogen loading of 6 water samples from midstream compared to Arkansas state limit**

We collected, classified, and counted a total of 9,781 macroinvertebrates from 26 families and 8 orders. Four taxa, Amphipoda, Ephemerellidae, Baetidae, and Chironomidae, dominated our samples (Figure 6). Together these four taxa made up ninety-three percent of the total number of macroinvertebrates we collected. Ephemerellidae was our most abundant macroinvertebrate family with 3,985 total individuals. Ephemeroptera (mayflies) was our most abundant order with a total of 4,547 individuals.



**Figure 6: Gross abundance of four major taxa**

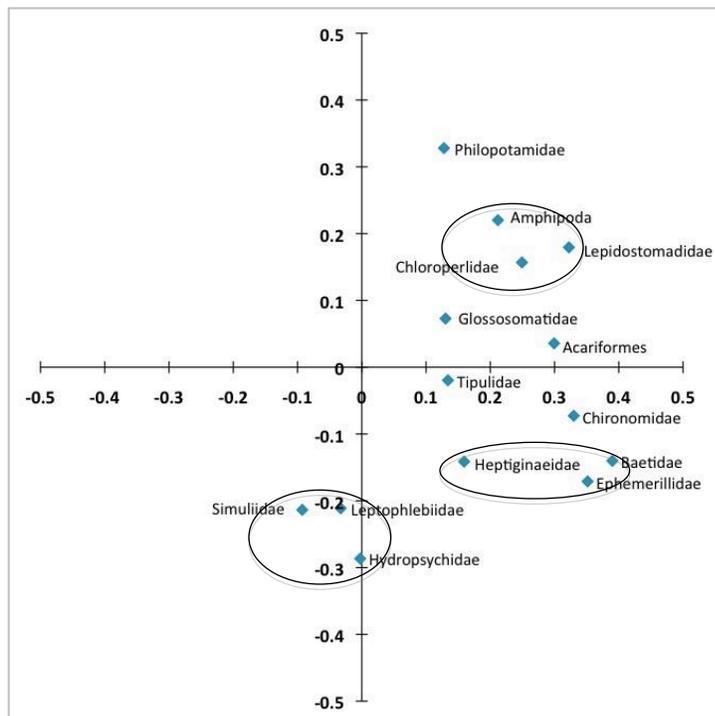
After collecting all of our macroinvertebrate and microhabitat data, we ran linear regressions on macroinvertebrate groups versus different microhabitat variables. Contrary to what we expected, we found only one significant relationship between macroinvertebrates and microhabitat variables. We discovered that the percentage of bryophyte cover from 0-50% and the number of individuals in Order



**Figure 7: Linear regression of percent bryophyte cover from 0-50% and number of Amphipods**

Amphipoda had a significant positive relationship (Figure 7). Above fifty percent the relationship became negative; however, even though it was negative, the relationship was not significant above fifty percent.

After running a number of linear regressions and finding that microhabitat was not playing a

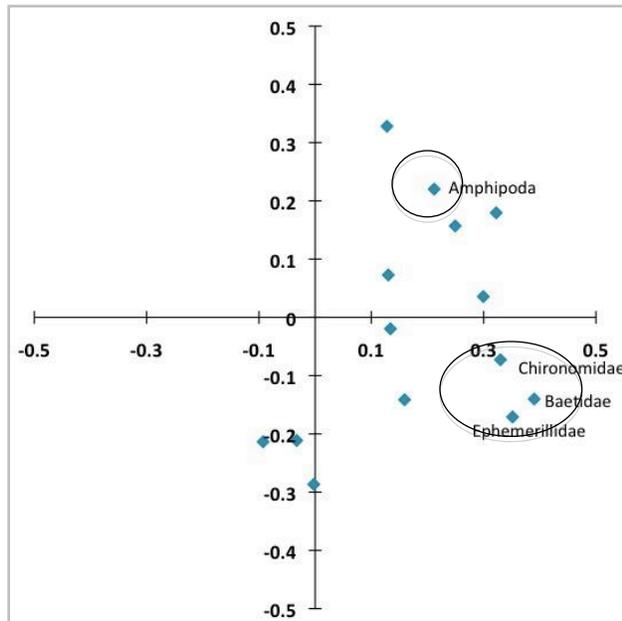


**Figure 8: Principal Components Analysis of macroinvertebrate taxa**

significant role in macroinvertebrate dispersal, we ran principal components analysis on the different macroinvertebrate taxa (Figure 8). By doing so we were able to examine the macroinvertebrates' community structure and how it affects their dispersal in the stream. We found three distinct groupings among the

macroinvertebrates on our PCA. The first group consisted of Amphipoda, Lepidostomatidae, and Chloroperlidae. The second consisted of Heptageniidae, Baetidae, and Ephemerellidae, and the last group consisted of Simuliidae, Leptophlebiidae, and Hydropsychidae. We also noted that Glossosomatidae and Philopotamidae were located fairly close to the first group containing Amphipoda, Lepidostomatidae, and Chloroperlidae.

We also examined the relationships of the four dominant taxa on the PCA (Figure 9). We



**Figure 9: Principal Components Analysis of macroinvertebrates emphasis on four major taxa**

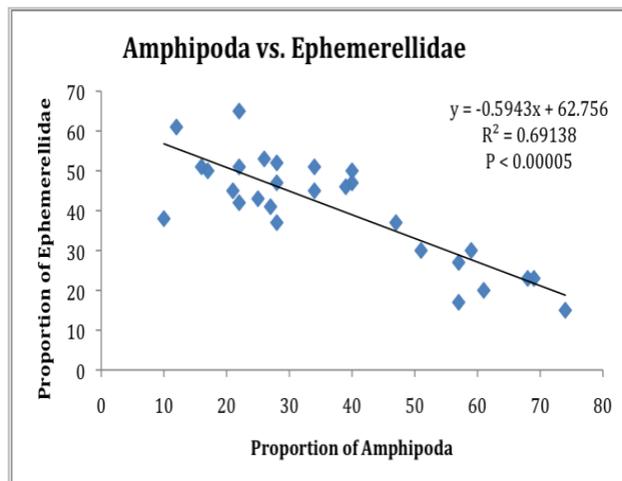
noticed an obvious grouping of Ephemerellidae, Baetidae, and Chironomidae, three of our four major taxa. Amphipoda, however, was not located near these three.

This prompted us to run linear regressions on the proportion of Amphipoda vs. the proportion of the other three major taxa, especially the most abundant taxa,

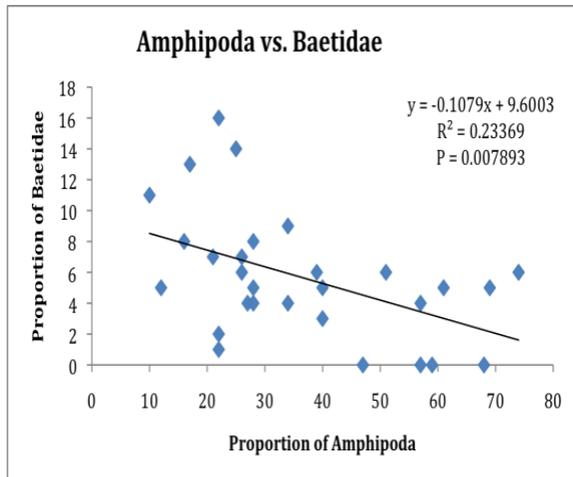
Ephemerellidae. The proportions of

Ephemerellidae, Chironomidae, and Baetidae all had significant negative relationships with the proportion of Amphipoda (Figures 10-12).

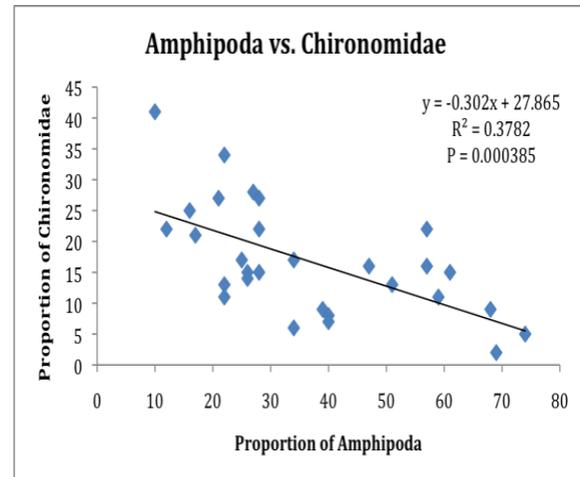
The proportion of Ephemerellidae versus the proportion of Amphipoda (Figure 10) was especially significant ( $P < 0.00005$ ,  $R^2 = 0.691$ ).



**Figure 10: Linear regression of the proportion of Amphipoda vs. the proportion of Ephemerellidae shows a very significant negative relationship**



**Figure 11: Linear regression of proportion of Amphipoda vs. proportion of Baetidae shows a significant negative relationship.**



**Figure 12: Linear regression of proportion of Amphipoda vs. proportion of Chironomidae also shows a significant negative relationship.**

### Discussion

Individuals in Order Ephemeroptera (mayflies) are very sensitive to pollution and therefore serve as good indicator species (U.S., 2011). Four of the families of macroinvertebrates we collected were from Order Ephemeroptera including two of our four major taxa (Ephemerellidae and Baetidae). Based on the gross abundance of mayflies we collected (4,547 individuals) as well as the fact that our samples contained four different families of mayflies (Ephemerellidae, Baetidae, Heptageniidae, and Leptophlebiidae), we determined that our study stream was healthy. The chemical test results from the sediment and water samples discussed previously also reinforced this finding.

Using PCA we found the macroinvertebrate taxa formed three groups according to functional feeding groups classifications. The first group (Amphipoda, Chloroperlidae, Lepidostomatidae) was composed of predators, scavengers, and shredders. The second group (Ephemerellidae, Baetidae, Heptageniidae) was made up of scrapers, and the last group (Simuliidae,

Leptophlebiidae, and Hydropsychidae) consisted of filterers. The scraping and filtering groups were located close to each other but far from the predator/scavenger/shredder group. This is intriguing and intuitive because as scrapers feed, they dislodge small particles that become suspended in the water. Filterers feed on those dislodged particles by filtering them out of the water. It follows logically that these two groups of macroinvertebrates would be near each other because one feeds on what the other leaves behind when feeding. It is also reasonable that both of these groups would stay far away from the predator/scavenger/shredder group. The further away the prey is from the predator, the less likely it is to be eaten.

Interestingly, not all non-predator taxa were located at a distance from the predator taxa. As mentioned previously, Philopotamidae and Glossosomatidae were located close to the predator/scavenger/shredder group on the PCA. Both taxa are from Order Trichoptera (caddisflies) and build protective cases for themselves. These two caddisflies may be able to live in close proximity to predators because they carry around their own protective cases with them.

We also found that Ephemerellidae, Baetidae, and Chironomidae, three of our four major taxa, had a definite inclination to be spatially located at a distance from the fourth major taxa, Amphipoda, on our PCA. At first, we accredited this spatial distribution to possible functional feeding group (FFG) overlap and thus resource partitioning, but as we studied the functional feeding groups of these taxa, we found that this was not the case. Individuals in Order Amphipoda are generally classified as shredders, but none of these other three taxa share this same classification. After realizing that the spatial partitioning of the taxa was not being caused by FFG overlap, we continued to research and found that Amphipods, though generally emphasized as shredders, are also predators of other macroinvertebrates (MacNeil, Dick, & Elwood, 1996). We concluded that the same predator-prey pressure that may have been driving

the spatial distribution of groups of non-predator macroinvertebrates away from the predator group discussed earlier may also be the force that is driving the spatial distribution of Ephemerellidae, Baetidae, and Chironomidae away from Amphipoda.

### **Conclusions**

We found that our stream was indeed a healthy first-order stream with abundant and diverse biological life. We determined that microhabitat variables did not play a major role in dispersal of macroinvertebrates in the study stream; however, we did find that community structure was influenced strongly by feeding relationships. Scrapers and filterers occupied positions close to each other and far away from predators. Predator-prey relationships may also play a role in the dispersal of the four major taxa, with all three of the non-predator taxa, Ephemerellidae, Baetidae, and Chironomidae, grouping together at a distance from the predator taxa, Amphipoda.

We found that in this stream it appears that the macroinvertebrates and specifically their feeding habits have a much greater effect on their spatial distribution in the stream than the varying microhabitats have on it. While this study provides compelling data regarding community structure of macroinvertebrates in a headwater stream, further research needs to be conducted in the Ozarks to more accurately assess and monitor headwater streams in this area.

### References

- Bovee, K.D. & Milhous. R. (1978). Hydraulic simulation in instream flow studies: Theory and techniques. Instream Flow Information Paper: No. 5: Fish and Wildlife Service FWS/OBS-78/33. 156 p.
- Cummins K. W. (1962). An Evaluation of some techniques for the collection and analysis of benthic samples with special emphasis on lotic waters. *The American Midland Naturalist*, 67(2), 477-504.
- MacNeil, C., Dick, J. T. A., and Elwood, R. W. (1996). The trophic ecology of freshwater *Gammarus* spp. (Crustacea: Amphiphoda): problems and perspectives concerning the functional feeding group concept. *Biological Reviews of the Cambridge Philosophical Society*, 72(3), 349-364.
- Merritt, R.W., Cummins, K.W., & Berg M.B. (Eds.). (2008). *An Introduction to the Aquatic Insects of North America, Fourth Edition*. Dubuque, IA: Kendal/Hunt Publishing Company.
- Meyer J. L., Strayer D. L., Wallace, J. B., Eggert, S. L., Helfman, G. S., & Leonard, N. E. (2007, February). The contribution of headwater streams to biodiversity in river networks. *Journal of the American Water Resources Association*. 43(1), 86-103.
- U.S. Environmental Protection Agency. (2006, December). Wadeable streams assessment: a collaborative survey of the nation's streams. Retrieved from <http://owl.english.purdue.edu/owl/resource/560/10/>
- U.S. Environmental Protection Agency. (2011, January 31). Mayflies. Retrieved from <http://www.epa.gov/bioindicators/html/mayflies.html>

U.S. Environmental Protection Agency. (2011, January 31). Midge Flies. Retrieved from

<http://www.epa.gov/bioindicators/html/midgeflies.html>

Vannote, R. L., Minshall, G. W., Cummins, K. W., Sedell, J. R., & Cushing, C. E. (1980). The river continuum concept. *Canadian Journal of Fisheries and Aquatic Sciences*, 37, 130-137.

NOTES:

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