

MONTANA INBRE

IDEA Network of Biomedical Research Excellence



Summer
2018
Newsletter

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The Spirit of Our People

Undergraduates at BCC investigate solutions to stress

A Teaching & Learning Garden at the Food Bank

Undergrad, Jen Mikkelson, turns research into vegetables & opportunity

Mark Schure's unique approach to suicide-prevention research



MSU Undergraduate, Jen Mikkelson, at the Gallatin Valley Food Bank
Photo by Adrian Sanchez-Gonzalez, MSU Communications

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MONTANA INBRE

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Jen Mikkelson and Jill Holder at the Gallatin Valley Food Bank | Photos by Adrián Sanchez-Gonzalez, courtesy of MSU Communications

Undergraduate Research in Action

INBRE Public Health Intern, Jen Mikkelson, partners with the Gallatin Valley Food Bank to create a youth gardening program. The results are impacting food security, youth education, and community wellbeing.

Biomedical research at Montana State University doesn't always require a lab coat, says History major and Montana INBRE Public Health Intern, Jennifer Mikkelson. For her, lab equipment varies by the season and usually includes a shovel and a T-shirt that can handle a little dirt.

That's because Mikkelson's lab is actually a new teaching and learning garden located just a few steps outside the Gallatin Valley Food Bank in Bozeman. Food and Nutrition Director at the Food Bank, Jill Holder, says that the garden, curriculum materials and network of community partners underpinning the initiative all exist largely due to Mikkelson's efforts over the past two years.

"Jen has really shaped the direction of this project, and the information she's helped us gather has been really instrumental getting everything off the ground," said Holder. "Without her, this project wouldn't be nearly as far along as it is."

What began as a modest feasibility study in October 2016 soon blossomed into something much larger and more meaningful, says Mikkelson.

"I thought at first that I was maybe going to do a short project, but there was always so much more to do," she said. "It became obvious from the nature of the work that this was going to require more time and effort to do well."

"When I think about the other things I could have been doing with my time, this feels like one of the most formative parts of my undergraduate experience."

Thanks to Mikkelson, says Holder, the food bank's first-ever summer gardening program for at-risk youth is just now wrapping up. During the nine-week program, Holder has observed the youth participants discover a sense of belonging, and she anticipates the effort will eventually generate hundreds of pounds of fresh produce for the food bank to distribute.

"They just kept showing up each week," she said. "Youth participants reported back that they had built strong bonds, and some actually said they would miss seeing one another when the summer session ended."

It became clear early on from partner input, Mikkelson said, that the program would need to offer something more than gardening skills to make an impact. That feedback led her to reach out to MSU's Human Development Clinic, which agreed to provide counseling services for youth.

"Looking back, I think that there would be huge gaps in our program without Human Development Clinic involvement," said Mikkelson. "For youth, giving back to their community by growing healthy food for people in need is a net positive, but bracketing it with professional-level counseling makes the experience that much more powerful."

The collaboration has been mutually beneficial, says Human Development Clinic Director, Heidi McKinley.

"It's given our master-level counseling students opportunities to see different variations of counseling and practice their skills in different settings," she said.

"I also think that having counselors interact in a community setting helps to reinforce efforts to decrease the stigma

of counseling,” she added. “We really promote a wellness model that says anyone and everyone can benefit from counseling regardless of what’s going on in their life.”

Despite all of the hard work and time spent on the project, Mikkelson says that she has gained far more from building the program than she ever expected.

“When I think about the other things I could have been doing with my time, this feels like one of the most formative parts of my undergraduate experience at MSU,” she said. “I’ve gained a lot of really practical and useful career skills that most students can’t say they got as an undergraduate.”

She added, “As a soon-to-be graduate, I feel like I have a lot to offer prospective employers thanks to these experiences.”

Mikkelson’s assessment of her employability might be an understatement, says Holder.

“I think researching a program and taking it from a startup and seeing it through to an actual operation is pretty huge,” she said. “There was a lot of collaboration and group input along the way, which required give and take, and being able to navigate that piece is a really marketable skillset for someone just coming out of school.”

Although Mikkelson acknowledges that her community-centered research is distinct from more traditional, lab-based research methods, she nevertheless sees similarities.

“In retrospect everything appears to fit together neatly, but in reality [my research] always felt stop-and-go, like wandering in a maze, hitting a dead end, having to trace your way forwards and backwards before finding a solution,” she said. “When it comes to research and design, you really don’t know what’s going to happen until you dive in, and I think that probably holds true regardless of setting.”



Story continues on next page ...



Mikkelson | Food Bank Continued ...

Despite being one of the driving forces behind the project, Mikkelson is quick to credit others for the successful launch. “AmeriCorps Vistas, Mattie [Griswold] and Rachel [Schorr], as well as Jill [Holder] and [MSU graduate student] Emily Cohan, were all instrumental in keeping the project moving forward,” she said. “Towne’s Harvest Garden let us use their greenhouse space in MSU’s Plant Growth Center, and the ASMSU Student Legal Services office helped connect us with Youth Court Services.”

She added, “We’ve all built something here that we can be really proud of, and being a part of it from the beginning has been extremely fulfilling.”

Holder sees even more opportunities for the garden in coming years.

“Long term, this is going to be a great resource for people in the community, and there will be many ways for folks to get involved and use it as a gathering place,” she said. We don’t know what it fully means yet, but a shared outdoor classroom, an outlet for wellness programs, a location to discuss our agricultural history and a space to encourage food security are some of our goals for the Learning Garden.” ■



RESEARCH Spotlight

Mark Schure

By Susan Higgins

“Most people living in Montana just don’t have access to the same resources commonly available in more urban areas. That’s one of the reasons our project is so critical.”



Mark Schure | Photo MSU Communications

Over a decade’s worth of statistics show that Montana, predominantly a rural state, consistently ranks among the highest – if not the highest – per-capita suicide rates in the US. Montana State University associate professor and Montana INBRE investigator, Mark Schure, has spent the past few years responding to the crisis.

According to Schure, people living in Montana’s more rural corners are among the most at risk in the state due, in part, to poor access to traditional forms of mental healthcare. Schure says that the ripple effects of suicide reach virtually everyone in the state on one level or another.

“Most people living in Montana just don’t have access to the same resources commonly available in more urban areas,”

he said. “That’s one of the reasons our project is so critical.”

Initiated from MSU’s Center for Mental Health and Research Recovery and supported by a grant from Montana INBRE, the project Schure and his team have been field testing is modified version of an Internet-based mental health intervention called *Thrive*. Originally developed by Waypoint Health Innovations, *Thrive* is a computerized Cognitive Behavior Therapy (cCBT) program designed to help persons positively cope with depression and anxiety symptoms.

Schure says that programs like *Thrive* can help rural Montanans overcome common barriers that can prevent people from



getting help – barriers such as the cost of traditional care, the perceived stigma of receiving counseling services, and the long distances between where Montanans live and where appropriate health care can be found.

“Basically, anyone who has regular access to high speed internet and has a *Thrive* account can use the program,” said Schure. “That’s a useful tool in a place like Montana where the nearest town can be dozens of miles away along a bumpy dirt road.”

According to Schure, *Thrive* uses programmed algorithms to curate tailored educational videos based on the user’s input regarding how she or he is feeling and doing. The videos provide information, guidance and feedback to the user on ways to improve their mental wellbeing – feedback that Schure says can make a difference.

“*Thrive* gives depressed people the tools to cope and avoid situations from getting worse,” he said. “From a public health perspective, we look for interventions that prevent poor health outcomes and lower quality of life.”

To test whether *Thrive* could work in Montana, Schure partnered with MSU Extension faculty, Sandy Bailey, and non-profit organization, One Montana, to demo the program. The goals of the demo were to gauge how well the program reduced depression and anxiety symptoms within a Montana-specific context and to develop a waitlist for a future randomized controlled trial. In 2016, the research team conducted focus groups and key informant interviews throughout the state to understand community members’ perspectives on the program’s potential to help with depression.

“The focus groups and interviews were helpful in developing new videos that would better resonate with rural Montanans,” Schure said. “We call the modified program *Thrive-Montana* in part to help convey that specific placed-based relevancy for participants.”

After those adaptations, Schure’s research team then worked with MSU Extension agents to identify and use community-specific ways to effectively recruit first-phase study participants. They set an initial

goal of recruiting 464 adult Montanans, and all aspects of the trial, from screening to intervention to evaluation, were conducted online. Preliminary results of that study are just starting to take shape.

“The first phase evaluation outcomes have been positive, showing overall short-term marked improvements in depression and anxiety symptoms,” said Schure. “We’re also seeing improvement in participants’ ability to function better socially and in psychological resilience – a belief in one’s ability to cope during adversity.”

He added, “A program like this can never really replace [in-person talk therapy], but can offer additional ways to learn positive coping skills.”

[Montana] INBRE has been essential for laying the groundwork for a larger NIH proposal.

What’s next for Schure?

Schure says that evidence from the current *Thrive* trial has helped secure funding for suicide prevention programming with the Montana Department of Public Health and Human Services in Helena. He anticipates that these funds will allow his team to offer the *Thrive-Montana* program for free to 1,000 additional adult Montanans in the coming years. The plan, says Schure, is to dig deeper and rigorously test whether the program can reduce suicidal thinking.

In addition, Schure is also working with a communications company to develop tailored marketing messages and strategies that can effectively reach individuals who are most at risk for suicide and could benefit from the program.

“What’s really exciting is that if we build on the current momentum of providing evidence-based mental health programs in this state, we will significantly raise awareness of mental health and increase our opportunity to make a meaningful impact,” he said.

Going forward, Schure plans to apply for additional National Institutes of Health

funding in order to expand on his work with *Thrive* and similar types of mental health interventions.

“[Montana] INBRE has been essential for laying the groundwork for a larger NIH proposal,” he said.

Schure is also interested in projects that pilot non-traditional therapies – a push he views as an opportunity to examine innovative interventions that have the potential to help address stress and positively impact a variety of mental health issues. In this vital work, Schure anticipates rich collaborations with other researchers with multiple skillsets and similar passions.

“Traditional evidence-based methods have great utility,” he said, “but there are so many other promising avenues to examine.” ■

Learn more about Mark Schure’s INBRE-supported research:
inbre.montana.edu/current-research/schure.html



The Spirit of Our People

Since 2012, an INBRE-facilitated, student-led research collaboration has investigated the correlation between stress level and disease susceptibility on the Blackfeet Reservation. This summer, a group of undergraduate students is building on previous work and taking the research in new directions.

L to R: Megan Gordon, Sequoia Reevis, Wil Horn, Scott Ollinger, Jerry Racine, Davida Grant, Aidan Higgins.

“I’m *really excited* about this summer,” says Wil Horn, a second-year liberal arts student at Blackfeet Community College in Browning, Montana.

He’s sitting at a long, rectangular meeting table inside of the college’s main office. The way he emphasizes the words *really* and *excited* conveys an obvious sincerity.

At the table, Wil is flanked by seven other undergraduate researchers. This cohort of eight has been working together in a research lab for almost a year now, and in addition to their regular research duties, they’ve been planning, at first quietly and then ever more vociferously, something new and altogether unique. Now, after months of lengthy conversations and overcoming obstacles, everything is starting to coalesce into an actionable plan. Judging by the other looks around the table, Wil’s enthusiasm is catching.

“With this new positive direction,” he continues, “I can’t wait to see how much change is possible, to move a little bit beyond some of the trauma-focused aspects

of previous research, and to do a more controlled study focusing on positive, active interventions.”

“This is a community college, but there are things going on here that you wouldn’t expect.”

Wil is referencing a subtle but consequential shift in the way that he and the other Montana INBRE students at the tribal college are viewing their work – and their roles – as undergraduate researchers.

This summer, the eight undergraduate researchers – **Megan Gordon, Davida Grant, Aidan Higgins, Wil Horn, Scott Ollinger, Jerry Racine, Sequoia Reevis, and Jolynn Running Wolf** – are planning to take a longstanding research collaboration between Blackfeet Community College and Montana State University a step further than it’s ever gone before.

Understanding what that means requires a little zooming out.

Books and Covers

Just east of the Continental Divide along the Rocky Mountain foothills in northwestern Montana, the Blackfeet Indian Reservation traces some of the most spectacular country in North America. Larger than Delaware, the reservation’s 2,400 square miles are the quintessence of high country shortgrass prairie – an expansive, rolling grassland interspersed with biologically productive rivers, lakes, creeks, and woods. To the west, the high ridgelines of Glacier National Park retain their icy white swatches year-round, feeding a constellation of lakes, creeks and streams with names like *Iceberg*, *Avalanche*, and *Two Medicine*. To the north, the same 49th parallel that divides the United States from Canada also splits the reservation from the northern expanses of the Blackfoot Confederacy’s historical territory.

Here, where the grass greets the mountains, stands the small, bucolic town of Browning – Blackfeet Reservation headquarters, tourism gateway to Glacier, and home to Blackfeet Community College. BCC is a higher-education, workforce-training institution

attended by some 450 students studying fields like business, information technology, education, health, nursing, mathematics, and human services.

Because it's located in a small, rural town and focuses on two-year programs, BCC perhaps isn't the first place one might expect to find a thriving metabolic research lab or a group of ultra-dedicated undergraduate students leading a sophisticated biomedical research project. But much like books and covers, one ought not judge a college by its ivy. As BCC health and education student, Jerry Racine, puts it,

"This is a community college, but there are things going on here that you wouldn't expect."

Racine is referring to a Montana INBRE-supported, student-run research collaboration between BCC and MSU that has been investigating the correlation between stress level and disease susceptibility on the reservation since 2012. During that time, undergraduate students at the tribal college have established baseline stress biomarker levels and uncovered a network of correlations between stress and other health problems. In addition to those more quantifiable results, the collaboration has enhanced scientific curriculum at the community college, led to infrastructure improvements and helped build deeper connections between faculty and students at both institutions.

Students say that working as undergraduate researchers has been transformative and uplifting, even if the imperative behind the work touches on matters of life and death.

Stress

Looking out across the Blackfeet Reservation's spectacular views of mountains and prairie, a newcomer might be forgiven for at first failing to notice a quiet current of grief and stress running through. For many of the sovereign Blackfeet Nation's members, the pride, deep familial connections and strength that accompanies membership in a closely knit community also come with a disproportionate share of heartbreak.

The literature is clear that American Indian and Alaska Native communities in the US endure a greater frequency and intensity of



Scott Ollinger organizes equipment at the BCC lab.

We wanted to bring a better light to research, deemphasize things like trauma and see things go in a more positive direction. The research needs to give something back more to the community in terms of health.

infectious diseases, autoimmune diseases, cancers, and other maladies when compared to the general population. These statistics unfortunately hold especially true in Montana, where state reports indicate that American Indians live 20 years less than other Montanans, on average.

Let that sink in for a moment. A Native person living here can expect to see around 7,300 fewer sunrises, miss roughly 21,900 opportunities to share a meal with a friend or loved one, and leave something like 168 million breaths undrawn in his or her lungs. Among closely connected communities like the Blackfeet, the ripple effects of such losses – often experienced as grief and stress – travel far and fast.

Stress, of course, is something that affects everyone to one degree or another. When short-lived and manageable, stress can be relatively benign or even motivating. But over the past two decades, scientists have come to understand that prolonged, unaddressed stress – typically called chronic stress – has toxic effects on the body and is linked with a variety of diseases and disease-related complications. Chronic stress,

some hypothesize, may even play a causal role in diseases like diabetes, heart disease, depression and some autoimmune disorders.

Line the Montana health disparity statistics up against what is now known about chronic stress, and one can't help but wonder whether the increased disease susceptibility and early mortality among Natives like those living in Montana might somehow be tied to excessive cortisol levels in the body. That question is precisely what INBRE undergraduate students at BCC have been researching for the past six years on the Blackfeet Reservation – with an impressive list of achievements to date.

But ask any one of the eight undergraduate researchers working in the BCC lab this summer, and they'll say that the full scope of what's possible is only now beginning to emerge.

New Directions

Back at BCC's rectangular meeting table, the BCC students are relaying the story about how, over the past year, each of them came to sense that something was missing from the research.

Several indicate how they are proud of previous accomplishments, yet also acknowledge a growing desire to contribute something more immediately useful to their community and to move the project forward in more positive ways.

“Previous research sometimes focused on the negative too much, and what we really wanted to contribute wasn’t happening,” says pre-engineering student, Scott Ollinger.

“We wanted to bring a better light to research, deemphasize things like trauma, and see things go in a more positive direction,” adds health-science student, Davida Grant. “The research needs to give something back more to the community in terms of health.”

Students recall how, during initial conversations last winter, it wasn’t immediately clear what that something would be. Brainstorming sessions revealed new possibilities. Discussing those possibilities revealed new challenges and opportunities. Solving those challenges brought on a lot of extra work – meaningful work, but work nonetheless. For instance, no one predicted that revising the study design would necessitate inventing an entirely new intervention, bringing several new technologies and measures on board, and taking on the daunting task of revising the project’s institutional research ethics review, otherwise known as the IRB.

“[Revising the IRB] turned out to be really challenging, but a very useful and ultimately a collaborative process,” recalls pre-engineering student, Aidan Higgins. “We bounced ideas off one another and it was really a great learning experience.”

Upon hearing this, INBRE project leader and BCC Math and Science Department Chair, Betty Henderson-Matthews, who’s also sitting at the rectangular table, lets loose a small smile. The grin divulges a sliver of how pleased she is with the level of ownership that students are taking.

“I’ve really been impressed with what the students have accomplished and will accomplish with this research,” she eventually confirms. “They’ve really taken the lead on getting IRB approval, revising the research design, and are sharing responsibilities while still keeping a sense of humor and keeping up with other schoolwork. That’s really a lot, and I couldn’t be more proud.”

As the students continue taking turns explaining the change, the totality of their plan emerges only gradually, as though slowly revealing parts of a mosaic, piece by



Davida Grant works with pipetting equipment at the BCC lab.

I really envision this research as bringing a positive light to BCC, giving back to the community, and helping contribute to a healthier community overall.

piece. They describe wanting to improve health on the reservation – not just measure stress. They want to bundle together several well-known stress-busters, including exercise, recreation, meaningful social interaction, time in nature, encounters with beauty. They want to package everything together in a way they hope will be relevant and meaningful for Blackfeet participants.

It’s a big research question with a lot of moving parts, but the center of everything is an experimental participant group that, over the summer, will go on a series of group hikes to culturally important locations in and around Glacier National Park. The guided group hikes will take care of the exercise and social-connection components, while the location will provide the nature, beauty and cultural relevancy. During those hikes, participants will also undergo planned discussions meant to elicit a sense of belonging and place.

“We thought it was important to utilize special places and incorporate the beautiful landscape that surrounds Browning,” said Grant. “Ours is really a beautiful part of the world.”

There are a lot of variables, but students predict that, over time, repeated doses of this anti-stress mélange will move the dial on participant wellbeing, which the students plan to track in a variety of ways, including measures for anxiety, depression, salivary cortisol and C-reactive protein. Students also plan to monitor participant sleep quality and activity levels using wristwatch technology made available through the ongoing collaboration with MSU.

Racine, who has been working in the lab for several semesters and is also incidentally the head football coach at Browning High School, says that he has seen firsthand how physical activity can be transformative.

“Our people were historically very active,” he says. “We’re not a ‘sit-down’ people. “I’m really looking forward to being able to say with confidence whether our intervention works.”

Assuming the students’ intervention does move the dial on participant wellbeing, the deeper hope is that the research will reveal more meaningful and perhaps more durable insights into improving health on the reservation in the future.

“I hope this research eventually leads to more recreational opportunities, contributes to a healthier community, and ultimately prevents our children and loved ones from needing treatment for diseases in the first place,” says Racine.

Opportunity

Whatever insights the new research might one day uncover, listening to the students' story makes clear that working in a research lab has already been transformative.

"When it comes to jobs and internships, I always [used to think] of working behind a desk, you know, no pay, pushing papers for other people, but this is the opposite," says health science student, Sequoia Reevis. "Work doesn't have to be like that. Science can be fun and meaningful and full of opportunity."

Megan Gordon, who studies math and science, has worked in the lab for several semesters. She credits the undergraduate research experience with helping her refine her future career path.

"Originally I took the job because I wanted money for school. But then I fell in love with the microbiology aspect of things, thanks in part to working with [MSU faculty and project mentor] Aga [Apple]," she says. "Now I see myself working in a lab professionally and hopefully in a hospital context close to my family in Browning."

Reevis also says the project has shown her that the world isn't always as it first appears – an insight she hopes to carry forward into a career as a respiratory therapist.

"When some of us [students] did a saliva sample on ourselves, I think I had one of the highest stress indicators of all of us," she recalls. "And I didn't feel particularly stressed at all, so I can see now how a lot of stress is hidden and people just don't know about it or think about it."

Talking with the students, there's a real sense that opportunities, perhaps once-hidden, are now materializing thanks in part to the INBRE-supported research.

"[Undergraduate research] can open more doors, and I can install lessons learned here into future classes," says Horn. "This expands opportunities, and it's great that it isn't just for science majors."

Research Culture

Listening to the students around the rectangular table talk, the thread that ties

everything together and the point to which the students repeatedly return is always a sincere desire to help the community.

"I really envision this research as bringing a positive light to BCC, giving back to the community, and helping contribute to a healthier community overall," says Higgins.

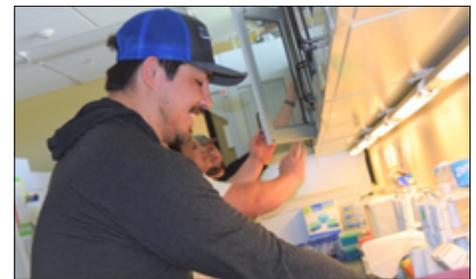
"It's great to know that the community has our back," adds Grant. "At first people were surprised that this level of research and academic work was happening at the community college in Browning, but people here are really impressed by what we can do."

[Undergraduate research] can open more doors, and I can install lessons learned here into future classes. This expands opportunities.

Although the students all know intuitively that community support isn't something to be taken for granted, there remain plenty of academics for whom this bedrock principle requires explanation.

In Indian Country, one doesn't have to dig too deep to find skepticism towards researchers, academic institutions and even western investigative methods. For some American Indians and Alaska Natives, the word research itself is a four-letter expletive eliciting all-too-recent memories of coercive participant recruitment schemes, reckless and unnecessary surgical experimentation on Native people and even heart-shattering stories of involuntary sterilization. Accounts such as these are tragically not an exhaustive chronicle of research abuses.

More recently, the 'paratrooper researcher' phenomenon – oblivious, big-institution academics who quick jump in to Native communities, collect sensitive samples, and then go AWOL – has deepened skepticism. For starters, this shortsighted approach is problematic because blood, hair and other samples are sacred to many Natives, and communities often want such samples treated with respect and returned once a study is completed. Related issues – data



ownership, publication rights, presenting information with requisite sensitivity and context, and making sure that community members actually benefit from the research – are difficult to navigate without a long-term commitment, open dialog and the infrastructure to manage processes properly.

Given this history, the fact that a research lab exists at all at Blackfeet Community College is something worth noting. Even so, a casual observer might still wonder why maintaining a lab of this sort is necessary when samples instead could be processed at MSU or even one of many private, fee-based labs.

The advantage in this case is that virtually everything – from biosamples to data, educational benefits, knowledge gains and skills – stays on the reservation under Native control and supervision. This small but critical detail is not lost on the study participants, say students.

"We had an elderly woman participant," recalls Reevis. "Her first question was, 'if I do this, will my samples stay [at BCC]?' And I told her, 'they're not going anywhere – they're staying right here.'"

Locating the lab at BCC doesn't just improve participant recruitment, retention, and trust, but student success as well, she adds.

"Personally, I'd feel like I'd really be stepping outside of my box if I were at a big school like MSU learning doing this type of research, but I just feel more comfortable working here with our community members."

Comments like these make clear that undergraduate researchers at BCC see this version of community-based research as quite distinct from the more problematic research varieties of the past. Some even suggest it might be part of new, more positive chapter in the history of research involving Native communities.

"I want our work here to inspire more BCC students to do research, and that their future research contributes to the foundation of a more positive research culture over time," says Horn.

Others still see potential for undergraduate research of this sort in communities beyond the Blackfeet Reservation.

"This type research could also be taken farther into different communities and they can tailor it and figure out how it could help their people," says Gordan. "There's stress everywhere. It's not just in Browning or on reservations. It's everywhere, but so is the potential for change."

And if those other communities don't happen to have a trusted lab for measuring salivary cortisol, now there's one in Browning, Montana, managed by tribal college faculty and staffed by Native undergraduate students.

Untapped Potential

"It's amazing what you can do with, you know, being consistent," said former INBRE student researcher, Dannette Spotted Horse, who has since graduated from BCC.

On a warm day in April 2017, Spotted Horse and several other BCC students drove 270 miles from Browning to Bozeman to present research findings at MSU's annual Undergraduate Research Celebration – the largest gathering of undergraduate research of its kind in the state. There, among a

swarm of other undergraduate researchers from around the state, Spotted Horse and fellow BCC students presented posters detailing their research from the previous year. Far from playing second-fiddle, the research that tribal college and community college students presented that day was on-par with, if not a notch above, comparable posters from the state's flagship research institutions.

High quality research coming from small colleges isn't an anomaly these days, says Montana INBRE Director of Student Programs, Sarah Codd.

"Over the past few years, the level of undergraduate research coming out of Montana-based community colleges, tribal colleges and primarily undergraduate institutions has been really impressive," she said.

Codd's sentiments are shared by INBRE mentor and MSU assistant professor, Aga Apple, who has been mentoring students at BCC for the past five years.

"I have never seen undergrads do so well and accomplish so much [as the students at BCC], and that includes my work with students at Dartmouth and Montana State University," she said. "They're just so focused on improving their communities and the lives of people there."

It's clear that neither Codd nor Apple mean to disparage undergraduate research coming out of Montana's bigger universities. Rather, it's a recognition that Montana is full of untapped potential – potential that's starting to get developed, in part, because of Montana INBRE Student Programs and emerging institutional partnerships like the one between BCC and MSU.

After the poster presentation was over, Spotted Horse took a moment to reflect on the mentorship she received as an undergraduate and how mentors can best engage students at tribal colleges.

"Above all, they're encouraging and focus on the positive," she said. "True mentors realize that [students from tribal colleges like BCC], when we're encouraged and supported ... we can do phenomenal work."

When asked about what made her mentors special, she said, "Instead of just being like, 'work, work, work' or treating this like a regular nine-to-five job, [great mentors] treat it like it's a family thing, the togetherness, the group, the team."

After a short pause, she added, "In my mind, people like Ann [Harmsen], Allen [Harmsen], Betty [Henderson-Matthews], and Dee [Hoyt], they fit that bill and then go above and beyond being so encouraging."

MSU mentors like Apple are well aware of the untapped potential in rural and tribal communities and are 100-percent invested in helping students succeed.

"It was very humbling to see how much these students accomplished with relatively fewer resources," said Apple, who grew up in Poland. "Being a foreigner myself, seeing their progress helped ground my own sense of belonging and sense of purpose."

She added, "Looking back, this has been such a joyful part of my working life. Every time the students succeed, I get an adrenaline rush."

For project leader, Henderson-Matthews, the focus has always been on transitioning potential into success.

"I've been trying hard to make sure these students get the full opportunity they deserve," she said. "Browning can sometimes be easy to overlook, but we're here and our students are doing exceptional work."

The story of eight undergraduate researchers at a tribal college working together, taking ownership of their work, revitalizing a research project, and charting a new scientific course is proof enough that overlooking small towns like Browning and community colleges like BCC is a mistake.

Fast forward back to the rectangular meeting table at BCC during the summer of 2018, and there's a sentiment of resilience and determination that lingers as the conversation concludes.

"There are a lot of talented people in Browning," says Racine. "We've been through a lot as a people, but we're still fighters. We have a spirit, and the spirit of our people runs deep." ■

Student Success Story

Cara Robertus



Cara Robertus received a 2018 Goldwater Scholarship, the nation's premier scholarship for undergraduates studying math, natural sciences and engineering. Photo by Adrian Sanchez-Gonzalez, MSU Communications

Montana INBRE student receives prestigious Goldwater Scholarship

This past spring, Montana INBRE undergraduate researcher, Cara Robertus, received the prestigious Goldwater Scholarship, the nation's premier scholarship for undergraduates studying math, natural sciences and engineering.

We recently caught up with Robertus to ask her about the award and to find out how Montana INBRE might have helped contribute to her success.

Here's what she had to say.

In what ways has the Montana INBRE program been most helpful or impactful to your academic & research experience?

"Through the Montana INBRE program, I learned how to write a research grant, define the scope of a research question and address it within a given time frame and create and present a research poster. By providing financial support and a sense of community, the INBRE program allowed me to pursue research as sole employment and introduced me to many other undergraduate researchers who are now my friends and colleagues."

Are there other ways in which INBRE has contributed to your success?

"The confidence and experience I gained preparing poster presentations for INBRE was instrumental in my being accepted to present at the Biomedical Engineering Society Annual Meeting, a national conference featuring graduate and undergraduate research."

How has the mentorship you received from [INBRE Investigator] Dr. Stephanie McCalla's lab shaped your thinking and career trajectory at this point?

"Working in Dr. McCalla's lab has exposed me to research and helped me to more specifically identify my interests. Especially in engineering, which offers a broad diversity of career paths, it can be difficult to decide which direction to take without having firsthand experience. Supplementing my coursework with research has been invaluable in my decision to attend graduate school and my desire to pursue a research career."

Story continues on next page...

Learn more about Montana INBRE Student Programs:
www.inbre.montana.edu/student_programs.html



What keeps you motivated when things start to get tough?

“For many, it would be difficult to continue working on a project [like this] and dealing with the daily setbacks, knowing that large-scale success is years down the road. It is even difficult for me sometimes to maintain motivation and positivity when things are not going smoothly. For me personally, I stay motivated by reminding myself of the tremendous good that this work could do for the underserved community. My ultimate research goals are to continue working on medical technologies for limited resource and point-of-care settings to improve the lives of the underprivileged. I find it is easier to maintain motivation when I have other people in mind.”

Future Plans?

“My current plan is to obtain my Ph.D. in biomedical engineering. Whether I pursue a research career in academia or industry, I hope to work with artificial tissues or prosthetics. I am fascinated by individualized medicine, especially 3D-printed tissue scaffolds or implants, and I would love to be instrumental in making that technology a reality in medical practice.”

What advice might you have for Montana students with an interest in Biomedical research or research into human health?

“I would encourage anyone who is interested in research to talk to professors and actively try to find a laboratory where they can get involved. Professors ... love to discuss their research with students, and showing proactive interest makes students especially stand out. Students should feel free to explore work being done in other areas of campus to find something they are passionate about. I would also highly recommend applying to the Montana INBRE program. Through my involvement with INBRE, I have been able to focus on research without needing another job, have learned essential skills such as grant-writing and poster preparation, and have made lasting connections with both students and faculty.”

Growing up in Bozeman, what does being a ‘Montanan’ mean to you?

“Bozeman is growing and the number of technology firms it attracts, it is entirely possible that I will be able to return here after graduate school. To me, being a Montanan can mean many different things, but in my experience, it means being a self-starter—having the work ethic and courage to pursue your dreams and work hard to achieve your goals.”

Through my involvement with INBRE, I have been able to focus on research, ... learned essential skills such as grant writing and poster preparation and have made lasting connections with both students and faculty.

Is there anything else you would like to share about your experience with Montana INBRE or mentorship you received?

“I would also like to acknowledge Dr. Ilse-Mari Lee, who has mentored me since I started at MSU four years ago. She has encouraged me in my pursuit of both research and music and was very instrumental in my applying for the Goldwater Scholarship. Her tireless support of all of her students is truly remarkable, and I have been blessed to benefit from her friendship and wisdom. The MSU news story briefly mentioned that I commented on the connection between research and music—in my experience at MSU, I believe my substantial involvement in the music program has fostered my creativity and communication skills and helped me to further develop empathy, all of which have been invaluable to my research and education as an engineer.” ■





eat. drink. talk science.

Crossing the Species Barrier

MSU assistant professor and Montana INBRE Investigator, **Raina Plowright**, to discuss “Predicting and preventing animal-to-human pathogen spillover in an era of environmental change” at the next Café Scientifique in Bozeman.

“Assessing current risk, modeling outbreak potential, predicting future scenarios and ultimately preventing outbreaks are all big-picture goals of this type of work.”

At the next Café Scientifique, Raina Plowright, an assistant professor in MSU’s Department of Microbiology and Immunology, will discuss *Crossing the species barrier: predicting and preventing animal-to-human pathogen spillover in an era of environmental change*. The free event will take place on **Thursday, September 27th at 6:00 p.m. at Story Mansion on Wilson Ave. in Bozeman.**

Plowright, who investigates conditions that enable disease-causing pathogens to spill over from one species to another, will present current research involving bats and bighorn sheep.

According to the Centers for Disease Control and Prevention, bats are common carriers for pathogens like rabies, nipah, hendra, ebola and Marburg – diseases which also infect humans. The World Health Organization lists bats as a potential source of the West African Ebola outbreak, resulting in 28,616 human cases and 11,310 deaths between 2014 and 2016.

“Despite a bad reputation as hosts for several notorious diseases, bats are actually quite interesting and special,” said Plowright. “They have unique immune systems that are always on high-alert, and that allows them to ward off diseases more reliably than other animals.”

The number of human-infecting pathogens that bats carry is only part of the reason why researchers like Plowright study them for spillover risk.

“Bats’ pathogen carrying capacity, changing climate patterns in the tropics and elsewhere, changes to ecosystems, and livestock movement into bat habitat all combine to affect disease spillover risk,” she said.

“Assessing current risk, modeling outbreak potential, predicting future scenarios and ultimately preventing outbreaks are all big-picture goals of this type of work,” she added.

Closer to Montana, Plowright is also a leading researcher into pneumonia in bighorn sheep.

The Plowright-led Bozeman Disease Ecology Lab is currently conducting a multi-year field investigation to explore factors driving recurrent pneumonia outbreaks and overall population declines that Plowright says threaten the species.

Plowright is an infectious disease ecologist, epidemiologist and wildlife veterinarian. After training as a veterinarian in Australia, she worked as a domestic animal and wildlife veterinarian in Europe, Asia, Australia, Africa and Antarctica. She later received a Ph.D. in Ecology from the University of California, Davis, and completed a postdoc at the Center for Infectious Disease Dynamics at Pennsylvania State University. ■

Learn more about Café Scientifique:
www.inbre.montana.edu/cafe/index.html



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