November 20, 2005

The Antarctic Sun

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Photo by Steven Profaizer / *The Antarctic Sun*

Bob Garrott prepares to tag, weigh and document a Weddell seal pup near Big Razorback Island on Oct. 30.

Seal researchers find obstacles, opportunities in ice conditions

By Steven Profaizer
Staff writer

Something is different in Erebus Bay. Something isn't right.

For the second year in a row, a large portion of Weddell seals are breaking their yearly routine of returning to the stretch of sea ice between Cape Evans and Scott Base.

In an average year, 1,200 to 1,500 seals line the bay. An initial census of this year's population found only 447 seals in the area. This poor turnout of adults drastically reduces the number of seal pups being born into these colonies.

See SCIENTISTS on page 8

Going for the Pole

Traverse team plans to complete journey to South Pole in January

By Peter Rejcek
Sun staff

If all goes as intended, the South Pole traverse team will unfurl an American flag from the Silverton American Legion Post #14 at 90 degrees south sometime this season.

"Our intentions are to complete the mission this year," said John Wright, project manager of the traverse. "Those are our intentions, and our intentions are good."

That mission is to prove whether or not a 1,600-kilometer overland route between McMurdo Station and South Pole is physically and economically feasible.

The answer is about 450 kilometers away — the distance between the South Pole and the field team's farthest south penetration from last year. The first half of this unmarked territory is believed to be crisscrossed with crevasses, Wright said. At the end of the second half is the South Pole, where Wright will hoist the flag from his Colorado hometown.

"That new ground, that unexplored terrain, has been the subject of intense route planning in the off-season," he added.

Route planning is not just about looking at maps. For Wright and others on his team it involves poring over field notes by parties who did previous crossings of the area, as well as studying high-powered satellite imagery. This technology is useful in helping refine the search for a viable route, but it's not safe to assume the area is without danger based solely on the images,

See SOUTH on page 7

Quote of the Week

"Behind every beaker, there's a whole bunch of Carhartts."

— Scientist acknowledging the help of McMurdo's ruggedly clothed support staff

INSIDE

Continental Drift

What's your main comfort item from home?

"My iPod. Music makes or breaks my days, so having my music here has been a huge comfort."

Caroline DeVan, Palmer research tech from Knoxville, Tenn., first season

"Myself."

Adam Rein, South Pole carpenter from Wasilla, Alaska, second season

"My guitar."

Josh Swindell, McMurdo dining attendant from Cookeville, Tenn., first season

Antarctic Photo Contest

Four Categories
Scenic, Wildlife
People, Other

Deadline is Dec. 11. Submit to:
antarcticsunsubmissions@usap.gov
Resolution at 300 dpi or higher.

Cold, hard facts

What's for sale?

Number of items sold at the McMurdo store from Oct. 1 to Nov. 15 include:

Grocery food: **11,415**

Souvenirs (not counting paper goods): **5,964**

Souvenir paper (mostly postcards, notecards and stickers): **4,341**

Antarctic souvenir clothing: **3,333**

Favorite item: **Women's "dorm pants," followed closely by stickers**

Also on the shelves: **Antarctic worker Bobbleheads, guidebooks, cribbage sets**

Source: McMurdo store staff

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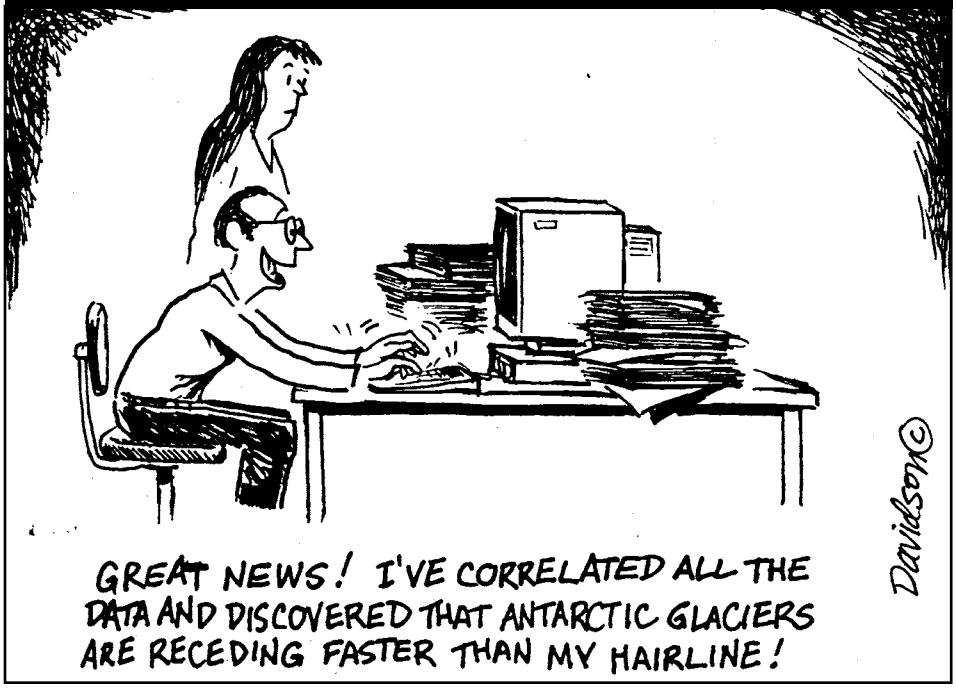


Thyroid to blame for Antarctic blues

By Steven Profaizer
Sun staff

Feeling depressed? Irritable? Forgetful?

It may be more than just a bad week, as these are all symptoms of polar T3 syndrome. Scientists working with NASA have been studying the effects of the condition on McMurdo and South Pole residents. The first two years of the study were direct observation of volunteers at the stations, and researchers have spent the last year reviewing the data.

T3 syndrome, which has also been called "winter-over syndrome," can start as the body adjusts to significantly colder temperatures during the first few weeks after arriving in Antarctica in the summer or in the first few weeks of winter.

Past research has shown a connection between adjusting to colder temperatures and changes in the body's endocrine system, specifically the thyroid gland, which is responsible for controlling the body's metabolism.

The scientists designed the first year of the study to look at the effectiveness of two different supplements in combating T3 syndrome. The first supplement was a daily tablet of thyroxine and thyronine, two thyroid hormones. The second was a small amount of an amino acid dietary supplement, called tyrosine, mixed with applesauce to make it easily edible.

The first-year results are now in, and they bring some new understanding of the condition but also contain mysteries of their own.

"What we're seeing so far is that the tyrosine, the nutritional supplement, worked better than we expected," said Larry Palinkas, co-principal investigator for the research team and a professor at the University of California, San Diego School of Medicine. "What we also found, however, is that the thyroid supplement didn't work as well as we had hoped it would."

The nutritional supplement did well, particularly in improving subjects' cognitive performance speed. It also improved mood, with people reporting less anger and anxiety when compared to those receiving the placebo, Palinkas said. That's good news because it suggests that the syndrome may be prevented without prescription medication, since tyrosine is available as a nutritional supplement.

In contrast, the thyroid supplement did relatively little to ease the symptoms of polar T3 syndrome.

"Either there were no significant changes between the thyroid supplement group and the control group, or the control group actually did better than the thyroid supplement group," Palinkas said. "That was unexpected. We're still not quite sure why that's the case."

One of the reasons the poor performance of the thyroid supplement was so unexpected was a preliminary study conducted at McMurdo Station in 1997-98. This study indicated positive results by subjects taking thyroid supplements.

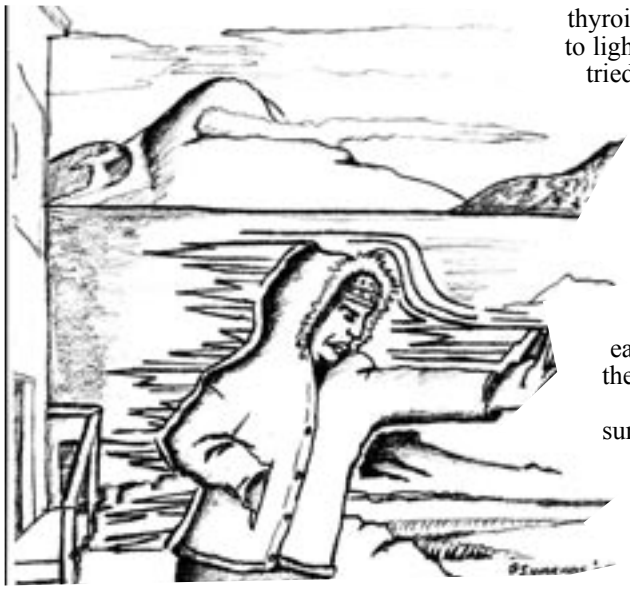
> Study shows that nutritional supplement helps combat "winter-over blues."

The scientists are currently doing a number of analyses to try to explain the newest results but have not yet found a satisfactory explanation.

The data was collected by monitoring volunteers at both McMurdo and South Pole stations during the summer and winter seasons of 2002-03. During the study, people were randomly assigned to partake in either the nutritional supplement area of the study or the thyroid hormone supplement area. Only about half of each group actually received the supplements, however. The other half was given a placebo and used as a control group.

A similar tactic was used in 2003-04, during the second year of the study in Antarctica.

"[That year] we decided to look at the thyroid supplements in comparison to light therapy," Palinkas said. "We tried to use short-term exposure to bright light to treat or prevent symptoms associated with T3 syndrome."



Drawing by Gary Niarhos / Special to *The Antarctic Sun*

The new group of volunteers took the same thyroid supplements as the year before, but they also sat in front of a high-intensity lightbox for 30 minutes each morning for two weeks at the end of each season.

The scientists would measure the volunteers' mood and cognitive performance at the beginning and end of summer and winter. A certain percentage of placebo treatments, both pills and lightboxes, were distributed during that year's study as well.

The scientists are busy analyzing that data now. They expect to have the initial analysis completed in the next few months.

While the final conclusions of the study are pending, the study is already changing the way some people are dealing with the strains of lengthy stays in Antarctica.

"This year we brought down [our own] full-spectrum lighting," said Jodi Roberts, who participated in the T3 syndrome study at the South Pole last winter with her husband, Kirk. "We also brought down a lot more supplements. [The study] made us think about how to help our bodies deal with the changes better."

Palinkas, along with several of his team members, has been studying the effects that prolonged exposure to extreme cold has on biological functions.

This study is funded by NASA with hopes that the research will have extra-planetary applications. Antarctica is considered to be one of the best comparisons on Earth to life in space, Palinkas said. Researchers hope that by studying people's reactions to life in the Antarctic, they can help better equip astronauts for problems likely to be associated with prolonged exposure to life in space.

"NASA has been devoting a lot of time and a lot of effort to looking at very long-duration missions in space," Palinkas said. "Going to Mars would likely be a three-year journey. During those years, astronauts won't be exposed to cold temperature but will be exposed to variations in light and other factors that are likely to affect their endocrine function."

Perspectives

Sea sickness and sun dogs aboard the *NBP*

By Craige Mazur
Special to the Sun

I can stare at the sea for hours, looking out upon the swells like it was a campfire burning through the night. The ocean is an epic story — without beginning or end, without a plateau or climax. There's not a moment of boredom in the story of the sea.

This was my first scientific cruise aboard the *Nathaniel B. Palmer*. We were searching for an anomaly in the sea ice called a polynya, which is a melt hole caused by warm water near the surface. Unfortunately, the large polynyas eluded us. But what we found instead will give scientists a better understanding of ocean conditions that could melt a hole through the ice in that region.

Onboard the *NBP* was a cast of 18 scientists, 12 science supporters, 15 crew members, a flock of petrels, and a few other flappers hitching along after we departed Punta Arenas, Chile. After transiting the southern Atlantic Ocean for 13 days, we spent the next couple of weeks meandering through the Maud Rise region in the Antarctic waters south of Africa.

The Maud Rise is a lonesome mountain rising about three kilometers above the sea floor, about one and a half kilometers below the ocean surface. In the late 1970s, an enormous polynya formed in this area and has since returned sporadically. Why some years and not others? We were here to find out. The scientists wanted to see if ocean convection was bringing relatively warm water from a few hundred meters below the surface up to the sea ice and melting it, and if this process was creating the polynya.

During the first couple weeks, we measured conductivity, temperature, and water depth (CTD). We winched an instrument cluster 500 meters down into the sea, over and over again — more than 100 CTDs in all. It was stop-and-go ice traffic 24 hours a day.

The second phase of the cruise was to find an ice floe thick enough to safely disembark the ship and establish an ice camp. Several instruments would then be deployed to measure just about every parameter imaginable of oceanic layers and water column stability. If environmental conditions cooperated, we would drift with the ice floe and collect data for up to 10 days.

Finding the perfect floe turned out to be a significant challenge. The thick, stable ice floes continuously developed devastating cracks each time the ship attempted to park. After three days, we struck solid ice and set up camp. It felt great to finally get off the ship and walk on solid ice. Three days of beautiful weather ensued, with astounding sunrises and awe-inspiring sun dogs. Sun dogs are basically rainbows that form on cold, clear, dry mornings where sunlight is reflected off the frozen atmosphere.

Unfortunately, on the third afternoon a show-stopping crack snapped our floe into a fragment of its original glory. From that moment on, all science was conducted onboard and my walks consisted of pacing up and down the decks.

Heading back to Chile after escaping the ice edge, I discovered that sea sickness has many faces. Most of these range from a chalky-white to greenish hue as people reeled in sync with the waves. Headaches, lethargy and a high tolerance for triple-feature movies viewed from deep within lazy-boy recliners defined our days. There's nothing else the body is capable of accomplishing whilst the seas and the blood chime a discordant tune.

Photo by Kathleen Gavahan / Special to *The Antarctic Sun*
Craige Mazur stands on an ice floe in front of the Nathaniel B. Palmer.

After five stable weeks in the ice, re-exposure to open water proved difficult. I never lost a meal, but the first day brought one lunch close to the surface. For months prior to this trip, mental preparedness was the strategy for combating sea sickness. (Five weeks on a surfboard in Costa Rica might also have helped.)

Day one back at sea knocked everyone on board into corpse pose. The labs and offices were empty, the lounge/movie theater was bean-bag-chair-on-the-floor room only.

For reasons unbeknownst to me, "Fear and Loathing in Las Vegas" and "The Perfect Storm" were the chosen flicks. Who'd have thought drug-induced-hallucination-cam followed by tiny-fishing-boat-drowning-its-way-through-two-hurricanes-and-60-foot-seas-cam would remedy sea sickness? But I lay there without the energy to protest, eyes barely open throughout the ordeal.

Counter-intuitively, the best remedy for sea-sickness is filling your belly with as much fodder as you can shovel past the esophagus. The challenge is mustering up an appetite when your body eggs you on to toss the cookies before you pry open the cookie jar. Even the comfort of basic bread and butter presented challenges. One bite mixed with a frothing mouth of bile instantly reverts bread back into dough, right in the comforts of my mouth.

Thankfully, the next day was calm, and our bodies returned to stasis as the swaying ship stabilized. Then came day three: 50 knot winds, seas at nine to 10 meters. But by then I had adapted. It was great to experience the highest seas I've ever seen without that ghoulish face and foamy mouth. The day did, however, render most everyone useless. Once again, the movies played on.

Craige Mazur was a systems administrator on the NBP *for nine weeks, and is now at McMurdo in his fourth season working as a computer technician at Crary Lab. For a daily log of the cruise kept by a teacher onboard, go to www.esr.org/mcw_index.html.*

around the continent

PALMER

Pack ice slows work

By Kerry Kells
Palmer correspondent

Palmer Station was busy preparing for the arrival of the *Laurence M. Gould* this past week, although the ship never made it to station.

The *LMG* was scheduled to arrive at Palmer on the morning of the 14th, but after getting within 10 kilometers of the station, the ice forced the ship to turn back. On the 16th the *Gould* headed back to Chile. We had hoped to welcome the LTER site review team, new arrivals, the ship's crew, marine staff and special projects scientific staff to station.

On the way here, the *LMG* was able to set up the camps at Petermann and Cape Shirreff islands and stopped to drop off and pick up supplies at Copacabana field camp.

The pack ice continued to make local boating impossible. Most science gear is unpacked, labs are set up and instruments tested and calibrated for the majority of groups. Now we need open water and a few more sampling instruments to begin working at the on-water sites, local islands and other transects on the water.

The new International Monitoring System (IMS) building was granted conditional occupancy in October, and the research associates began moving projects from the T5 building over to the new facility. The research associates operate and maintain projects and on-site equipment for several geology, seismology and meteorology projects, as well as projects in other scientific fields.

One such project is the TeraScan Satellite Imaging System, which shows ice concentrations in the area and captures about 25 to 30 images a day. The research associates also maintain a project on global thunderstorm activity and its effects on the radiation belts and the lower ionosphere. This project uses equipment to receive and record very low frequency radio waves to study the activity of the ionosphere and magnetosphere, which are different levels of the atmosphere.

The associates also help with air sampling for two projects. One works to determine rates of marine biological productivity and ocean mixing, and the other takes long-term measurements of carbon dioxide and other climate-relevant atmospheric gases.

The team from the Comprehensive Test Ban Treaty Organization completed the set-up for the new radionuclide aerosol sampler and analyzer unit in the IMS building.

Photo by Cara Sucher / Special to *The Antarctic Sun*

The building that houses the International Monitoring System is the newest addition to the landscape at Palmer Station. The IMS building will house numerous geophysical and atmospheric research projects, as well as the Comprehensive Test Ban Treaty air sampling system.

SOUTH POLE

Temperatures warm

By Amnesty Kochanowski
and Tom Lohr
South Pole correspondents

"It feels warm today," a heavily layered Polie mumbles through his frozen balaclava, gaiter and beard.

The temperature at South Pole has increased about 20 degrees since the first summer flight on Oct. 21. However, the past week has been very windy. Wind speeds exceeded 60 kph and postponed some outdoor work. A 1.5-meter snowdrift is still blocking the main entrance into the Dome. The actual temperature, without windchill, hovered around negative 35 degrees Celsius.

The bundled up Polie commented about the warm day on Nov. 15, when the wind finally slowed down. A large, double sundog was also seen that night. Sundogs are colorful spots in the sky created by the reflection or refraction of sunlight through the numerous ice crystals that make up cirrus clouds.

Along with the temperatures, the station population and the number of flights continue to climb. There is a notable difference at meal times with 236 people looking for food in the dining hall. When the first personnel arrived for the summer less than

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the week in weather: Nov. 11-17

McMurdo Station
High: 28F / -2C
Low: 7F / -14C
Max. sustained wind: 33mph / 53kph
Windchill: -33F / -36C

Palmer Station
High: 43F / 6C
Low: 25F / -4C
Max. sustained wind: 37mph / 60kph
Precipitation: 8mm

South Pole Station
High: -25F / -32C
Low: -40F / -40C
Peak wind: 32mph / 51kph
Max. Physio-altitude: 3,225m

Continent From page 5

Photo by Robert D. DeValentino / Special to *The Antarctic Sun*

Amnesty Kochanowski offloads a LC-130 using heavy equipment at South Pole recently. Warmer temperatures mean the planes are no longer creating contrails, which can obscure visibility during cargo operations.

a month ago, there were only about 150 people.

Planes are heard from 10 a.m. to past midnight. So far this summer there have been 75 flights to South Pole as of Nov. 18, and on Nov. 10 the ambient temperature was warm enough (at negative 42 degrees Celsius) for the planes' contrails to disappear. Contrails are artificial clouds created by the plane's engines in the frigid air. When the contrails disappear, cargo can be safely loaded and flown to McMurdo.

Mail and waste, along with retrograde science equipment from the closing of the Skylab building and Antarctic Sub-millimeter Telescope and the Remote Observatory (AST/RO), have been loaded onto the LC-130s to be returned to McMurdo.

With the loading of the AST/RO equipment, the U.S. Antarctic Program begins saying goodbye to one of its most successful projects.

The scientific team that broke new ground in sub-millimeter astronomy returned to the Ice this season to dismantle the key components of the AST/RO facility.

Scanning the skies since 1995, the 1.7-meter telescope set up shop at the South Pole to take advantage of the region's meager atmospheric moisture. Moisture is the sworn enemy of sub-millimeter astronomy because it blocks a significant portion of the energy that AST/RO seeks to detect. Other sub-millimeter telescopes also seek out dry climes to conduct research, but compared to the conditions at Pole, these rival instruments must cut through considerable signal-robbing humidity.

The multi-national project made significant contributions to astronomy during its stint on the continent. The project's involvement in better understanding molecular clouds and star formation are particularly noteworthy, according to Nicolas Tothill, a sub-millimeter astronomer with several seasons working at AST/RO.

Sometime around mid-December, Tothill and the rest of the AST/RO crew will haul down the signature skull and crossbones jolly roger that flutters from the AST/RO lab, and make way for newer Antarctic science. When asked how he would like AST/RO to be remembered, Tothill gave the telescope a fitting eulogy: "As the project to have conducted the most sub-millimeter astronomy in the southern hemisphere."

On Sunday evening, all the seats in the dining hall were filled and people sat on the floor to hear Bill Spindler's lecture, "The South Pole: Then and Now." Spindler spoke to the rapt audience for nearly an hour and half about the history of South Pole. Spindler just wintered here, as well as back in 1977. (For more detail about Spindler, see page 4 in the Oct. 30 issue.)

Other recreational activities include language and dance classes, Weird Documentary Night ("Sherman's March") and karate.

SHIPS

NBP

Compiled from reports by Alice Doyle
Marine Projects coordinator

The polynya, or gap in the sea ice, is quite small at this time of year, and we did not hit it by Nov. 8. We brought all the deck incubators back on-line to prepare for the first day of sampling the next day. The incubators proved trying as we traveled through slush and ice. They continually clogged the inlet valves. It was a long night.

"Today was the first day of sampling, and a busy day it was," wrote Alice Doyle, marine projects coordinator, on Nov. 9. We conducted several conductivity, temperature and depth (CTD) casts, and used other equipment. Just about everything that could take a sample took a sample. By evening, the science party decided to leave the sampling station and head north where there was greater fluorescence.

We moved farther north to a new site the next day. The biomass in the area is greater than that in the south, but there is also a lot more ice. Here, we repeated the busy operations of the day before.

Warmer weather on the 11th gave way to a few large patches of open water in the area. We decided to deploy a 24-hour floating array on the 12th. The array went in without a problem, but soon the winds increased, quickly closing up the areas of open water.

At 3 p.m. the buoys of the array disappeared under two rafting ice floes. We immediately went to the area where they were last seen and broke up the ice.

"Lo and behold, the buoys appeared and the array was recovered without harm," Doyle wrote. The rest of the day was filled with regular instrument deployments.

We continued at the same sampling station the next day. The operations were as usual. After yesterday's array deployment we cancelled a similar operation on Nov. 13. In the afternoon, we were treated to a visit from more than 35 emperor penguins and as many Adelies.

Lots of ice the next day prevented us from completing all of our normal instrument deployments. Early in the evening we stopped for ice sampling. After sampling a few locations, we got underway, heading toward our helicopter rendezvous site.

LMG

Compiled from reports by Herb Baker
Marine Projects coordinator

The ship had problems early in this cruise as the starboard engine failed by Nov. 8. The *Laurence M. Gould* continued south under one engine while the engineers examined the starboard engine to see if it could be repaired. The good news was the weather was almost perfect.

The good weather held until Nov. 11, when it started deteriorating, though the ship kept its course toward Cape Shirreff. The ship arrived late on the 11th and set up camp for those staying there.

The *Gould* then continued on to Copacabana field camp on the morning of Nov. 12. The conditions there were marginal when the ship arrived, but the wind starting easing and the crew was able to begin boating operations. The cargo transfers were completed, and the *Gould* left on its course for Petermann Island to establish the camp there.

The Lemaire Channel was mostly ice-free, and the ship kept its course toward Petermann, arriving late on the 13th.

Nov. 14 began very early for everyone. We were up by 3 a.m. to prepare for an early morning camp set-up at Petermann Island. The camp was totally assembled by 6:30 a.m., and the *Gould* was underway to Palmer Station by 7 a.m. The transit to Palmer went smoothly until we encountered a thick band of sea ice along the southern side of Anvers Island. Southerly winds had pressed the pack ice together for several days.

We pushed through the tightly packed ice as far as we dared. The captain decided we could not make it into the station. We were about 10 kilometers from Palmer when we were stopped by the ice. As of Nov. 14, the ship was just outside the thick ice zone waiting to see if the wind conditions would change direction and loosen the pack enough to allow the *Gould* into station.

Two days later, the captain decided that the ice was too thick and the *Gould* headed back to Punta Arenas, Chile.

Camera spies on single-celled carnivores

By Emily Stone
Sun staff

What do foraminifera do when we're not watching?

That's what Sam Bowser wants to know. He's studying the improbably large and voracious single-celled organisms that live in the sediments of McMurdo Sound. He wants to learn if they're moving around, catching food and reproducing during the bulk of the time that his divers aren't able to watch them.

Last winter, Bowser's group experimented with leaving a camera underwater at New Harbor to spy on the forams, as he calls them. This month, they plan to put the new and improved camera back on the seafloor to stay for the winter. The goal is to make it remotely operable, so Bowser can both retrieve pictures and move the camera lens from his office at the New York State Department of Health's Wadsworth Center in Albany, where he works as a cell biologist.

The camera, dubbed ROMEO, performed well for a while this past winter. ROMEO stands for remotely operable micro-environmental observatory.

"After two months, the light that we rigged up took a nose dive," said Jeff Blair, an engineer with Magee Scientific of Berkeley, Calif., who designed ROMEO. After that, the pictures went black.

The group hadn't intended to leave ROMEO underwater for the winter last year. But the summer testing went so well that they decided to try. Blair rigged up a light at the last minute — filling a salt shaker with lights and epoxy. This year, more conventional lights are solidly affixed to ROMEO's meter-high frame.

The six batteries ROMEO used last year died after six months. Blair improved the camera's energy efficiency — reducing its needs from 40 amps to three amps — so it can run on two batteries for more than a year. ROMEO takes a series of seven pictures three times a day, and spends the rest of its time "sleeping" to conserve energy before waking up for the next round of pictures.

ROMEO was taking pictures of a scallop over the winter. One species of forams live parasitically on the scallop, drilling through its shell and slowly sucking up the scallop's nutrients.

Bowser will review the two months worth of pictures from this winter once he gets home to see what they reveal.

Photo courtesy of Jeff Blair / Special to *The Antarctic Sun*

A photo from the underwater camera last year shows a scallop being devoured by foraminifera, the white dots on the shell.

Forams are very abundant in the ocean. They usually live in deep water, but appear in the shallow areas at New Harbor. Bowser is studying their evolution and place in the ecosystem, which is why seeing what they eat and what eats them is so important.

A new component of the camera will allow Bowser to look at two different kinds of forams that root themselves in the ocean sediment, with the tops of their bodies floating in the water. A microscope will be aimed at these forams — commonly called tree and flower forams because that's what they resemble — to see how they live and eat during the winter.

"The idea is to see it eating or doing something interesting," Blair said.

Bowser doesn't know if the creatures, which can be larger than a centimeter, move around or stay in one place. He believes they eat much larger animals, such as baby sea urchins and star fish, but he isn't sure how it happens.

"Are they capturing it, or are they coming across a dead thing every once in a while?" he asked. "We're going to watch them."

When ROMEO goes back in the water, it will be attached to a cable that runs along the sea floor and up to an antenna near the New Harbor field camp. That antenna beams ROMEO's pictures to a computer at McMurdo, which will send the images to Albany. The difficulty now is making sure the system meets Internet security standards so the data and computers are safe from viruses while information is sent to Albany and Bowser sends instructions back to the camera.

"Nature has been easy," he said of getting the camera to work underwater compared to working out the Internet issues.

NSF-funded research in this story: Sam Bowser, New York State Department of Health, Wadsworth Center; www.bowserlab.org

South Pole traverse sets out to complete its four-year mission

From page 1

according to George Blaisdell.

"It is [helpful], but there's no silver bullet," said Blaisdell, the National Science Foundation operations manager. Before joining NSF two years ago, Blaisdell worked as an engineer with the U.S. Cold Regions Research and Engineering Laboratory (CRREL), based in New Hampshire. He's been involved with the traverse project since it first started taking shape in 1995.

The imaging technology, he further explained, is useful for steering around the big obstacles. "It helps us choose and select a preliminary corridor," he said.

Back in familiar territory

The traverse field team left Nov. 11, exactly a year to the day of last year's departure. There's more to the serendipity: They departed on the 11th hour of the 11th day of the 11th month, 87 years to the minute of the signing of the armistice that ended World War I — now called Veterans Day.

This is the fourth year of the South Pole Proof-of-Concept Traverse project. Over the three previous seasons, the traverse field team crossed the Ross Ice Shelf, climbed the Leverett Glacier through the Transantarctic Mountains, and made it to the edge of the polar plateau at 86 degrees south.

That's more than a thousand kilometers of known territory to travel before crossing the polar plateau. But familiarity doesn't breed contempt when the terrain you're crossing can move up to two meters a day, right in the middle of the Ross Ice Shelf.

"Because the surface on which we travel is so dynamic, we can't be certain that the trail we have flagged and marked is still safe," Wright observed.

In fact, the traverse field team is scheduled to make four stops between its November departure date and the polar plateau, where it will begin forging the final leg of the trail. At those planned stops, a PistenBully sporting ground-penetrating radar on a three-meter-long boom will snoop ahead to ensure the route is still safe, Wright said.

"We have several dangerous areas that we have to cross again," he explained. The field team has had to maneuver through at least two major crevasse fields in the past, including the shear zone, a Swiss-cheesed area of cracking about 50 kilometers from

See TEAM on page 11

Scientists look for missing Weddell seals

From page 1

Scientists typically expect 350 to 550 seal pups to be born in the 11 colonies that call Erebus Bay home. So far this year, the team has located only 224 pups. Last year's final pup count came in even lower at 168.

The thick, extensive, multi-year sea ice is almost certainly to blame, said seal researcher Bob Garrott. Garrott currently serves as the co-principal investigator of the 37-year-old project studying the Erebus Bay population of Weddell seals.

"These seals can ream holes through the ice [to get to the surface] but not 14 feet of ice," Garrott said. "There just aren't as many places for seals to haul out."

The low turnout of seals is giving the scientists a unique opportunity to witness the effect that changing natural conditions have on the seal population.

"It's interesting after about 35 years of observing the same system to have sea ice conditions change everything," Garrott said. "[We're observing] a condition that might only happen once every 100 years, or maybe only once every few 100 years, that completely changes the short-term dynamics of this population."

There are winners and losers in every group of animals, and the ones that have shown up for the last two years appear to be the winners, Garrott said. Researchers have found that it's primarily the oldest, most experienced females that are returning to the surface after a winter at sea and successfully producing pups.

"What's perplexing to us is that we can't yet find where [the missing seals] are at," Garrott said. "I don't think they're dead; they're just not here. I'm certain that when the sea ice finally does blow out, they'll come back."

The scientists have already taken one of two planned helicopter trips this season in search of the absent seals. So far they have found only five tagged seals, all of which were tagged as adults, Garrott said. If they don't locate the missing animals, one possibility is that the seals are simply staying in the water because the current conditions are not favorable for pupping.

In recent years, the team has created two new aspects of their project to further study the Erebus Bay seals, but the core of the program for most of its existence has been the tagging and monitoring of the population. The program's database contains records of over 16,000 tagged animals and over 162,000 re-sightings.

The group's primary focus is linking variations in things like reproduction, survival and population size to fundamental drivers in the system, such as climate, sea ice conditions and food resources.

Photos by Steven Profaizer / *The Antarctic Sun*

Above, Bob Garrott leads Ben Pope as they walk into the pressure ridges near Big Razorback Island to document mother-pup seal pairs. Below, a lone Weddell seal pup lies on the sea ice. Bottom, Garrott, on right, and Pope hoist a seal pup on a spring scale to get its weight.

"This is probably one of the longest-running databases for a long-lived, large mammal in the world," said Garrott, who took over the project with co-principal investigator Jay Rotella five years ago.

There's no other place you have 500-kilogram carnivores you can study in this way, Garrott said. Weddell seals are naturally docile animals. And since there are no land-based predators in Antarctica, they have no reason to fear the scientists as they walk amongst them inspecting tags. This type of project would be impossible with grizzly bears, lions or other animals at the top of the food chain.

Scientists add information to the ever-growing database by tagging every pup born in the study area with two identical tags, one on each rear flipper. After all the pups are tagged, scientists perform repeated surveys to count the seals. To do this, the team splits into crews and visits all the Erebus Bay colonies in one day, recording the tag numbers of every seal they see.

The team tries to do a complete count of each colony about seven times a summer with four to five days between visits. At any given moment, many seals are in the water, but the scientists have a very high probability of recording every tagged animal in the population through repeated visits, Garrott said.

"Right now, over 90 percent of the seals in Erebus Bay are tagged," Garrott said. "About 70 percent of those were tagged as pups, so we know their exact age. It is

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Seal database relies on tagging all pups

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absolutely imperative to our work that we tag every seal born in the population each year."

The scientists do their best to ensure that happens. They will spend weeks each season slowly snowmobiling along the tidal cracks and combing through the pressure ridges that erupt from the flat sea ice.

Seals emerge where cracks in the thick sea ice provide an easier path to the surface, Garrott said. In these areas, the scientists must test every foothold to avoid finding a crack the hard way.

"Most of the time, these cracks don't actually go all the way to the ocean. If you step in one that's been covered over by snow, you'll just bang your shin up," Garrott said, as he tested the footing on the opposite side of a tidal crack by plunging a pole into the snow until it struck solid ice. "But some of them do go all the way down. You have to be alert to where you're stepping."

Making sure all the pups are tagged greatly improves the quality of the data, which scientists use to get information such as immigration, emigration, survival and birth rates.

"It doesn't seem very high tech; it doesn't seem very sophisticated, but the analytical end of things is very sophisticated," Garrott said.

Quantitative ecologists use the data provided by the study to draw conclusions about the population. The Weddell seal project is one of the few studies in the world that has the data set to fuel scientists' most advanced methods of analyzing animal populations.

A new way of weighing

Tagging and monitoring the population remains the team's focus, but two more recent additions to the project incorporate some more sophisticated technology.

Kelly Proffitt is a co-team leader and Ph.D. student who is currently leading a mass dynamics study that Garrott and Rotella initiated when they took over the project. This study is designed to develop techniques and procedures to document the weight of seals at critical times of the year.

In a year when the mean weight of the animals is above average, the scientists can deduce that something about the marine environment resulted in an abundance of fish that allowed the animals to thrive. They can then go back and look at factors like sea ice and climate conditions to see what the contributors were. Conversely, in years when the seals come in on the small side, they can take a look at what ecological factors may have had a negative impact on availability of fish for the seals.

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Photo by Steven Profaizer / *The Antarctic Sun*

Bob Garrott sorts through the many styles and colors of tags used during the program's 37-year history studying Weddell seals. Two tags are placed on the rear flippers of all pups born in Erebus Bay.

Photo by Peter Rejcek / *The Antarctic Sun*

White Island sits surrounded by permanent ice near McMurdo Station and is home to a trapped colony of Weddell seals.

White Island functions as prison for seal colony

By Steven Profaizer
Sun staff

Ice may have kept many Weddell seals away from Erebus Bay for the last several years, but it has also imprisoned a small group of 10 to 20 seals at their home near White Island for well over a half century.

White Island is located in the middle of the Ross Ice Shelf. The lack of openings in the surface of the ice means there is no way for the seals to access the open ocean, as the distance is too great to swim without places to come up for air.

How the seals got to the island is unknown. Scientists speculate they swam through a crack that opened in the ice shelf and has since closed, trapping them on the tidal crack along the island.

"This is just a case of being at the wrong place at the wrong time," said Bob Garrott, co-principal investigator of a project studying the Erebus Bay population of Weddell seals.

Garrott and his team of researchers head to White Island twice a year to check in with the seal captives. While the seals typically produce a couple of pups each year, the pups seldom survive, he said.

There are many conditions that may contribute to this, but lack of food is not one of them.

"They are some of the largest we measure, so we don't think food is a problem," Garrott said. "But the conditions are tough out there, and the pups just don't survive well."

One challenge the seals face is the 10 to 15 meters of platelet ice, disc-shaped ice crystals that appear to float in the water and amass on the underside of the ice shelf. The rough edges of this ice make for a treacherous path from the ice surface to the water deep below.

Evidence of the tough ice conditions can be seen on many of the seals, as eye injuries on the adults are much more common than normal, Garrott said. And for a recently weaned pup just learning to swim, burrowing through the platelets to reach the feeding grounds under the ice may prove too much of an obstacle to overcome.

Many of the seals born into the colony never even live long enough to worry about the platelet ice. The scientists find a larger proportion of dead newborn pups and evidence of birth defects that may be arising from inbreeding due to the small number of isolated animals.

"It's highly likely that over the past several decades not enough pups have been surviving to replace the old adults that are dying, resulting in a slowly dwindling population that may eventually disappear," Garrott said.

High-tech methods enhance long-term study

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The team observes a lot of variability in the seal population. Everything from the size of the animals to pup production varies from year to year. Papers published on the seals often speculate as to what environmental contributors could cause the variations, but little work has been done to explore these hypotheses.

"We wanted to take what we've been doing for the past 35 years and make it more valuable," Garrott said.

The weight of the seals is an indirect measure of how much food they were able to eat during the previous year, Garrott said. When females emerge from the water and slide up onto the ice to birth their offspring, they are at their maximum size for the year and can weigh more than 500 kilograms.

After the seal produces its pup, it will nurse the pup on the ice for 25 to 40 days. During that time, the mother can lose up to 40 to 50 percent of her body weight and will be at her minimum size for the year by the end of nursing.

"How much weight these seals can afford to lose and transfer to their pup dictates how big that pup is when it's weaned," Garrott said. "And we think how big that pup is when it's weaned dictates the reserves that it has to live on until it figures out how to catch its own food effectively."

The scientists try to weigh both the mother and pup about two days after the birth. The team continues to check back in with the pair throughout the nursing and weaning process, as the pup grows to about 115 kilograms.

The pups are fairly easy to hoist onto a spring scale. But the mother seals are tough to move to anywhere they don't feel like being. To get an exact weight of the mother seals, the scientists must coerce them onto a large, custom-built weighing platform that is mounted on skis.

Scientists are now switching to a digital photography system of weight estimation. This method minimizes the disturbance to the seals and increases the number of adults that can be measured by increasing the speed at which they can complete the process.

Scientists take digital pictures of a seal with mounted remote-controlled cameras, which are designed to photograph the animal from the top and from the side. The group then inputs the photos into software that calculates body measurements like width, height, length and surface area. These measurements are used to estimate the seal's weight through an equation derived from similar photos of seals that were physically weighed.

"We're getting to a point now that we don't have to weigh them anymore; we can just go out and take the pictures," Garrott said. "It's very non-invasive, and we can sample a lot more animals with this method. A lot of times we can just walk up and take the pictures without the animal doing more than just picking up its head to look at us."

Photos by Steven Profaizer / *The Antarctic Sun*

A mother Weddell seal and her pup lie on the sea ice. Pups grow to about 115 kilograms by the time they complete the nursing and weaning process, about one month after they are born.

A look under the ice

The second new aspect of research Garrott and Rotella implemented is aimed at trying to get a direct measure of fish abundance in McMurdo Sound. The scientists hope studying the seals' food supply will help them better understand the seals and the ecological factors that impact them.

The team, led in this project by co-team leader Mark Johnston, tested sonar devices under the sea ice last year to detect and identify schools of fish. The scientists soon realized that while they could recognize many fish species by their sonar signatures, they could not identify the species of some large schools of fish.

Engineers created software in the off-season to constantly record the sonar information so the scientists could collect the data in real-time and decipher it later.

"[The software] has been very successful at collecting a lot of data," said Steen Mogensen, an engineer with the seal science group and part of the team that developed the sonar software. "The real trick now is telling the signatures apart. Right now we are hoping to accumulate data and be able to interpret it better later."

Bob Garrott, left, and Ben Pope return to the science team's camp of four huts on the sea ice near Big Razorback Island.

In addition to using the sonar system, the group has brought down fishing gear, nets and an underwater camera to try to identify the fish.

If the group is successful at learning what the unknown fish signatures are, they hope to install a network of these sonar systems in McMurdo Sound to collect this data and accrue it into the database.

NSF-funded research in this story:
Bob Garrott and Jay Rotella, Montana State University,
http://www.homepage.montana.edu/~rgarrott/antarctica/index.htm

Photo by Peter Rejcek / *The Antarctic Sun*

A South Pole Traverse tractor hauling fuel pulls out from Williams Field on Nov. 11. The eight-person team, led by John Wright, plans to complete a 1,600-kilometer snow trail from McMurdo to South Pole this season.

Team updates, improves methods of snow travel

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McMurdo. Wright said an updated survey of that area was conducted in October.

The second major crevasse field on the far end of the Ross Ice Shelf nearly derailed the traverse last year.

Progress was stopped for nearly a month while the traverse team on the ground and elsewhere tried to find a way to thread its way through the cracks. Wright said it appeared the project might have come to an end.

"I said to myself, 'We may not get through it,'" he recalled, explaining that the field team never had any intentions of giving up but that they were up against a deadline.

"I have never thought that this project could not be done," Wright added. "This is a doable thing."

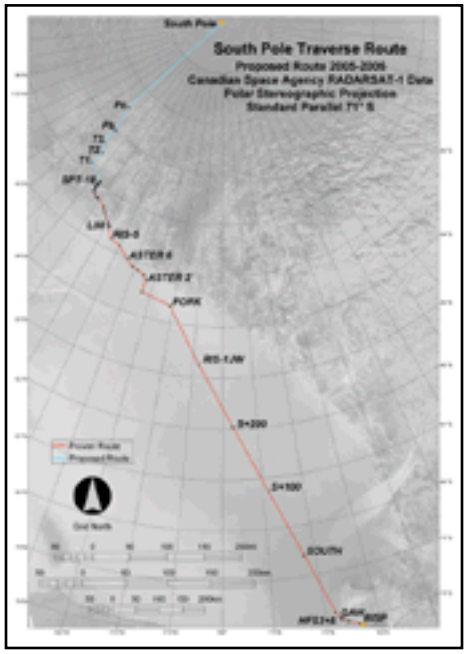
Maintaining the established route of compacted snow has thus far not been a problem, Wright said. However, he cautioned that "nobody has ever done this kind of thing before" and the shifting surface could push the trail toward a new crevasse. Or a new crack could form. Or a small fissure might grow larger.

"We're learning that as we go," he said.

What a load

Blaisdell noted that the traverse is not only blazing a trail to South Pole, but advancing a science — snow travel — that's been relatively dormant for half a century. The challenge has been to develop technology and prepare solutions for carrying the cargo efficiently and cheaply on a snow trail, he said.

Russia, Germany and France also do traverses from coastal stations to the continent's interior. However, those cargo trains are much lighter, Blaisdell noted. The South Pole traverse is expected to weigh in at more than 420,000 kilograms, nearly 90,000 kilograms more than last year, thanks to the addition of an extra tractor. The traverse will include six tractors, fuel sleds and sleeping compartments.



Graphic courtesy of John Wright / Special to *The Antarctic Sun*

The South Pole Traverse route covers 1,600 kilometers. The farthest point south from last year is at SPT-18. Beyond that point is virgin territory, the first half of which is believed to be laden with crevasses.

Such massive weights are possible partly because the traverse team has figured out how to nearly quadruple the amount of weight the tractors can pull compared to just a few years ago, Blaisdell said.

Another breakthrough, learned the hard way by slogging through soft snow, was the redesign of the sled skis and the way they're pulled behind the tractors. In collaboration with CRREL engineers, the traverse team was able to dramatically reduce the drag by spacing the skis so they wouldn't bog down behind the tractor's churned up tracks. The curvature of the skis was also modified to lessen resistance.

"We're going about it in a scientific way," Blaisdell said of the project's progress.

The next step

Should the traverse complete its mission this year, the next step is to establish a regular McMurdo to South Pole haul. Wright said he believes it will eventually be possible to conduct three round-trip traverses per summer season.

"We'd have to grow into that capability," he added.

Fuel is the most obvious cargo, especially because there's plenty of flexibility in how it's transported, he said. For example, the containers carrying fuel to be consumed on the trip are collapsible and could even be dropped along the trail and retrieved on the return trip to McMurdo.

"There are a lot of nice things about fuel as a commodity," Blaisdell said. "It doesn't have to be [at Pole] in three hours."

This year's traverse is scheduled to deliver the equivalent cargo of about a dozen LC-130 flights, currently the only means to deliver equipment and fuel to South Pole. Wright said the field team will deliver only material cargo this trip, in the form of tractors, trailers, loaders, loader accessories and spare parts. One item includes a D8 Caterpillar now sitting at the foot of the Leverett Glacier.

Blaisdell said there is a lot of interest in the traverse's potential. One scenario might even be to remove the old South Pole Dome overland, he said. The Dome may be dismantled as early as the 2007-08 season.

"There are a lot of possibilities," Blaisdell said.

Profile Scout part of Antarctic tradition

By Emily Stone
Sun staff

Boy Scout Ben Pope got some valuable advice from former Antarctic Scouts before heading to McMurdo Station.

"Don't worry about getting enough sleep," Pope remembers the veterans telling him. "You'll get it when you get home."

Pope has taken those words to heart, trying to pack in as much as he can of Antarctica during his three months here. And he doesn't just want to see it all. He wants to experience it hands-on by working alongside scientists and support staff — everything from helping seal scientists on the sea ice to draining motor oil in the vehicles department.

"I'm not here to be a tourist," said Pope, 19, of Newton, Mass.

Pope is here through the Antarctic Scout program, which brings a Boy Scout or Girl Scout to the Ice on alternating years. The goal is to help foster an interest in science among young adults. The tradition started in 1928 when Adm. Richard Byrd brought Eagle Scout Paul Siple along on his expedition. Since then, a total of 18 scouts have come to Antarctica through the program.

Pope learned about the opportunity, which is open to all Eagle Scouts between 17 and 20 years old, four years ago through his dad, who is also his Scoutmaster.

"I thought it was really cool, so I kept it in the back of my mind," he said.

In the meantime, Pope worked on the various merit badges that are recommended for Antarctic Scouts, and started college at the Massachusetts Institute of Technology, where he's majoring in mechanical engineering. In January, halfway through his freshman year, he decided to apply.

His friends, who are used to Pope's curiosity and adventurous spirit, weren't surprised by his decision. But others didn't quite get it, he said.

"Everyone asks me, 'why do you want to go to Antarctica?'" he said. "People down here have a better sense – why not? It's Antarctica."

An avid hiker and winter camper, Pope said he wasn't intimidated by the trip.

"I was in a backpack on my dad's back before I could walk," he said. "It was kind of second nature."

Photo courtesy of Ben Pope / Special to *The Antarctic Sun*

Boy Scout Ben Pope stands at the top of Observation Hill near McMurdo Station, where he's spending three months as part of the Antarctic Scout program.

While here, Pope spent about a week working with Shane Kanatous and his team. Kanatous, who is studying the muscular system of Weddell seals, said Pope was an asset to the group. He was conscientious, helpful, and easy to get along with.

> "He's the image of what you think a Boy Scout is going to be."
>
> *— Scientist Shane Kanatous, talking about Ben Pope*

"He's the image of what you think a Boy Scout is going to be," he said.

Kanatous, of the University of Texas Southwestern Medical Center, said that once Pope got comfortable with the group, his engineering background became apparent and he started asking questions about how the group does its work and why it approaches tasks a certain way.

"They were very intuitive questions," he said.

When he's not working, Pope is still trying to soak up as much Antarctic knowledge as he can. For example, he was fascinated by a recent lecture by a glaciologist based on data that the science group had just gathered that week.

"Nobody anywhere, unless you were in that room last night, knows anything about that," he said.

Curiosity runs in Pope's family.

"My dad, I don't know how he knows it, but he knows something about everything," Pope said.

Pope is compiling journal entries and photographs that the Boy Scouts are publishing online. Pope is also signed up to speak at local and national Scouting events to promote the program.

As for long-term goals, Pope said he hasn't yet settled on a career. Perhaps he'll get an engineering job with an alternative energy company or become a pilot.

He'll be at McMurdo through late January, as late as he can push it before he has to return to school for the spring semester.

"I have a class Jan. 23 at 8 a.m. that I'm supposed to be at," he said.

Until then, he plans to keep experiencing as much of the continent as he can.

"People keep telling me I'm the luckiest guy down here," he said. "Every day I realize that's more and more true. It's only possible because so many other people are working on the really important things."

Read more about Ben Pope's time in Antarctica at www.scouting.org/boyscouts/antarctic/index.html