



November 10, 2002

Where science goes shopping

By Mark Sabbatini
Sun staff

The atmosphere is sort of Costco meets Bob's Country Market.

A quaint bell jingles as people enter and are greeted by the store's sole employee. Shopping baskets are stacked near the first of several short aisles of mostly familiar groceries. Customers pick cans of yams and boxes of instant oatmeal off shelves one at a time — but here they keep picking. And picking.

At checkout time there's no "paper or plastic" dilemma. Instead shoppers load what may be thousands of pounds of goods into triple-walled cardboard crates, which often are destined to be thrown out of planes as they taxi down ice runways.

Thanks for shopping at the Berg Field Center Food Room at McMurdo Station. Have a nice day.

The store, tucked into the second floor of a cargo building, is where scientists and others working at remote sites stock up on supplies before heading out to the field. What's on the shelves may need to feed a few people or a dozen, for one week or six, and be suitable for cooking equipment ranging from backpacking stoves to reasonably modern kitchens.

But McMurdo residents with a

See Grocery on page 10

Dressed for town



Photo by Melanie Conner/The Antarctic Sun

This well-dressed visitor hangs out along the road to McMurdo's ice runway, delighting passers-by. He seemed unconcerned by the audience he drew last week, falling asleep while paparazzi snapped shutters around him. For most of the gawkers it was the first penguin they've ever seen. "This made my Antarctic experience complete," said Frank Abbatecola, a Summit County, Colo., resident at McMurdo Station for his second season. Another Adelie penguin was spotted by the ice pier Friday.

When the Ice was green and growing

Antarctica's warmer, not gentler, past

By Kristan Hutchison
Sun staff

Long, long ago, back when Antarctica was a warm place, a hungry dinosaur choked on his dinner, which happened to be another dinosaur his same size.

Imagine the preceding battle — The 22-foot cryolophosaurus standing nearly upright on his two sturdy back legs while he ripped at the peace-loving, plant-eating prosaurapod with his sharp teeth and front claws. The prosaurapod, slightly bigger at 25-feet-long, but without enough defenses, trying to escape as they splash together into a river bed running red with his blood.

Victorious, cryolophosaurus dined in earnest, tearing large bites from his prey. Only he should have chewed a little better, because part of a leg stuck in his throat and he died there in the riverbed.

There they lay, predator and prey, while smaller dinosaurs scavenged their bodies. There they stayed as the world slowly cooled and ice covered the continent. There they were when 200 million years later geologist David Elliot spotted a bone sticking up as he looked for rocks in the Transantarctic Mountains.

See Paleo on page 6

INSIDE

Le'go the AGO;
remote power
switch

Page 9

Following Scott,
for a few miles

Page 3

Quote of the Week

"You haven't lived until you've crossed the Drake Passage."

— IT worker who's spent seasons at all three stations, including Palmer

Ross Island Chronicles

By Chico



Cold, hard facts

Antarctic discoveries

2000 — Balloon-borne instruments provide first detailed images of the early universe.

1999 — Four new fish species are found in Antarctic waters, giving biologists insight into the processes of evolution in ecological niches.

1994 — Amundsen-Scott South Pole Station provides images of the crash of comet Shoemaker-Levy 9 into Jupiter.

1991 — Fossil of 25-foot-long dinosaur discovered 350 miles from the South Pole proves dinosaurs were on every continent.

1986 — Researchers establish chlorofluorocarbons as the probable cause of the Antarctic ozone hole.

1982 — A fossil mammal discovered on Seymour Island proves Antarctica and South America were connected about 40 million years ago.

Source: Office of Polar Programs

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Katabatic Crosswords: Safety first

Across

3. What safety training is intended to prevent
4. Fail to do this after an incident and you're in trouble
9. Another word for snow hut
10. The most dangerous problem in Antarctica, due to lack of water
13. Abuse this and your job is history
16. Way beyond the ordinary (plural)
17. Sorting it prevents damage to people, environment
18. Weather where some limits are in place
19. Keeping things clean and sterile

Down

1. A common sickness upon reaching the South Pole
2. The most common cause of back injuries
5. Bypassing of training by showing proficiency (abv.)
6. On a slope, always approach helicopter from here
7. Never dump these down a lab sink
8. Vigorous sanitation rules intended to preserve this
10. Caused by exposing skin to elements
11. A loss of body core temperature
12. This must be working before an aircraft will leave a field camp site
14. A pre-check of equipment by field teams
15. Lots and lots of this helps prevent incidents

Solution on page 4

Squares too small? No pencil to erase your mistakes? Try our interactive online puzzle at www.polar.org/antsun



Photo by Joan Myers/Special to The Antarctic Sun

Sunday sledgers pull into Scott Base. In harness, from left to right, are Zachary Willette, Melissa Rider, Damien Henning, Karen Joyce, and unidentified puller and Seth White. Steve Preshler walks beside the sled. An unidentified rider sits in front of the sled, with Lisa Ferber and Joe Heil, while Robbie Liben stands to urge the team on. This photo also ran in the New York Times on Tuesday. If you know the identities of the two unidentified people, please e-mail Joan Myers.

Race to the ~~pole~~ base

By Kristan Hutchison
Sun staff

Hardy fools or foolhardy, a dozen McMurdo residents started out in Robert Scott's footsteps on Nov. 3, pulling two sleds across the sea ice.

They ended up at Scott Base, drinking beer.

"I've always wanted to do this, ever since I saw that original footage of three guys slogging in the snow and struggling," said Karen Joyce, who instigated the Sunday sledging expedition. The Berg Field Center provided sleds. The harnesses came from the Field Safety Training Program and safety manager Mike Salasek.

The sled pullers started out in high spirits, barking like dogs and even getting down on all fours to experience pulling from a four-legged perspective. But as they had for Scott, the dogs quickly gave up and the pulling reverted to two legs. They soon gained an understanding for what the original expeditioners must have thought during three months of sledging.

"We thought the same kind of thoughts that would come to anybody, which was 'someone here is not pulling,'" Joyce said.

The sleds were weighed down by people

"It really slides along quite well, provided there's not hills, glaciers, crevasses, scurvy, you're well-fed and had brunch in the morning."

— Joe Harrigan, sledger

jumping on and off the back, as well as some rocks, "because it was a scientific expedition," Joyce said.

Scott's party had hauled 1,500 to 2,000 pounds with just three people. The Sunday sledgers were pulling about 900 pounds, but still found it hard work.

"About halfway through you started hearing murmurings through the haulers, 'well I wouldn't want to do this for eight hours,'" said Joe Harrigan, who was pulling on the other sled.

An advance team had laid out caches of food, mostly Raisin Bran, along the trail and

set up a depot with a pole midway. Andy Young attempted to ski past the sleds with a Norwegian flag.

"I was too lazy to pull," he said.

Young's flag was stolen, but by the time the first sled reached the midway depot someone else had left a Norwegian flag there, with a note "Enjoy the Pole, Roald."

"Now we can all really kind of understand how miserable (Scott) must have been," Harrigan said. "There wasn't a single one of us who thought that was a reasonable thing to do, to go two months pulling that much weight."

Except maybe Julian Ridley, who inherited a taste for Antarctic adventure.

His great-grandfather, William Colbeck, was part of the first expedition to ever pull sleds onto the Antarctic Plateau with the Southern Cross Expedition of 1898. Colbeck returned to Antarctica in 1903 as the captain of the *Morning*, helping to release Scott's ship from the sea ice.

Then Ridley's grandfather, another William Colbeck, came to the Antarctic on the *Banzare* expedition in 1929.

Ridley joined the Sunday sledgers to feel what it had been like for his forefathers.

"It was fun. We had moments where we

See Sledge on page 4

Sledge From page 3

were joking and where we pretended we fell into a crevasse,” Ridley said. “Then there were times we had silence and you could look out at the mountains and imagine what they must have felt to take off on that same day.”

Pulling the sled he noticed even the small rises and falls caused by sastrugi.

“The biggest realization was just getting a taste for what they endured,” said Ridley, who used to look through photo albums of the Antarctic with his grandfather. “The clothing we have today and the clothing they had back then, the physicality of it all, it was a real eye opener – giving me a new understanding for the term ‘dash to the Pole.’”

Still, if he’d been offered a chance to join the first sledging expedition to the South Pole, Ridley said he would have gone.

“No question, it’s that old adventurous spirit.”

Like Scott and Amundsen, the Sunday sledging hadn’t been planned as a race, but as soon as there were two sleds heading the same direction

it became one.

The two teams were wearing different harnesses, which both agreed gave the winners an advantage. The winning team had harnesses attached at the waist, as Scott’s had. Joyce’s team wore chest harnesses, requiring them to use their back and abdominal muscles to pull.

“That was the longest three miles I’ve gone in a long time,” said Joyce, who regularly runs marathons.

Harrigan was on the team that pulled into Scott Base seven minutes earlier.

“The hauling was not nearly as bad as we had suspected,” he said. “On a good sled on flat surface it really slides along quite well, provided there’s not hills, glaciers, crevasses, scurvy, you’re well-fed and had brunch in the morning; it certainly makes a difference.”

After pulling for one and a half hours, the sledgers arrived at their goal— not a pole, but a bar.

“I don’t think I’ve had a cold beer taste that good in I don’t know how long,” Joyce said.

Corrections: Photos of icebergs printed in the Oct. 27 issue on p. 7 and 8 were misattributed. They were actually taken by Laura Hamilton.

In the same story bergy bits were misdefined. According to the *Antarctic Dictionary*, bergy bits are larger than growlers, not smaller.

A photo of a snowy owl printed in the Nov. 7 issue on p. 12 was misattributed. The photo was taken by J. Craig George. A photo of a polar bear printed in the same issue on p. 13 was taken by Todd Chandler.

The Antarctic Sun regrets all errors.

Have a better winter and remember it

Join a study testing preventative treatments for Polar T3 Syndrome. Participants could experience improved energy, enthusiasm and memory.

Winterers at the South Pole and McMurdo Station can contact medical by Nov. 15 to join the study.

Answer to p. 2 crossword

A	L	I	N	J	U	R	I	E	S
R	E	P	O	R	T	F			
U	S	T	I	C	H	D			
H	Q	I	N	Z	H	E	E	W	N
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	F	I	R	E	M	L	L		
H	R	O	S	A	L	C	O	H	O
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P	O	T	B	A	O	S	T		
H	I	K					W	R	
E	X	T	R	E	M	E	S	W	A
R	E	C	O	N	D	I	T	I	O
I	W								
A	S	A	N	I	T	A	T	I	O

Continental Drift

How concerned are you about ozone ?



“I’m just worried where all our air is going to go and if it will escape through the hole.”
 John Ross
McMurdo mechanic from Fernandina, Fla.



“Pretty concerned, just because since I’ve been down there I haven’t been real good about wearing sunglasses and since then I’ve developed a terigium in my eye.”
 Kim Grimm, *Palmer marine projects coordinator from Breckenridge, Colo.*



“I’m not concerned. I’m not going to be lounging in a chaise lounge getting a tan.”
 John Fowler, *South Pole iron worker from Anchorage, Alaska.*

around the continent

PALMER

Hitting the slope on skis, boards and beds

By Tom Cohenour
Palmer correspondent

Some blue-sky days call for a brief break from science to enjoy the freshly fallen snow. The recent combination of warm, calm weather after a snowstorm sent people off eagerly gathering up skis, boots and poles. A few selected Nordic, while others preferred Alpine; Palmer has a modest selection of both types of ski equipment.

Occasionally, a snowboarder could be seen gracefully slicing a path down the slope of the snow-covered glacier behind station. Nearly as often they could be seen bouncing down.

"I spent more time on my butt than standing on the board," laughed one beginner who refused to give up.

The glacier, officially known as the Marr Ice Piedmont, completely covers 38-mile (61-kilometer) long Anvers Island. At the center of Anvers Island, the glacier is 2,000 feet (600 meters) thick. The ice front is 180 feet (55 meter) high above sea level and 115-130 foot (35-40 meter) below sea level, at its deepest point. The ice front has been retreating, mainly by calving, since at least 1965 at a rate of 30 feet (10 meters) per year.

Palmer resides on a rocky spit of land jutting into the ocean with the glacier sloped up behind it rather than a sheer face. This feature allows easy access for hikers, skiers, snowboarders, snowmobilers and sleds. It's one mile from the station to the end of the flagged route on top, including the 14 percent grade lower section where much of the fun takes place.

It was on the steep lower section that the Palmer Station Winter Olympics were held a year and a half ago, with the main event being the mattress race. Two old plastic-covered mattresses were salvaged and put into use as the perfect sleds. That is to say, almost perfect. Steering a lumpy old mattress as it's gliding down a slick glacial slope with three hysterical teammates aboard is no easy task.



Tom Cohenour/The Antarctic Sun

Old mattresses and innertubes become sleds for the Palmer Winter Olympics.

Tryouts were held this week in preparation for the 2003 Palmer Station Olympic Mattress Racing Competition. A two-inch dusting of snow created a billowing cloud of powder around each mattress as it roared down the glacial raceway. Time trials revealed that three people on one mattress didn't make for faster times, but only created a higher degree of operator error.

SOUTH POLE

Summer crew arrives

By Liza Lobe
Pole correspondent

"It's great to be back" and "what have I gotten myself into?" were just a couple of the comments expressed Tuesday when two ski-equipped planes deposited the main-body crew at 90 degrees South. After several delays for various reasons we arrived to fresh temperatures and warm welcomes.

Our arrival signaled the long-awaited departure of most of the winter crew. They were an anxious bunch on the flight deck to greet us. There were lots of hugs of hello and good bye. After about 30 minutes the outgoing winterers were boarded and heading towards warmer climates and the new, wide-eyed arrivals were herded into the dome, most of them experiencing the 10,000 feet physiological altitude for the first time. "Drink more water" and "take things very slow" were heard over and over. The next day starts early and the work will be steady as we all settle in to daily routines

that will be our life until mid-February.

SkyLab Science: Experiments in the SkyLab include year-round monitoring of the sun's energy spectrum with the Earth's magnetic field, producing a spectral range of low-frequency electromagnetic waves picked by antenna arrays. In addition, "nighttime" auroral-based observations are used to gather information about magnetospheric and ionospheric influences of highly energized solar wind particles streaming through the Earth's magnetic field.

Optical data acquisition systems include All Sky Cameras and Imagers, as well as spectrophotometers and interferometers.

SHIPS

Cruising north and south

The research vessel *Laurence M. Gould* stopped at Cape Shirreff on Livingston Island on Friday to open a seal research camp. Despite challenging conditions, the put-in went well. On the way to Cape Shirreff the *Gould* passed a large whale.

The *Gould* is working the Southern Ocean alone, shuttling people and cargo between Chile and the Antarctic Peninsula, while the research vessel *Nathaniel B. Palmer* dropped off waste from the Peninsula in California, a trip made every two years. While there a new crane was installed and various systems were tested. On Nov. 3 the *Palmer* visited Los Angeles, where a smaller local boat taxied out passengers to the *Palmer*.

"Water taxi spent an hour running around in circles trying to find us in the very dense fog," wrote Marine Projects Coordinator Steven Ager in the daily report. "We recommended to the water taxi driver some radar and GPS training. We never saw another ship or any landmark except as radar blips in visibility of about 50 feet. Relieved, we are currently under way for multibeam sea trials."

All the tests went well and the *Palmer* is scheduled to leave Port Hueneme, Calif., for Lyttelton, New Zealand, today.

The Coast Guard icebreaker *Polar Sea* also left Seattle last week, headed south.

the week in weather

McMurdo Station

High: 29F/-2C Low:-3F/-20C
Wind: 51 mph/81 kph
Windchill: -40F/-22C

Palmer Station

High: 38F/4C Low:19F/-7C
Wind: 39 mph/62 kph
Melted precipitation: 0.4 in/1 cm
Snowfall: 1 in/3 cm

South Pole Station

High: -13F/-25C Low:-55F/-48C
Wind: 12 mph/19kph

Looking back

~ 750 million years ago
Antarctica and North America connected.

~500 million years ago
Antarctica is at the Earth's equator.

~245 million years ago
Synapsids, an evolutionary link between reptiles and mammals, coexist in Antarctica with giant amphibians, some with heads at least three feet long. The synapsids come in a wide variety of both plant- and meat-eaters, ranging from cat-size to cow-size.

~190 million years ago
Dinosaurs live in Antarctica, including varieties common in North America and the *Cryolophosaurus ellioti*, meaning "frozen-crested lizard," which hasn't been found elsewhere.

~180 million years ago
Antarctica is in the high latitudes, with a quarter of the continent inside the Antarctic Circle.

~ 65 million years ago
Antarctica is near its current polar position and dinosaurs go extinct globally.

~ 35 million years ago
First evidence of the Antarctic ice sheet. After that the ice sheets wax and wane.

~ 30 million years ago
A current of water begins to circle Antarctica, isolating it from the warmer waters and climates to the north.

~15-17 million years ago
The Antarctic ice sheets become permanent, corresponding with the beginning of global cooling.

~ 1.8 million years ago
The northern hemisphere ice sheets develop.



Photo illustration by Mark Sabbatini/The Antarctic Sun

Looking at an ice-covered landscape, it's difficult to imagine the forests once growing in Antarctica. In this illustration, drawings of three trees found by paleobiologists Tom and Edith Taylor are superimposed over typical Antarctic scenery.

Paleo From page 1

Elliot radioed William Hammer, a paleontologist working further down Mt. Kirkpatrick. Hammer dug up the dinosaur bones, piecing together the story of the cryolophosaurus' last meal. He found the prosauropod leg and foot bones stuck in the meat-eater's jaw and throat. The scavenging dinosaurs had left tooth marks - and a few teeth - in cryolophosaurus' legs.

The cryolophosaurus, or "frozen-crested lizard," turned out to be a whole new species and an important find in the evolution of early carnivorous dinosaurs, Hammer said. It was about 40 million years older than the next dinosaur in its evolutionary line.

That and other discoveries of fossil remains have helped puzzle together what Antarctica was like before it froze over. Hammer has found animals living at three different time periods, from pre-mammals and giant amphibians living 245 million years ago to the dinosaurs 200 million year ago. The amphibians are evidence that Antarctica was once warmer, Hammer said. They weren't migratory and couldn't have survived if the water froze in the winter.

"We envision sort of a cool, temperate climate kind of thing, kind of like coastal Oregon or Washington today," Hammer said. "It was too high latitude to be hot, but winters weren't all that harsh."

Antarctica has been at a near polar latitude for more than 120 million years, but it didn't get cold until 40 million years ago. Before then, the Earth is thought to have been an average of 10 degrees warmer. The first evidence of Antarctic

ice sheets appears about 35 million years ago.

"The current situation is the thing that's abnormal in terms of geological history," said Scott Borg, National Science Foundation program manager for Antarctic Geology and Geophysics. "The world was a much warmer, much different place."

For much of that time Antarctica wasn't centered on the South Pole, but sat partially outside the Antarctic Circle. At the time cryolophosaurus choked on his last meal in what would become the Transantarctic Mountains, he was living around 65 to 70 degrees south latitude. Now the Antarctic Peninsula sits at that latitude.

By 65 million years ago Antarctica was near its present position inside the Antarctic Circle.

"Things were substantially different, but there were still prolonged periods of very short days in the winter and very short nights in the summer," Borg said. "Whatever ecosystems were there had to adjust to those sort of seasonal changes in the light."

For most of that time Antarctica would have been green, not white. Lush forests of ginkgo, ancient conifers, ferns and moss supplied habitat and food for the animals and birds.

Paleobiologists Tom and Edith Taylor found forests of fossilized tree stumps still standing in the Transantarctic Mountains. Near the Beardmore Glacier a ghost forest of 99 stumps stand erect, some still a foot and a half tall and up to 2 feet in diameter.

See Paleo on page 7



Drawing by Bill Stout/Courtesy of Bill Stout

Cryolophosaurus wanders through a very different Antarctica in this illustration.

Paleo From page 6

“This was a good-sized forest that had a canopy to it and probably was wet underneath, where there were lots of ferns and plants and things like that,” said Tom Taylor.

In the Triassic period, the general vegetation pattern was similar to areas of New Zealand with glaciers in the mountains, then vegetation spreading down to the coastline. Some plants went dormant in the winter, but most didn’t. One large ancestor of modern conifers dropped fern-like leaves in the fall. Despite the dark winters, the trees had growth rings 10 times the size found on trees growing now in Alaska. The Taylors were surprised to also find cycads, a tree with a spongy trunk that now grows in tropical areas.

“Everybody loves the animals,” said Edith Taylor, “but plants provide the air we breathe, the food we eat and the clothes we wear.”

The animals that once lived along the Antarctic Peninsula also relied on the vegetation growing in what was then a warm, humid climate, said Jim Martin, professor and curator of vertebrate paleontology for the South Dakota School of Mines, who has also been bone-hunting in Antarctica.

“This would have been a well-vegetated area,” Martin said. “Much warmer and more humid than it is today, completely different than the snow and ice you’re experiencing now.”

See Paleo on page 8

Antarctica’s Jurassic park

Some of the dinosaurs and other giant reptiles living in early Antarctica:

Ankylosaur

Heavily armored, tank-like plant eating dinosaurs. They ate low-lying plants, such as ferns, shorter cycads and moss. It was found on Ross Island.

Cryolophosaurus

The only carnivorous dinosaur found in Antarctica to walk semi-upright on its back legs. Its name means frozen-crested lizard, for the cold region where it was found and the characteristic crest on the top of its skull, above the eyes. It was about 22 feet (7 meters) long. A cryolophosaurus skeleton was found in the Transantarctic Mountains.

Hadrosaur

Duck-billed herbivores with horny beaks. They ran on two legs, but may have walked on all four while grazing. They probably lived near bodies of water.

Hypsilophodontid

Meaning “high-crested tooth,” these were a group of small, gazelle-like, herbivorous, large-eyed, long-legged, five-fingered, four-toed, herding dinosaurs. Hypsilophodontids had no natural defenses from predators except their speed, senses and small claws on their toes. Usually up to 10 feet (3 meters) long, an unusually long one, 13 to 16 feet (4 to 5 meters) long, was found on Vega Island.

Plateosaurid prosauropod

Herbivores with long necks and tails, walking on either two or four legs. Its bottom jaw attached well below the level of its teeth. They ranged in size from about 10 to 33 feet (3 to 10 meters). It was found being eaten by the cryolophosaurus in the Transantarctic Mountains.

Lystrosaurus

The “shovel lizard” was a heavily-built, mammal-like reptile, with a stubby tail. Instead of teeth it had two tusk-like fangs made of horn. It was a plant-eater about 3 feet (1 meter) long that lived in herds near lakes and swamps.

Mosasaur

A carnivorous marine reptile with 4-inch (10 cm.) long teeth and a “duck-bill.” They were up to 33 feet (10 meters) long and had 3-foot (1 meter) long skulls. The lower jaw could unhinge to eat things larger than their own heads. They were not dinosaurs, but were related to snakes and monitor lizards.

Plesiosaur

Flipped marine reptiles, with long, snake-like necks, tiny heads and wide bodies. They were not dinosaurs, but ranged in size from 8 to 46 feet (2 to 14 meter) long. They lived in the open ocean and breathed air. Plesiosaurs remains were found on Vega Island on the Antarctic Peninsula.



Illustration by Dan Varner/Courtesy of Jim Martin

Mosasaurus battle in an artist's rendition of an early Antarctic scene.

Paleo From page 7

Visiting islands along the Antarctic Peninsula in past years, Martin, Judd Case from California, and their colleagues found evidence of ancient marine reptiles, dinosaurs and shore birds. The bird fossils look remarkably modern, suggesting Antarctic birds may be a link in the surviving evolutionary chain.

“What is exciting about this is they are very modern in their appearance and elsewhere there are birds that are very primitive that later become extinct,” Martin said. “We think that Antarctica was a seed, or at least an important area of dispersal, for modern birds.”

A single tooth they found on Vega Island helps confirm the hypothesis that South America was once connected to Antarctica. The one-and-a-half inch long tooth is identical to those found in North America belonging to hadrosaurs, a duck-billed dinosaur about 15 feet high and 30 feet long.

“This tooth is so close to some of the North American teeth you couldn’t tell them apart,” Martin said.

The hadrosaur was a land-based dinosaur, so its presence in the Antarctic islands supports theories that there was a land connection between the Americas and Antarctica before 65 million years ago.

“The thinking is that this allowed migration pathways,” Borg said.

Martin and Case believe possum-like marsupials found in

North America could have followed that path through South America and across Antarctica to Australia, but their remains are more elusive than the larger dinosaurs and reptiles.

In areas of Vega Island that might once have been shallow water, the Martin-Case team found a number of marine reptiles, including mosasaurs or giant lizards and plesiosaurs, long-necked reptiles similar to descriptions of the fabled Loch Ness monster.

The mosasaurs were meat-eating reptiles up to 50 feet long, with large jaws and sharp teeth. Martin-Case’s group found lots of those teeth and jaws. The plesiosaurs were flippered reptiles about 25 feet long that lived on fish and other swimming animals.

Some of the scraps of bone Martin has found just make him want to return and look for more, like the claw of a theropod, a meat-eating dinosaur.

“We are seeing some tantalizing evidence for them,” Martin said, “and we are hoping of course to find a partial skeleton, something like that.”

Martin believes there’s much more evidence of early Antarctica frozen beneath the permafrost, but it’s hard to dig up dinosaur bones when the ground is like cement.

During the peninsula’s mid-summer thaw, Martin can sometimes dig down two to three feet before he hits permafrost. He has tried to thaw the ground down further, without much success.

“There’s not much we can do beyond that level,” Martin said. “You can work all afternoon and get about two inches down. It’s labor intensive when you’re using a pick.”

In past seasons he had to leave some surprising finds behind in the frozen ground.

“We are hoping a plesiosaur skull will be on the end of this neck that’s going into the permafrost,” Martin said.

Working on the Antarctic continent, Hammer has been able to fly in jackhammers to help him.

When they manage to remove a bone, the cold is still a problem. The standard practice is to wrap fossils in plaster and burlap, like a cast on a broken leg, Martin said. But the plaster is made with water, which freezes before it sets.

Despite the challenges, Antarctica has proved to be one of the best sources of fossil plants from the Triassic and Permian ages, the Taylors said. They found plant fossils in petrified peat at two locations in the Queen Alexandra Range. Peat deposits of that age had only been found in one other place in the world.

Many of the Antarctic plant fossils are also unusually well-preserved through a process called perimineralization. In perimineralization, silica in the Antarctic groundwater infiltrated the plants before they decayed, preserving the cells and tissues intact. For the researcher looking back in time, it’s like the difference between finding someone’s initials inscribed in cement, or finding their entire body buried under a house.

Martin, Hammer and the Taylor’s all hope to return and look for more evidence of Antarctica’s warmer side.

“There are probably more out there,” said Edith Taylor. “We just haven’t covered every inch of the Transantarctics.”



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Future of remote observatories depends on sun and wind

By Kristan Hutchison
Sun staff

Remote observatories on the Antarctic plateau are being turned over to a higher source of power.

Researchers looking for a faster, cheaper and, most of all, more reliable way to get data are switching to solar and wind power.

Propane generators proved unreliable for the six Automatic Geophysical Observatories, or AGOs, placed across the continent a decade ago. Each winter several of the AGOs shut down, usually when water vapor from the generator freezes the exhaust pipe closed, said Ted Rosenberg, the lead scientist for the Polar Experimental Network for Geophysical Upper-atmosphere Investigations, PENGUIn, as the projects in the AGO sites are officially called.

Last winter was the worst yet. One by one the generators failed, the computers stopped caching data and all six AGOs went silent by March.

"It was kind of like the old AGO felt that the project is ending, so they just ceased to collect data," said Vladimir Papitashvili, National Science Foundation manager of the Antarctic Aeronomy and Astrophysics program. "It's never happened (that) all of them ceased before."

The 10-year grant was ending anyway, so the six PENGUIn scientists decided to rethink the way their project is run. Their instruments record the way the Earth's magnetosphere reacts when struck by the solar wind, a flow of particles from the sun. The collision causes auroras, electric currents and geomagnetic fields. It can also disrupt satellite communications, damage power lines, induce currents in underground pipelines and cause corrosion. The data they are collecting are more important than ever, since it could be used to predict such problems.

"Industry is now looking into that, asking how you guys can help predict these space weather storms," Papitashvili said.

Of the six AGO sites, three will continue to run with solar panels. One of those will have an additional wind generator, which may keep it running through the sunless winter. If wind power works at the test site, it may be added to the other two AGOs next year, said Papitashvili.

"They discussed the scientific goals, the objectives of their study and they felt this (magnetic latitude) chain, which includes the South Pole as an additional site, better suits their scientific objectives," Papitashvili said.

The other three AGO sites, the most remote, will be left shut down and may be removed from the field in the future.

The AGOs that continue operating will also be outfitted with Iridium satellite modems, so the data can be downloaded in real time by the researchers from their universities in the U.S., rather than having to send someone to the AGO site to collect the computer drives.

This should all make the AGOs cheaper and easier to maintain. In the past the AGOs required six tanks of propane fuel to run



Photo by Kristan Hutchison/The Antarctic Sun

A Twin Otter stops at an Automatic Geophysical Observatory on the Antarctic Plateau last summer. In the future the remote sites will be serviced almost entirely by Twin Otter.

through the winter. The tanks were big enough they had to be delivered by an LC-130 airplane. To allow the plane to land, a crew of three to four people were flown to each AGO in a Twin Otter and left there for a week or so to plow out a runway. It was a lot of time, manpower and money to keep an automated station running.

Switching to solar and wind power will allow the AGOs to be maintained by the smaller Twin Otter planes. It's only an interim step though.

The next generation

In the long term, the instruments at AGO sites may run off a completely new system. Marc Lessard, an engineering professor at Dartmouth College, is leading a group of six investigators to design a replacement for the AGOs. The group will work with the Cold Regions Research and Engineering Lab in New Hampshire and Northern Power in Vermont. The Autonomous Realtime Remote Observatory (ARRO) will provide 50 watts of wind and solar power and be able to send back data as it is collected via an Iridium satellite connection, Lessard said. The Iridium connection will also allow researchers to control the site from afar, speeding up or slowing down the rate of data collection, switching which instruments are running, and troubleshooting problems. The same technique is often used to fix satellites when problems arise.

The compromise made by depending on wind power is sometimes the wind doesn't blow. The observatories will be able to continue running for 11 windless days before they run out of power, Lessard said. Such extended periods of calm are very unusual on the polar plateau, according to the observations made by the existing AGOs, Lessard said. The ARROs are expected to shut down for only a day or two a couple times each winter.

Designed as modular boxes, the ARROs will be able to fit in a Twin Otter. Scientists from all disciplines should be able to use them to plug in instruments across Antarctica, and in other parts of the world. Lessard already has interest from scientists working in Northern Canada as well, where the modules might be deployed by float plane.

"The ARROs are being designed with the vision that they will also function in the Arctic, with some modifications," Lessard said.

Lessard will present the design at the American Geophysical Union meeting in December for comments. The ARRO system will be tested on Mt. Washington in two years. Though Mt. Washington gets down to only -30 F (-17 C) in the winter, instead of the -80 F (-44 C) on the polar plateau, the winds at the summit reach 200 mph (320 kph). The test wind generator will also stay there for technicians to train on before going to Antarctica to maintain the units, Lessard said. In four years an ARRO unit will be tested at the South Pole. After that, it may become possible to plug in a data recorder anywhere on the continent.

"It would be sort of a frame to put instrumentation into," Papitashvili said. "It may suit meteorological, seismometric, aeronomical, space physics and other kinds of remote observations."

“This place is not a 7-11.”

This is for people going into the field.”

— Deborah Baldwin,
food room coordinator.

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craving for cherry pie filling or Slim Jims shouldn't expect to satisfy it here.

“It's very important people know this place is not a 7-11,” said Deborah Baldwin, the food room's coordinator. “This is not here for people getting snacks. This is for people going into the field.”

The tight reins are necessary because the food must be bought in retail-size packages and is therefore much more expensive than the industrial-size containers that feed McMurdo's general population. A field team may bring along enough powdered milk to make several dozen gallons, but mixing more than a quart or two at a time probably means having extra in a location lacking proper refrigeration or a place to dispose of it.

Meal planning often starts months in advance as groups examine sheets listing supplies expected to be available. But when they arrive at McMurdo a certain amount of flexibility is often called for.

“Ask me for anything that you need that you're not finding,” Baldwin told a group of five ice drillers as they arrived to pick out supplies for their stint at Onset Delta camp. But, she warned, “things are going very quickly,” she said. “You might look and find out you have to substitute.”

The men scattered and started looking for an estimated 600 pounds of food, trying to fulfill a general plan more than cravings for any specific items they hoped to bring.

“We just put down some good meal plans, what people like,” said Jay Johnson,



Photo by Mark Sabbatini/The Antarctic Sun

Jim Green, a driller for a science team deploying from the University of Wisconsin at Madison, picks supplies from the food room at McMurdo Station. The store-like environment provides supplies for teams that will be in the field anywhere from a few days to a few months.

lead driller for the team, most of whom work at the University of Wisconsin at Madison.

In baskets and boxes, the supplies began to add up: the drinks alone comprised of three 24-drink containers of apple juice, four large cans of V-8, four 12-quart boxes of powdered milk along with similar quantities of powdered Gatorade, “raro” sports drink, hot chocolate and instant cider.

Plenty of quick foods are available, including freeze-dried backpacking meals, but much of what the group buys are staples for everyday cooking.

“Do you have five-pound bags of flour and sugar?” asked Jim Green, another driller from Madison.

“We have white flour here, bread flour there and sugar on that shelf there,” replied Baldwin, guiding Green to a set of shelves in a far corner.

Like a country store proprietor she

fielded a flurry of such questions about tortilla chips, spices and macaroni and cheese. She also advised them on what to bring. Jam is better than salsa when it comes to glass jars, for example, because the former has less liquid and is therefore less likely to shatter.

“You can bag up the salsa and freeze it,” she suggested.

Different camps have to pick supplies for different conditions. Those going to relatively temperate locations in the Dry Valleys may have to worry about food thawing, for example, meaning they're more likely to take dehydrated hash browns instead of frozen.

Team members must keep track of the items they select and their weight. Afterward they are packed in triwalls — gigantic boxes meant to be stacked on pal-

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Grocery From page 10

lets — usually sorted by meals and by what is safe to freeze.

Those deploying get to skip the final step of paying for the goods, which are part of the budget for the United States Antarctic Program. But they are expected to pick supplies judiciously, since certain items cannot be redistributed once brought to the field.

Baldwin said parties often plan on about five pounds of food per person a day in the field — although that can vary widely by packaging and the type of food chosen — and teams also typically bring enough emergency supplies for an extended stay if weather or other circumstances keep them in the field.

Typical meal plans include oatmeal, granola and other easy-to-fix items for breakfast, trail mix and other food that can be eaten on-the-go for lunch, and a varied menu of more typical foods for dinner, generally the main meal in camps.

Andrea Isgrow, the cook for this year's ITASE traverse to the South Pole, said her strategy is to pick a variety of staples, keeping in mind that the group of about 15 people will probably include at least one vegetarian and some people with food allergies. She also knows that, given the limited access to supplies, it may not be possible to please all people at all meals.

"It's funny; people always seem to want what we don't have," she said, adding if someone truly finds a meal objectionable "there's always bread. There's always peanut butter."

Her shopping included a trip to a walk-in freezer outside the main building, which houses everything from artificial crab to desserts. Baldwin noted the food room is temporarily low on steaks and urged Isgrow to bring some fruitcake for



Photo by Mark Sabbatini/The Antarctic Sun

Jason Hay, a first-year general assistant from Chicago, bags trail mix at McMurdo Station's food room for deploying science teams. General assistants are sometimes brought in as temporary help for the lone employee who works full-time in the room.

the holidays, even though only participants from Britain and New Zealand seem to like it.

Most of the supplies for the traverse will come from McMurdo's galley, but Isgrow visited the food room recently to pick supplies for a five-person crew who will make preparations for the journey at Byrd Surface Camp. The weight allotment

is 500 pounds for the week of preliminary work, but she said trying to measure and weigh exact quantities of items isn't her style as she prepares to spend the next several weeks cooking off a two-burner stove in one of the most remote locations on Earth.

"I don't really follow recipes," she said. "I just throw things together."

The Antarctic Photography and Writing Festival

Four photo categories:

Scenic **Wildlife**
People **Other**

Photos may be digital or traditional, preferably submitted at 300 dpi.

Rules:

◆ **One entry** per category per person for both the photo and writing contests, so choose your best. ◆ The contest is for photography and art with an Antarctic theme. This will be broadly interpreted. ◆ You do not have to be on the ice to enter. ◆ **All entries due by 7 a.m. Dec. 16.** ◆ Send entries to Antarctic Sun - McMurdo.

Four writing categories:

Poetry: Up to 30 lines

Haiku: Traditional 5-7-5 syllable poem

Micro-fiction: Short stories; up to 300 words

Non-fiction: Essays, memos, journal entries, etc.; up to 300 words

Profile

Story and Photo by Mark Sabbatini/Sun staff

Sally serves love and laughter a'la carte

The difference between a good cook and a great one may simply be a level of affection for preparing the same ingredients.

Sally Ayotte is applying that lesson to Antarctica's largest kitchen after six years of winning hearts with her cooking at the South Pole. This season she's traded her spatulas – with a bit of regret – for the supervisory task of coming up with a winning recipe at McMurdo Station, a kitchen five times as large that struggled at times last season.

In the cold, harsh environment of Antarctica, food may be the most important thing for workers from a physical and psychological standpoint. A sign on Ayotte's office reminds workers "we are the morale committee," a mission she pursues with passion.

"Food is love," she said. "It comes from your heart and soul. If you can't put love into it, it's going to taste bad."

The menus this year aren't drastically different, but the buzz in the dining hall is notably more upbeat. Many give credit to Ayotte, the station's executive chef, for hiring a strong staff before the season and running a smooth operation upon reaching the Ice.

"I think she hires more for attitude than aptitude," said Phil Edwards, one of three McMurdo sous chefs. "If your attitude's right you can learn."

Even so, Ayotte didn't overlook qualifications, he said.

"Almost half the people in this kitchen must have graduated from culinary school," said Edwards, a graduate of The School of Culinary Arts at the Art Institute of Colorado.

Ayotte, a dietitian, has spent most of her working life preparing food for groups, starting in health care settings and moving to more active settings, such as outdoor groups in Alaska and Colorado.

"I'm not a restaurant cook," she said. "I'm not a behind-the-lines, can't-see-who's-feeding-you cook. I like feeding my friends."

Her job at McMurdo involves menu planning, ordering supplies, supervising operations at the other U.S. Antarctic stations and a number of other administrative duties. Giving up the actual cooking is hard, she said, but she also wanted to make a difference at McMurdo.

"Essentially, my friends were going hungry here," she said.

Ayotte doesn't try to sugarcoat the responsibilities of the job when talking with her workers, most of whom are likely to work only one season in the kitchen before looking for a different position if they return to the Ice. The 54-hour weeks are hard and the "customers" who eat up to 5,000 calories at four meals a day can be demanding, but the kitchen can be – indeed, needs to be – an enjoyable place to work.

"You must smile. You must have a kind word. If you don't, please don't come here," she said she tells potential recruits. "I told them ahead of time we're here to fix up this place."

There's a difference, of course, between demanding a positive attitude and generating one. Several workers said Ayotte is a boss



Mark Sabbatini/The Antarctic Sun

Executive chef Sally Ayotte inspects the dinner entrees at McMurdo Station

who has achieved the latter with her own work habits.

"I think she's great because she's very personable," said Kirstin Hamlyn, a first-year dining attendant from Seattle. "She's always asking how we're doing. Being at the bottom of the ladder it's always nice to know the people higher up care."

Ayotte, a native of Rochester, Mass., became interested in a career as a dietitian while working at a hospital in high school. She earned a bachelor of science degree in food and nutrition from Framingham State College in 1985, subsequently working in hospital and nursing home kitchens on the East Coast for a few years. Seeking something more adventurous, she then took a job cooking for the 400 employees

of Alaska's Denali National Park for four summers.

She spent one winter in Honduras cooking for a whitewater rafting company, then worked for a Colorado rafting company the following summer where she met two co-workers who had been to Antarctica the previous season. Ayotte said she had considered and rejected working on the Ice before, feeling the 1,000-person population of McMurdo was too large for her, but her rafting co-workers were the first to tell her about the South Pole station.

She spent her first season as the mid-rats cook, preparing meals for about 35 people on the overnight shift. In some ways it was like cooking for a very large family.

"My rules (for the diners) were: smile and giggle, give me menu ideas and do your own dishes," said Ayotte, who worked alone in the kitchen during the shift.

The following five seasons she took over the main dining operations of the Pole, supervising about a dozen employees. She also had to learn the secrets of preparing food at the altitude equivalent of 11,600 feet using ingredients such as powdered milk that don't cook the same way as their regular namesakes. Antarctic cooking also means a notable shortage of common cooking ingredients such as cream, eggs and fresh vegetables.

Ayotte developed a following among the 200-plus workers who came to the Pole each summer, fine-tuning some personal recipes in addition to the normal fare. She achieved international recognition after being featured in a Los Angeles Times article in July of 2001 which highlighted a personal cookie recipe that became a station favorite, with 40 dozen made daily.

A modified version of the cookies is one of the dishes Ayotte brought with her to McMurdo this year. She said special dishes often require an extensive amount of labor, meaning they may only be served a few times a season, but "all the headaches are worth it."

Ayotte said she isn't sure what her long-term plans are, but in the short-term she wants to continue building on the improvements made so far.

"It takes more than one season to make changes and make them stick," she said.