The Antarctic Sun

Published during the austral summer at McMurdo Station, Antarctica, for the United States Antarctic Program

November 7, 2004

Scientific fishing yields huge catch

By Kristan Hutchison
Sun staff

Scientists aren't telling tales of ones that got away during their two-month fishing trip in the Southern Ocean. They're satisfied with the 9,900 fish they caught.

"I think everybody accomplished much more than they thought would be possible," said chief scientist Bill Detrich, who first proposed the International Collaborative Expedition to collect and study Fish Indigenous to Sub-antarctic Habitats (ICEFISH) eight years ago.

It was the first science cruise of that size dedicated primarily to fishing, said Detrich. The cruise on the research vessel *Nathaniel B. Palmer* involved 31 researchers, including 8 graduate students, from the U.S., U.K., New Zealand, Italy, France, Germany, South Africa and Australia. Using trawls, traps, beach seines and ordinary fishing poles, they hauled up enough fish to fill their lab freezers. They collected samples, including a few previously unknown species, and data for 21 research projects.

"There's enough stuff to last for years and years and years," said fish biologist Joe Eastman, who sent three drums packed with more than 100 gallons of fish and

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Photo by Daniel Doolittle / Special to *The Antarctic Sun*

ICEFISH scientists fish for one of the target species of the notothenioid suborder in Tristan da Cunha. From left: Carl Hansen, Bruce Sidell and Joe Eastman at right

Photo by Brien Barnett / *The Antarctic Sun*

Red Sox fans cheer their team's victory over the Yankees in game seven of the playoffs.

News from home, miles away

By Kristan Hutchison, Emily Stone and Brien Barnett
Sun staff

A crowd around the televisions at the entrance to McMurdo Station's dining hall is a sure sign something important is happening in the outside world.

If it's something really important, the large screen TV inside the dining hall goes on, so people can watch while they eat. Most were watching Wednesday night, as U.S. election results rolled in from the other side of the dateline.

Unlike Ernest Shackleton's men, who didn't hear news of World War I until they returned, people at U.S. Antarctic stations today can stay as informed as they choose. The New York Times Digest is distributed each morning at Palmer, McMurdo and South Pole stations. All the stations and some of the field camps have access to the Internet as well, though only McMurdo gets live television feeds.

"I feel both connected and disconnected," said Stefan Pashov, who follows the

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INSIDE

Quote of the Week

"McMurdo is the only place where your reputation has more fun than you do."

- Woman discussing rumors in the dining hall

Ross Island Chronicles By Chico

Cold, hard facts

Antarctic Treaty

When signed: **Dec.1, 1959**
Original signing nations: **Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, USSR, United Kingdom, U.S.**
Languages the original treaty was written in: **French, English, Russian, Spanish**
Nations currently part of the treaty: **45, about two-thirds the world population**
Who can join: **Any member of the United Nations or country invited by treaty nations**
What's covered: **land and fast ice south of 60 degrees**
Main objective: **"That Antarctica shall continue forever to be used exclusively for peaceful purposes… (and recognizes) the substantial contributions to scientific knowledge resulting from international cooperation in scientific investigation in Antarctica."**
Good to know: **Nuclear explosions and disposal of radioactive waste materials are prohibited**

Source: The Antarctic Treaty

The Antarctic Sun is funded by the National Science Foundation as part of the United States Antarctic Program (OPP-000373). Its primary audience is U.S. Antarctic Program participants, their families, and their friends. NSF reviews and approves material before publication, but opinions and conclusions expressed in *The Sun* are not necessarily those of the Foundation.

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Matt Davidson

How's the weather? AMPS will tell you

By Brien Barnett
Sun staff

Predicting the weather in Antarctica isn't easy, but new tools may begin to give forecasters an edge they've never had before. That in turn will help pilots, science planners and field camp leaders make the most of their time on the Ice.

Inside a small office at the National Center for Atmospheric Research in Boulder, Colo., sits one of the creators of a powerful computer model that is already helping with forecasts. Jordan Powers helped develop the Antarctic Mesoscale Prediction System, or AMPS. It draws on data from a wide range of sources: including satellites, automatic weather stations and weather balloons and observations from stations all around Antarctica, to create a model forecast of winds, precipitation, cloud cover and other aspects of weather.

"It's got higher resolution than the other models they use and all its products have been tailored to the needs and preferences of the McMurdo forecasters." Powers said, adding that German, Australian, Chilean and British Antarctic research stations also use AMPS forecasts.

AMPS, which is updated twice a day, gives forecasts up to five days out.

The model is more precise than ever. Onscreen AMPS data can be viewed as a grid at intervals from 3.3km over Ross Island to 90km over the whole of Antarctica and the Southern Ocean from Australia and New Zealand to South Africa. A computer that uses 36 central processing units to crunch all the data creates the model. It takes about six hours to run. In the meantime, many are waiting for the information.

"People really do live by the weather there," Powers said. "You spend a day there and you have people coming in all the time (wanting data). Pilots, scientists."

The model creates maps of weather systems around the U.S. Antarctic stations. The model's grid is focused at 10km sections over Palmer and South Pole. Over the Ross Island area the grid tightens to 3.3km sections, which is useful for aircraft activities.

Most AMPS users are forecasters, technicians and scientists working in Antarctica or for projects there, but the average Joe or Jane has access to the AMPS Web site. Those accustomed to the slick graphics of the Weather Channel may think the site is overly technical. Weatherunderground.com incorporates AMPS data into its models and forecasts and provides a simpler version of weather on the Ice.

In the U.S. and most other countries, many professional and amateur weather watchers track and supplement loads of data coming from satellites and automatic weather stations. There, forecast grids are set at about 12km and computer forecast models are tightly refined. Not so in Antarctica. While there are data from the edges of the continent, most of the interior has no stations and few observers.

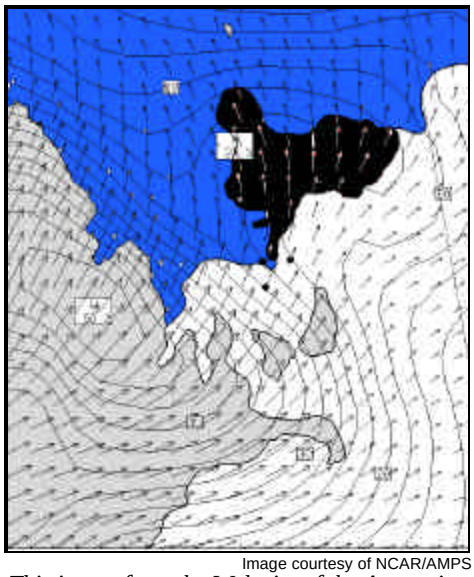

Image courtesy of NCAR/AMPS

This image from the Web site of the Antarctic Meteorological Prediction System, or AMPS, shows the direction of surface winds near Ross Island, Antarctica (black). The air comes from the land (light gray) and ice shelf (white) over the island and out to sea (dark gray). AMPS offers various maps and information to forecasters.

Conventional models used in the States won't work in Antarctica because of the different physical processes at work. AMPS takes Antarctica's uniqueness into account.

"The surface characteristics (of the model) are modified a bit to account for the fact it's ice and snow," Powers said. "We're trying to represent a polar atmosphere better."

Weather watchers say AMPS is one of the most powerful tools for creating Antarctic forecasts, along with satellite data being developed by the National Oceanic and Atmospheric Administration, or NOAA.

Jeffrey Key is a physical scientist for NOAA and works for the office of research applications. He is trying to develop advanced methods for using satellite data. Currently several satellites offer operational and experimental data, such as wind speed, water vapor and cloud densities, to forecasters. Antarctic forecasters will rely on satellites operated by NASA. Information from military satellites may supplement the data.

Key is in McMurdo this season along with meteorologist Matthew Lazzara of the Antarctic Meteorological Research Center (AMRC) at the University of Wisconsin to help install a computing system that will generate polar wind data.

The system will work with a receiver that should allow forecasters at McMurdo's weather center and scientists to obtain satellite information without going through an intermediary. That will help speed up the flow of information and may lead to more accurate forecasts. Key said it now takes about 2-4 hours to get raw wind speed data from the satellites and another hour or two to process the data for the models.

"If we can even cut a half hour off that time by generating winds here at McMurdo covering much of Antarctica, then more of those winds will get into the weather prediction models and thereby improve weather forecasting," Key said.

Key said NOAA has a 20-year data set of Arctic weather and is in its 12th year of collecting Antarctic data. That has yielded a few surprises. Scientists discovered that at certain times of year, clouds over the poles seem to warm the air rather than cool it because the clouds act as insulators and catch the sun's reflection off the ice.

The satellite data and information from other sources are compiled and maintained by the small staff of the AMRC. The center is charged with researching aspects of Antarctic meteorology that may improve the accuracy of Antarctic forecasts, stocking imagery of Antarctic icebergs and maintaining automated weather stations, Lazzara said. The AMRC also acts as a backup forecaster for McMurdo's weather center, though it's never had to do that.

Key said the wind data from satellites help reduce "forecast busts," — weather predictions that are way off.

AMRC is also working on Lazzara's study of the evolution of fog in the Ross Sea area. That research is important because fog can shut down the runways and halt flights into and out of McMurdo Station, which is a vital link to the South Pole.

Others at AMRC are studying the accumulation of precipitation in Antarctica as well as how weather patterns can affect planning and logistics operations on the continent. AMRC also assists with long-term climate monitoring and other research.

Matthew Lazzara and Jeff Key will give Wednesday's science lecture, titled, "Unlocking the Secrets of Antarctic Meteorology: Clouds, Fog and Polar Winds," at 7:30 p.m. in the Crary library.

The Antarctic Sun's *Kristan Hutchison contributed to this report.*
NSF-funded research in this story: Charles Stearns, AMRC, http://amrc.ssec.wisc.edu/
Also: AMPS, http://box.mmm.ucar.edu/rt/mm5/amps/

Perspectives

Chilling in Antarctica

By Michael Blachut

My job as refrigerator repairman is to keep things cold. In Antarctica, keeping something cold is more difficult than you might imagine. There are a million jokes about it, such as, "Just put it outside!" I believe that would work, but for some reason they want it inside; they being scientists, cooks, bartenders, nurses, and doctors. They all want their refrigerators indoors.

You might ask, "Why do they need refrigeration there?" Well, let's take a look. The number one reason is science. Science in Antarctica, especially biology and microbiology, is temperature-related. Biologists love samples, need to keep them for a long time, and the accepted method is to freeze them down to -81C. In the science building, named after the famous Antarctic researcher, Dr. Albert P. Crary, are nine of these ultra-low freezers. There are biology labs with specialized refrigerators, such as precision incubators, which hold temperatures within 0.10C. There are freeze dryers, environmental rooms, temperature-controlled baths, explosion-proof refrigerators and more. We have counted 100 refrigerated devices in this 4,300 square-meter laboratory facility. Remember, these aren't "normal" refrigerators; scientists are fussy about temperature when they do research, and their refrigerators tend to be a bit fussy and finicky too.

Next to the Crary Lab is an ice core storage building where ice cores brought into McMurdo from the science camps are stored until the ship arrives to transport them to the U.S. During summer in McMurdo, the ambient temperature rises above -1C. While the ice cores are here, they must be refrigerated. Some of these ice cores are a 50,000-year historical ice record and represent an extremely valuable piece of research. The ice cores must be kept at -25C, and since data loggers are packed with each one, the temperature cannot vary.

Because McMurdo's temperature is above freezing during the summer months, storing a one-year supply of frozen food is also a challenge. This half million kilos of food is stored in the frozen food warehouse, which can easily stay at -20F for seven months just sitting there. However, for the summer mechanical refrigeration is required.

The kitchen is an obvious place for refrigerators and has plenty. Besides the usual reach-in, pass-thru, under-counter and walk-in variety, today's modern dining rooms require a number of 21st century, computer-controlled, refrigerated devices.

Juice machines, ice machines, ice cream machines and a host of other refrigerated appliances use logic boards to control their behavior. This makes the life of a refrigerator repairman interesting. There are some "morale-type refrigerators." The ice cream machine is an example. After the evening meal, it is common for workers to sit around and have a cone, a treat to soothe even the most savage beast.

There are three bars, each with their all important ice machines and beverage coolers, and there are 40 water coolers in buildings to keep the heat-traced water at a palatable temperature. Most of the dormitories have ice machines to cool drinks after a hard day's work. Many work centers have a refrigerator stocked with food in case a storm blows in and the workers have to remain in their work building. The medical building has its share of refrigerators for blood, medications and other purposes.

By now you might be saying, OK, I see why they need a refrigerator repairman, but I can't imagine what this person would do while waiting for something to break. Think about parts; fully 25 percent of my job involves ordering, finding, handling, predicting and maintaining records involving parts, and I always wish I had more parts.

As you can see, a refrigerator repairman is necessary in Antarctica. My job is diverse, exciting and challenging beyond my wildest dreams. A few of my refrigerator dreams have come true here in McMurdo. When I was a refrigeration student, I remember reading about a two-stage freezer, but I never saw one until I came here. I have had the greatest opportunities that one could imagine. I have had the pleasure of working with a scientist on his one-of-a-kind freezer that was capable of reaching 4 degrees above absolute zero — unbelievable to me.

Photo courtesy of Mike Blachut / Special to *The Antarctic Sun*

Refrigerator repairman Michael Blachut keeps fridges running all winter at McMurdo Station, Antarctica.

My job fits my lifestyle; I'm retired and in good health. I like to travel and meet people with a wide variety of experiences, and this place certainly allows me to do those things. I had never met a scientist before I came here, and now I routinely have the pleasure of eating lunch with cutting-edge scientists.

The future here at McMurdo looks promising. On the horizon are new technologies and the challenge of reducing energy consumption. I started my "Antarctic Adventure" 10 years ago. I usually work eight months during winter and rotate out when the summer refrigerator repair folk arrive. I enjoy traveling and have visited 33 countries in my off time. When home, I like to visit my refrigerator repair buddies. My job provides them an endless source of humor. They, as well as most people, are amazed when I tell them that a cutting-edge science base in the coldest place on earth has over 500 refrigerators to keep things cold. Who would have ever thought?

Michael Blachut was the winter refrigerator technician at McMurdo Station and has spent 60 months at the station in his 10 years working for the Antarctic program. Learn more at http://groups.msn.com/antarcticmemories/refrigeration.msnw

around the continent

SOUTH POLE

Cold poses cargo problems

Compiled from information from Scot Jackson, Katie Hess and Brenda Everitt

The winter crew has left, mostly for warmer places, but the station's summer population already is up to 216 people.

As usual, the station is set on a fast pace. New arrivals barely had time to catch a breath, appreciate the scenery of the plateau or get settled into their rooms before their workday began.

The kitchen staff, lead by "Cookie" Jon Emmanuel, already is preparing delicious meals. Mechanics in the heavy shop are working around the clock keeping things running. Heavy equipment operators are plowing accumulated snow 24 hours a day. Cargo crews are preparing for a busy season with major science construction projects such as IceCube, the project to drill numerous holes in the glacial ice to detect particles from deep space. Some of the scientists who will work with the IceCube installation have arrived on station, with many more scientists and technicians arriving soon.

The temperature has hovered around -50C. Fortunately, the wind has been slack with wind chills down to about -70C.

Photo courtesy of Scot Jackson / Special to *The Antarctic Sun*

A moving LC-130 offloads cargo from its tail ramp onto the ice runway at South Pole Station during the opening days of the summer season.

The cold causes problems for cargo crews unloading arriving planes because the planes' engines have been producing contrails of thick, steamy air, reducing visibility. Aircrews have had to use a technique in which pallets of cargo are released off the tail of the plane while it is moving along the ice runway. Cargo crews collect the pallets once the plane is out of the way and the contrails dissipate. The technique — termed "combat offloading," "drifting cargo" or "freight training" — is considered to be safer for people and machinery because it keeps both out of the low-visibility areas behind the plane, which must keep its engines running while at the Pole. South Pole cargo handlers are hoping for warmer weather soon so they can resume their normal operations.

Sometime this week a large shipment of helium is expected. The helium is used to cool several of the telescopes and instruments that scan the skies.

Back inside the station, the emergency responders on the medical trauma team have been reviewing procedures and training for any incidents. At a distance of 1,300km from McMurdo and nearly 4,000km from Christchurch, New Zealand, trauma patients must rely on the advanced telemedicine and the medical staff at South Pole. Doctors Christian Otto and Rebecca Comley, along with their summer trauma team, practice their skills on volunteer "patients." With temperatures of -50C, the potential for accidents becomes far more serious and makes medical responders' tasks even more complicated. They review questions such as at what temperature does a cervical collar freeze solid? Or, where is the line between assessing a patient for a serious bleed vs. avoiding exposure of the patient to hypothermia or frostbite? By practicing now, the medical team increases its chance of helping a patient in a real emergency.

Photo by Katie Hess / Special to *The Antarctic Sun*

Greg Weber, Kelly Siman and Russell Lester work on "patient" Stephen Boudreaux during a South Pole trauma team drill. The team learns to respond to emergencies in the extreme cold by practicing indoors first.

PALMER

Station learns about LTER

By Kerry Kells

Palmer correspondent

With the arrival of the majority of the science groups on station, the summer is in full swing. The researchers on station include several groups from the Palmer Long Term Ecological Research (LTER) project. LTER is a research network that studies different ecosystems over long periods of time. The network includes two sites in Alaska, one in Tahiti, one in Puerto Rico, 24 in the continental U.S. and two in Antarctica. Besides the marine-based LTER research at Palmer, there is an LTER site on the other side of the continent, in the McMurdo Dry Valleys.

Our introduction to LTER this week was from Hugh Ducklow, with the College of William and Mary and the Virginia Institute of Marine Sciences. He gave the Wednesday Night Science Lecture on 10 years of research with the LTER. Ducklow is the principal investigator of the Palmer LTER and heads up its microbial biogeochemistry component studying microbial ecology, dissolved organic matter and sediment traps.

Ducklow's lecture focused on sea ice variability and the "biological pump," the

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the week in weather

McMurdo Station
High: 25F / -4C
Low: -08F / -22C
Max sustained wind: 24mph / 39kph
Windchill: -47F / -44C

Palmer Station
High: 36F / 2C
Low: 16F / -9C
Max. sustained wind: 6mph / 9kph
Precipitation: 3mm

South Pole Station
High: -54F / -48C
Low: -66F / -54C
Peak wind: 15mph / 24kph
Max. Physio-altitude: 3,419m

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role of ocean plankton in pumping carbon dioxide out of the atmosphere and storing it in the ocean. Humans during the industrial age have put carbon dioxide into the atmosphere at rates equivalent to hundreds of millions of years over most of Earth's history. The data collected at Palmer helps explain how the marine system creates the seasonal variability of carbon dioxide concentrations. Ice cores collected by other Antarctic programs indicate variability in past ages when the carbon dioxide levels fluctuated from glacial and interglacial periods. Sediment traps measure the settling of plankton blooms in the deep sea in the LTER sampling grid, an area from Palmer Station south to Rothera Station that is studied each year.

Satellites measure sea ice variability. The images show advances, retreats and the extent of sea ice. When there is more ice area, the retreat is later. Krill thrive with more sea ice and so does primary production. The phytoplankton blooms result in more sedimentation and therefore, more carbon dioxide is removed from the atmosphere in the "biological pump" of the ocean. With the warming of the area, there is less ice, an early retreat of sea ice, less primary production, less sedimentation and a weaker "biological pump."

As summer continues, folks at Palmer Station will learn more about each component of LTER from phytoplankton to krill to penguins.

The station celebrated Halloween on Saturday night. Costumes included both the scary and the humorous. A polar bear made a visit, followed by a penguin, a scarecrow, Where's Waldo, Julia Child, a can of nuts, a box of fruit juice/beer, Hedwig from "Hedwig and the Angry Inch," Frankenstein, Elvis, the Curse of the Bambino (deceased) and the "Rat Bastard" superhero, an inside joke here at Palmer. The next day, our day off, was a sunny one and the perfect opportunity to go sledding on the glacier.

SHIPS

Nathaniel B. Palmer

Compiled from reports by Karl Newyear and SS Jacobs

The *Nathaniel B. Palmer* completed work for the Antarctic Slope Front study, which looks at currents in the ocean along the Antarctic coast. The cruise went along the Antarctic continental margin off George V Coast, including a circuit of the Adelie Trough and the western, downwind side of the Mertz Glacier Tongue.

Heavy ice forced the *NBP* to backtrack to the east for a while on Oct. 24. It's thought that a moderate-sized, grounded iceberg is causing the sea ice to accumulate on the iceberg's upstream side. The ship stopped every 8km to collect samples and data while not breaking ice.

The next day had exceptionally nice weather and emperor penguins came for a photo op while the crew conducted the first 24-hour block of dedicated measurements of a vertical column of water. The instrument worked quite well, though the chosen location didn't have the hoped-for strong tidal mixing. Nevertheless, the data will be useful.

Then weather deteriorated, hindering whale and seabird observations.

On Oct. 28, the ship crossed the Antarctic Circle and headed east along the coast to the west face of the Mertz Glacier. The excursion deep onto the narrow shelf sampled the dense shelf water involved in mixing near the Antarctic Slope Front, including its glacial melt, providing data to compare with observations made there in early 2001.

The area is known for katabatic winds, which create a shore polynya, an expanse of open water in the ice.

"This morning we discovered why," wrote marine projects coordinator Karl Newyear. "However, the skies have cleared and the view of the glacier is awesome."

So far during the voyage, researchers have spotted 62 whales and recorded more than 500 hours of their songs. Although most of the whales were minke, there was a probable sighting of a Gray's beaked whale. Twenty crabeater seals were seen on the way out of the ice, mostly female and pup pairs, many with male escorts.

Most emperor and Adelie penguins were spotted on or near the continental slope, as expected from earlier work. Somewhat more surprising was a concentration of many hundreds of Antarctic petrels in a narrow band close to the Mertz Glacier Tongue, and their near absence in the rest of the polynya. The petrels appeared to be feeding on material embedded in the forming ice. On Nov. 1, the ship turned toward Timaru, New Zealand for refueling.

Laurence M. Gould

Compiled from reports by Dave Morehouse

The outbound winter staff from Palmer Station began their journey north on the *Laurence M. Gould.* They engaged in a full movie marathon as the ship rolled with southeast swells. Despite the swells, the ship seemed to be traveling in the lull between two large depressions and missed the heavy stuff.

On Oct. 29, the *Gould* arrived back at Puntas Arena, "where we will fuel, dispense our passengers to the Chilean countryside, and await an opening for us at the Prat Pier in Punta Arenas."

Continental Drift

What's your favorite place on station?

"My bed."

Michael Lamb, *McMurdo dining attendant, Girdwood, Alaska, first season*

"My favorite place on station is actually off station."

Joe Pettit, *Palmer station manager, Boulder, Colo., nine seasons*

"I enjoy working in the Dome and Skylab. These older buildings contain a lot of character and history. Also, I enjoy the 'commute' into the new station from my Hypertat."

Brenda Everitt, South Pole science tech, Minneapolis, Minn., first season

Treating the Antarctic blues

By Emily Stone
Sun staff

When Marc Shepanek arrived at McMurdo Station last month, he discovered that his roommate had arranged extra lights all over the room, even leaving some on while he slept.

The abundance of light was actually a direct result of the research that brought Shepanek down here – a study of the causes of physical and mental changes that occur while living in Antarctica. His roommate, who had just completed 15 months on the Ice, was a subject in the study. He was so taken with the light box he got as a participant that he stocked up on as many lights as possible.

Shepanek, chief of aerospace medicine at NASA headquarters in Washington, D.C., is in Antarctica for about a month to wrap up the third and final year of research into the polar T3 syndrome. The syndrome is a thyroid condition that researchers believe is caused when the body adapts to extreme cold.

T3 is a thyroid hormone that acts as a neurotransmitter and also regulates body temperature. In extreme cold, T3 gets used so much to keep the body warm that the brain is left with a less than adequate supply of the hormone. This can cause the "Antarctic stare," common particularly among winter residents, forgetfulness and lack of focus, as well as increased anger, irritation and depression.

The goal of the study is to learn how to combat polar T3 syndrome so that workers in cold places can avoid mental slowness and mood drops.

Shepanek's roommate was Mike Blachut, a refrigeration technician who was a year-long participant in the T3 study. During the 2003-2004 year, the study looked at the potentially positive effect of ingesting a T3 supplement and of using a light box during the day. Fifty-three people participated in McMurdo and 47 at the Pole.

Blachut said he thought the light box worked wonders.

"It just calmed my whole day," he said.

He said he got much more irritable and spacier over the winter.

"You can just feel it. If somebody doesn't say 'hi' to you…it gets magnified. You just build on that," he said before leaving McMurdo last week. He started making extremely detailed "To Do" lists for himself at work, otherwise he said he'd forget what he was doing. He also spent a lot of time looking for tools he'd just put down.

Larry Palinkas, a professor of family and preventative medicine at the University of California at San Diego, heads the T3 study. He said research shows that T3 syndrome is caused primarily by cold, not darkness, though the long Antarctic night may play a supporting role in mood and cognitive decline.

His team has started getting preliminary results from the 2002-2003 season.

The results show that T3 levels drop at two main points during the year – during the first month of summer, when people arrive, and again at the beginning of winter. Both are times when the subjects were adapting to lower temperatures than they were used to. But, obviously during the austral summer, subjects were getting much more light than normal.

"That's why we think it has more to do with temperature than light," Palinkas said.

To test this theory, some of the study's 2003-2004 participants were given either white or red lights to sit in front of each day, in addition to either a thyroid supplement or a placebo.

The previous year's study focused on the supplements alone. The 2002-2003 participants were given one of three things, either a thyroid supplement or tyrosine, which is a dietary supplement that produces a similar effect as thyroid hormones in the body, or a placebo. Palinkas said the results from the 2002-2003 season indicate the medications had an effect on participants' moods and efficiency in completing computerized tests of cognitive performance.

"If you're on an active medication, whether thyroid hormones or thyrosine, your cognitive performance seemed to improve significantly during the winter, but not so much during the summer," he said.

The variation between seasons might be due to the small sample size, which will be countered some when the past year's data is added to the mix. Or, he said, it might be that researchers see a more pronounced effect from the medication in winter because people are battling more pronounced cold at that time.

The fact that the medication appears to be helping is an important discovery, Palinkas said.

"These are fairly low-cost, non-invasive ways of helping people cope," he said. "If we can accomplish that, I think we've done, hopefully, a great service to the U.S. Antarctic Program."

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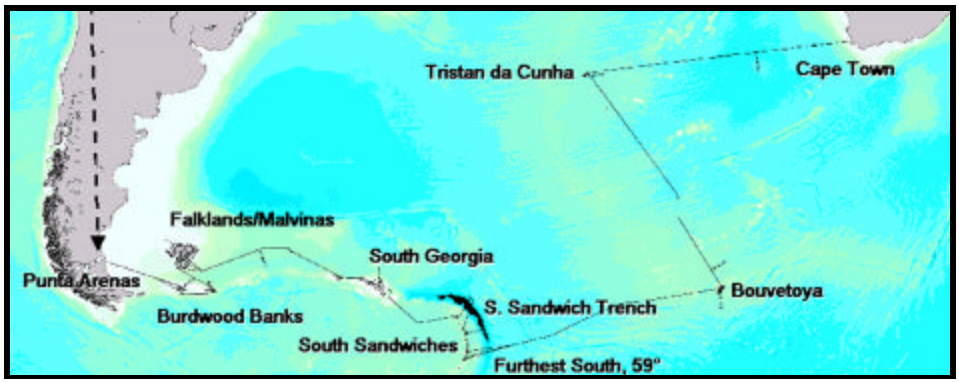
Photo by Kris Kuenning / *The Antarctic Sun*

Last November, T3 researcher Marc Shepanek tests the blood pressure of utility technician Dave White, who volunteered for the tests during his summer and winter at McMurdo Station. Shepanek is back on station collecting the results of the medical study.



Map courtesy of Bill Detrich / Special to *The Antarctic Sun*

"This was really going to be a one-time shot, and that means we had to cover all the islands and get it done."

— Bill Detrich, chief scientist

In two months, the scientific fishing cruise zigzagged among the subantarctic islands between Punta Arenas, Chile and Cape Town, South Africa.

ICEFISH

From page 1

two boxes of preserved tissue to Ohio University.

The *NBP* left Punta Arenas, Chile, on May 17 and arrived in Cape Town, South Africa on July 17, stopping at seldom-visited subantarctic islands along the way to drop a line or net. The cruise went through the Falkland, South Georgia and South Sandwich islands, to the isolated Bouvet Island and then north to Tristan da Cunha.

"This was really going to be a one-time shot, and that means we had to cover all the islands and get it done," said Detrich, a professor of marine biology and biochemistry at Northeastern University in Boston.

The purpose of the cruise was to relate the evolution, physiology, biochemistry and population dynamics of Antarctic fish to their more temperate cousins in the subantarctic. The results could help researchers understand the evolutionary impacts of global climate change, loss of biological diversity and depletion of fish stocks.

"We got just about every single species we wanted," Eastman said. "We didn't get huge numbers of some of them, but we got some and the ones we really wanted we got in large numbers."

Most wanted

The most sought after fish was the Falklands mullet, because it represents the closest evolutionary relative to the ancestor of the dominant Antarctic fish group, the Notothenioidei. The mullet and most notothenioid fish are red-blooded, but surprisingly the sixteen species of Antarctic icefish (family Channichthyidae) are white-blooded. Understanding how the white-blooded icefish evolved from a species like the mullet could help researchers find genes and proteins that would help treat human diseases, Detrich said.

Icefish evolved about 10 million to 15 million years ago from temperate marine fish that migrated into Antarctic waters after the icecap retreated. Like Darwin's finches, they found the isolated southern habitat and adapted into separate species to fill all the niches, including ones that elsewhere would be filled by unrelated fish, Eastman said.

Though the Antarctic icefish have been studied for many years, their subantarctic relatives have not, Detrich said. He and many other researchers on the cruise hoped the Falklands mullet might provide the evolutionary link, offering the key to how the Antarctic fish developed the physiology and biochemistry that allows them to live in the extreme cold.

"In order to understand or interpret the specialization it takes to live under Antarctic conditions, we need to see what the stock was like that gave rise to these Antarctic fishes," Eastman said.

The *Nathaniel B. Palmer* arrived at the Falkland Islands on a miserable day. Cold

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T3

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The results also have shown a difference between participants at McMurdo and at the South Pole. McMurdo subjects reported being more depressed during the summer than the winter, while Pole participants said they were more tired in the summer, but more depressed in the winter. Palinkas said this, again, might have to do with small sample size, or it might be that McMurdo is simply a more stressful place to be during the hustle and bustle of the summer months.

Shepanek is interested in these types of community factors that might affect participants' results, but don't show up in blood tests or questionnaires. By living here, he learns which jobs require workers to spend a lot of time outside and which don't. He knows that a dining attendant who lives and works in Building 155 will spend less time outside than a dining attendant living across the station who has to walk to work. Shepanek specifically requested to live in a louder, more crowded dorm than the relatively cushier ones usually reserved for scientists, so that he could get a sense of how regular dorm life a ffects residents' quality of life, and thus their moods.

"I wanted to make sure I lived an average life here. A picture is worth a thousand words. Living like everyone else is worth a lot," he said. "If you come down here… you have a better perspective. And having a better perspective makes you a better researcher."

Shepanek is spending about a month between McMurdo and the South Pole, gathering all the study's equipment and data. The subjects had blood samples taken at the beginning and end of each season, and those are being shipped to San Diego for analysis. There are also the results of the subjects' mood questionnaires and the cognitive tests they took on computers. In total, 189 people participated in the study, 100 last year and 89 the year before.

Palinkas said he hopes to have the last round of data ready for analysis by the end of the year so his team can start presenting papers on the polar T3 syndrome in the spring.

Shepanek said NASA is involved in the study because astronauts spend a great deal of time in isolation and, if they go outside their ship or station, in the cold of space. There aren't enough astronauts to form a legitimate scientific study, so the Antarctic workers fill in.

"Since we don't have a lot of astronauts spending time in space, we try to get as much ground analysis as we can," he said. "We really appreciate being here and being able to do this."

NSF-funded projects in this story:
Lawrence Palinkas, University of California at San Diego.
www.polart3.ucsd.edu

Photo by Andrew Thurber / Special to *The Antarctic Sun*

The Nathaniel B. Palmer *in an inlet at South Georgia Island, one of the many subantarctic islands visited during a two-month cruise.*

ICEFISH

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wind blew a mix of rain and snow into the faces of scientists-turned-fishermen. The islands' rolling hills were desolate, broken up mainly by the occasional field of boulders. It reminded Eastman of North Dakota, only by the ocean.

Falkland Islands fisheries scientist Paul Brickle led the researchers into an estuary where they lowered the seine nets twice and pulled up about 100 mullet.

"We didn't have enough buckets to bring all the fish back to the Palmer," Eastman said. Some of the mullets waited in the cold, exposed to the air, for more than an hour before they could be shuttled to the aquarium. But almost all survived.

"They're just really tough. That's the ancestral Antarctic fish," Eastman said.

Eastman and Bruce Sidell replaced the blood in about 25 fish from nine species with a colored latex that will show up on x-ray, allowing them to study the pattern of blood vessels through the body.

One thing they've discovered is that the icefish have an incredibly dense pattern of vessels in the eye supplying blood to the retina. This may be necessary to get enough oxygen to the retina without having hemoglobin to carry it, said Sidell.

"In fact, it was so dense that if the blood was red they'd probably be blind, because the pattern would obscure the formation of an image," Eastman said.

He and Sidell want to see if the same is true of their ancestral cousin, the mullet fish, to determine whether that dense pattern is an adaptation to the absence of red blood cells and the environment, or a persistent trait shared with earlier, more temperate-water relatives.

Rare species

Besides the mullet, the ICEFISH cruise brought back about 15 specimens of fish that haven't been widely available to researchers before. At Tristan da Cunha, they caught more than 100 Tristan klip fish, a unique Antarctic relative that lives at 27C, isolated in the middle of the South Atlantic Ocean. Most of the fish were caught from 50m to 400m deep. A few times they managed to fish much deeper, down to 5,400m, by extending the lines holding the net almost as far as they can go. The deepest haul took 20 hours.

For many of the researchers, it was the first time they'd seen many of the species. Fish physiologist John Macdonald has fished with a hook and line or bottom-based traps for about 30 years in the McMurdo Sound area, and only caught two icefish. Most of the other fish they caught he'd only read about.

"From being familiar with a minority, I'm now probably familiar, have seen or touched, more than half the species in the family," Macdonald said from the University of Auckland. "It's just very pleasing to see there really are more than just a couple species. You read about these things in ichthyology texts, but until you really see it, it doesn't bring it home."

Samples from the fish will be available to many more researchers now. The cruise researchers prepared specimens for museums and universities around the world, including the Museum National d'Histoire Naturelle in Paris, the Smithsonian's Museum of Natural History in Washington DC, the South African Institute of Aquatic Biodiversity in Grahamstown and the University of Tennessee in Knoxville. Detrich also collected samples from about 30 species of fish to add to a genomic bank of fish DNA he's creating at Northeastern University in Boston.

Garbage collectors

The most common fishing method involved running the trawl net along the bottom in shallow areas, scooping up a sample of fish and the invertebrate community.

When the bulging trawl net dumped its

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colorful pile of squirming life onto the deck, the fish biologists were waiting. They swiftly pulled out the fish, trying to get them into the aquarium water before the fish froze. They left behind piles of sponges, bryozoans and hydroids.

"As fish biologists we refer to that as trash, but the invertebrate biologists – that's gold to them," Detrich said. "I wanted to make sure that none of that was going to go to waste."

Invertebrate biologist Stacy Kim and her team from San Jose State University came in with snow shovels to clean up the hundreds of kilos of marine trash, filling one to 50 orange plastic fish baskets each time.

"The stuff could come up in pretty good shape, or it could be mashed to a pulp," Kim said.

One of the rarest creatures Kim found was a group of tubeworms pulled up in a trawl net. Though she won't be sure what they are until she analyzes them in her lab, Kim believes the worms were vestimentiferans, usually found around hydrothermal vents, cold seeps and carcasses.

Kim got a better view of the bottom when a remotely operated vehicle sent footage. The camera captured large fan structures and the animals crawling through their branches or hiding in the low spots.

"We got some really neat information from that on how the community looks before you run it over with a net," Kim said.

Photo by Andrew Thurber / Special to *The Antarctic Sun*

Ice coats an instrument used to scoop samples of mud from the seafloor.

Photo by Dan Doolittle / Special to *The Antarctic Sun*

Chris Jones, left, and Marino Vacchi examine a trawl catch from the waters off the Falkland Islands during the ICEFISH cruise.

They were able to send a scoop down and bring up an intact sample of the seafloor ecosystem about a dozen times. Once Kim is able to look at those mud cores in the lab, they will reveal the microscopic invertebrate population.

She and most of the researchers are still waiting for the samples to catch up with them. While the researchers got off the ship and flew home from Cape Town, the samples went back to Lyttelton, New Zealand aboard the *NBP* so they could be sent home by ship to Port Hueneme, Calif and then by truck.

"This way we know we're going to get it and it stays in good shape," Eastman said.

See floor

As the "oddball geologist" on the fishing cruise, Daniel Doolittle was also very interested in images and samples from the seafloor.

Doolittle, a graduate student from the University of Miami Rosenstiel School of Marine and Atmospheric Science, worked with Chris Jones from National Oceanic and Atmospheric Administration's Antarctic Marine Living Resources (AMLR) program to correlate the fish population with the make-up of the seafloor. By bouncing sound beams off the bottom and measuring how much returned, he was able to classify the seafloor into about 10 different categories. He used samples or footage from the seafloor to help him determine what those categories represented, such as mud, sand, rock and beds of sponges or kelps. The measurements are traditionally taken with a single-frequency sonar pointed straight down, to reveal a section of seafloor tens of meters across. Doolittle is trying to expand the technique, possibly creating software to allow a multibeam sonar to collect similar data for hundreds to thousands of meters across the track of the ship.

"AMLR and the science community in general are trying to move toward an ecosystem-based management model," Doolittle said. "This type of research supports those goals."

A summary paper Doolittle wrote with Jones and Susan Lockhart was already used at the Convention on the Conservation of Antarctic Marine Living Resources' (CCAMLR) annual meeting in October in Hobart, Tasmania.

"We were at these habitats that haven't been explored for years," Doolittle said. "Any kind of information, first-hand, direct, is useful data to be incorporated into the mission of the CCAMLR and the Antarctic Treaty in general."

Networking

Two months together onboard the ship gave the researchers plenty of time to get to know each other and compare notes. By the end of the trip several collaborations had evolved. Kim is working with one of the Italian scientists, Doolittle is collaborating with Christopher Held, and Macdonald made plans for future projects with Marino Vacchi.

"Any time you work with other scientists who have similar interests, you talk and compare ideas," Macdonald said.

Researchers from the ICEFISH cruise will reconvene in Maine in August, a year after their cruise, to share their results. They plan to collect their papers for a special issue of the journal Polar Biology.

That may be just the start. The international collaboration hopes to follow up with two more cruises, making it around the rest of the continent. The Italian Antarctic program is considering a cruise during the International Polar Year in 2007, which would cover the South Pacific section of the Southern Ocean, from the Ross Sea through Campbell and the Balleny Islands. About three years after that, another cruise would cover the Indian Ocean sector, through the Kerguelen and Heard islands.

NSF-funded research in this story: Bill Detrich, Northeastern University, www.icefish.neu.edu
Stacy Kim, Moss Landing Marine Laboratories

Photo by Rudy Moore / Special to *The Antarctic Sun*

Tony Black mails his absentee ballot at the South Pole Post Office on November 2.

Photo by Kristan Hutchison / *The Antarctic Sun*

Elizabeth Shier knits while watching the third presidential debate rebroadcast in the McMurdo dining hall in October.

News

From page 1

news on TV and through the Web. "Connected through the media and other sources of information, but cut off from directly impacting anything, such as doing grassroots work."

It's tougher for researchers at some remote field camps to keep up with world events, since their only contact with the world is through the McMurdo radio operators. Operator Rachel Jenkins said two camps called for election results Thursday morning and others may have called in during the night shift.

The South Pole also got election updates overnight from the radio operators. The telecommunications satellites serving the Pole ended their daily relay more than 14 hours before the news of Senator John Kerry's concession. Most of the station population read the final outcome at breakfast on the information scroll that usually displays the flight schedule and other station announcements.

Palmer Station relied on the Internet. People there streamed video from MSNBC, CNN and other news services while the votes were being counted and checked.

"I think this election is very important for people down here, who get out and travel the world," said Shandra Cordovano at McMurdo Station. She stayed in touch with the election through CNN's Web page and emails sent from friends.

In the McMurdo computer room, IT trainer Bill Jirsa noticed the Internet speed slowed markedly on Wednesday afternoon, as most people with access to computers logged on to follow the election count.

Before the real votes were counted back home, Palmer and McMurdo Station residents held completely unofficial elections for fun. In McMurdo, the recreation department collected votes not only for U.S. president, but for a station mayor, foliage and mascot. More than half the station population voted and 10 field camps radioed in their mock votes. Like some pre-election polls, the mock election gave the opposite result from the real one.

Official Election 2004 votes trickled off station by mail during preceding weeks. By Monday, the McMurdo post office had postmarked 523 absentee ballots and sent them north, said postmaster Kathleen Soutter. The last of the absentee ballots for the presidential election were postmarked from Pole on November 2. The ballots were express-mailed from Christchurch, NZ, to make sure they arrived in time to be counted.

"I don't know if it will get there in time," said Shelly DeNike, who'd sent her absentee ballot the week before. "Being from Alaska, I don't know if I'll have a lot of importance on the national election, but the senate race is pretty important."

Beyond voting, people have few ways to actually participate in the news as they watch it unfold back home.

Without campaign ads, signs, or phone calls, election buildup was quiet on the Ice. About 40 people gathered in the dining hall on Oct. 19 to watch a tape of the third presidential debate. Some brought their knitting or beads to work on while Bush and Kerry sparred on the screen.

Georg Bakker, a medical administrator in his second season who watched the debate, said he pays much closer attention to news when he's home compared to when he's in Antarctica. He was surprised by this change during his first year at McMurdo. When he got off the Ice last year, he said he picked right back up where he'd left off, keeping close tabs on current events again.

Part of the reason for the change when he gets to McMurdo is simple.

"I work more hours," he said.

But there's something else at work, too, he said. Life here offers a break from the sometimes depressing world news.

"Antarctica is a little bit of a vacation to me," he said.

Presidential elections come around every four years. Red Sox fans had to keep tabs on an event that hasn't happened in 86 years — watching their team win the World Series.

Mark Hanson, a dining attendant from Beverly, Mass., worked two hours on his day off specifically so he could get off early on Oct. 28 to watch Game 4 of the series. He pulled a chair up to the television outside the dining hall and planted himself there for the full game. His right knee bounced up and down non-stop as the innings ticked away and the Sox held onto their lead. By the eighth inning he could sit no longer and had to stand and fidget.

"I can't believe I'm not home right now," he said. "It's killing me not being there."

Hanson said he talked with and e-mailed his friends more during the playoffs and World Series than normal. His mom is going to send him all the Boston Globes, Boston Heralds and Sports Illustrateds written during the series. And he's been able to watch the end of every game because his shift ends at 4 p.m.

"My friends were telling me before I came down here that I should bring my own car so when the Sox win, I can flip it over and light it on fire," he said.

When the miraculous last play was made and the Sox won, Hanson jumped up and down, screaming "yes!" He couldn't wait to call his friends and his grandmother.

"If it takes me going to Antarctica for the Red Sox to win the World Series," he said, "I'll do it."

Profile In the field with "Adventure Barbie"

By Emily Stone
Sun staff

Melissa Rider was working in a veterinarian's office in Boulder 10 years ago when a friend pointed out a newspaper ad for jobs in Antarctica. The job fair happened to be on Rider's day off, so she went.

"I didn't know diddly about Antarctica," said Rider, who was 23 at the time. She was hooked immediately. The remoteness of the continent, its extreme environment and wildlife captivated her.

"I was absolutely possessed," she said. "I must go there."

Rider has now spent seven seasons in Antarctica over the past 10 years working a variety of jobs. She was a waste management technician at McMurdo Station her first year, and worked her way up through a series of jobs to become a full-time Raytheon Polar Services employee. She works now as a planning support manager in Colorado and as a field camp manager for special projects on the Ice.

Last summer, she managed the camp on an island in the Weddell Sea where paleontologists found dinosaur bones that might belong to a new species. That discovery let Rider experience the excitement of the science she'd been supporting for years from afar.

"So often in the program we know what's going on with science but we're not standing right there," she said.

Photo courtesy of Melissa Rider / Special to the *Antarctic Sun*

Melissa Rider at the Bransfield Strait in November 2003. Rider spent last summer as a field camp supervisor on an island near the Antarctic Peninsula, where scientists were searching for dinosaur bones.

Rider's good nature and instinct for mixing a healthy dose of fun into a long day's work were evident at the camp. She coined her own nickname of "Adventure Barbie" after scientists spotted the candy-pink wristwatch she was sporting. And she made sure to bring her purple "travel boa" to the remote Antarctic island.

The project also showcased Rider's professional strengths and versatility, according to her boss on the project, John Evans, the coordinator of special science projects for Raytheon.

The dinosaur project, which had 10 scientists, was the biggest field camp Evans had ever organized. The group planned to land on Vega Island off the Antarctic Peninsula where previously discovered bones lay waiting for removal. But when the ship arrived, the island was surrounded by tightly packed sea ice and couldn't be reached.

The ship made a detour to Palmer Station while waiting to see if the ice would break up, and picked up three more people to help with the hunt, Evans said. They made another attempt at landing, but the island was still blocked. The group picked the nearby James Ross Island instead, doubtful of whether they'd find anything. For Melissa this meant that she had a larger than expected group going to the wrong island on her first outing as a field manager.

> "I didn't know diddly about Antarctica. ... I was absolutely possessed. I must go there."
>
> *— Melissa Rider, on first learning about jobs in Antarctica 10 years ago*

Evans, who went out with a smaller group nearby, said Rider was unflappable.

"I had four guys and me and just enough tents and just enough stuff and if I had more people I probably would have gotten grumpy, and she didn't. Melissa never lost her smile. She adjusted and did fine." Evans said. "That's kind of vintage Melissa."

After a week on the island, "they found the bones of this critter," Rider said. Immediately, the scientists knew they had something unique. The dinosaur bones are still being analyzed, but may be the remains of a previously unknown species, a particular treat since the scientists hadn't planned to dig there.

This summer Rider is managing the field camp at Petermann Island near Palmer Station for a study of the effects of tourism on birds. She bought herself a new candy-pink watch for the season.

All this is a long way from Rider's beginnings in the waste treatment center. After that, she worked at the Berg Field Center, first as a coordinator and then as a supervisor. The center outfits scientists for their time in the field. She then became an assistant manager in field science support. One large project in that job was the unexpected task of coordinating the loading and unloading of 45 passengers and 5,500 kilograms of cargo from the research vessel *Nathaniel B. Palmer* when two miles of sea ice kept the ship from docking at McMurdo's ice pier.

Rider took three years off from the U.S. Antarctic Program to work in Colorado as a researcher and then for Outdoor Semester in the Rockies and the Outward Bound School. But the draw of life in Antarctica pulled her back, and happily so.

"There's nothing quite like it," said Rider, now 33 and living in Denver. "The Ice has been a really formative part of my life. I have such a strong admiration for the continent and an even stronger love and admiration for the people there."

And those people have an equal admiration of her.

Evans described Rider as smart, organized and having a knack for defusing tense situations with her good humor.

"She's compulsively upbeat," he said. "She walks into a room and it's like a beam of sunshine."