THE ANTARCTICAN SOCIETY

NEWSLETTER

HONORARY PRESIDENT - RUTH J. SIPLE
7338 Wayfarer Drive, Fairfax Station, VA 22039 (703)250-7338

Vol. 03-04 January No. 3

PRESIDENT
John Splettstoesser
P.O. Box 515, Waconia, MN 55387
Tel/fax (952) 442-2604
spletts@usfamily.net

TREASURER
Paul C. Dalrymple
Box 325, Port Clyde, ME 04855
pcdal@midcoast.com
Fax:(207)372-8571
Phone: (207) 372-6523

Paul C. Daniels
Memorial Lecturers:
Dr. William J. L. Sladen, 1964
RADM David M. Tyree (Ret.), 1965
Dr. Roger Tory Peterson, 1966
Dr. J. Campbell Craddock, 1967
Mr. James Pranke, 1968
Dr. Henry M. Dater, 1970
Sir Peter M. Scott, 1971
Dr. Frank Davies, 1972
Mr. Scott McVay, 1973
Mr. Joseph O. Fletcher, 1974
Mr. Herman R. Friis, 1975
Dr. Kenneth J. Bertrand, 1976
Dr. William J. L. Sladen, 1977
Dr. J. Murray Mitchell, Jr., 1978
Dr. Laurence McKinley Gould, 1979
Dr. Charles R. Bentley, 1980
Dr. Robert L. Nichols, 1981
Dr. Robert H. Rutford, 1982
Mr. R. Tucker Scully, 1983
Dr. Richard P. Goldthwait, 1984
Dr. Mark F. Meier, 1985
Dr. Claude Lorius, 1986
Dr. Louis J. Lanzerotti, 1987
Mr. Peter J. Anderson, 1988
Dr. Ted E. Delaca, 1989
Dr. Sayed Z. E!-Sayed, 1990
Dr. Charles W. Swithinbank, 1991
Dr. Susan Solomon, 1992
Dr. Michele E. Raney, 1993
Dr. Doyle A. Harper, 1994
Dr. Edith L. Taylor, 1995
Dr. William J. L. Sladen, 1996
Dr. Robert Bindschadler, 1997
Dr. Charles R. Bentley, 1998
Dr. Donal Manahan, 1999
Dr. Philip Law, 2000
Dr. Richard Alley, 2001
Dr. Carl Safina, 2002
Dr. Mary K. Miller, 2003

BRASH ICE. Well, we finally got the holiday season out of the way so that w< can go forward with enjoying life. John Spletts is out there in deep waters on one of those humongous ships lecturing to a thousand heads at a time on the glories of Antarctica.

Meanwhile it is time to write, but first a report on Our Ancient and Honorables Our beloved Honorary President, Ruth Siple, has been moved to the Magnolia Care and Rehabilitation Center, 365 Johnson St., Wadsworth, Ohio 44281, where she answers, hopefully, the phone at (330), 334-0506, She had a bad stretch in December where she was hospitalized, but is in the process of recovering and looking forward to her 93rd birthday on January 16th. She is practically blind and her short-term memory is non-existent, but she is under the loving eyes of her youngest daughter, Mary Cathrin, who visits her daily. Meanwhile Norman Vaughan, Mr. Indestructible, celebrated his 98th birthday in mid-December, and is eagerly looking forward to his 100th birthday when his mountain climbing buddy, Vernon Tejas, swears he is going to put Norman in a sling and carry him to the top of Mt. Vaughan. When it comes to Norman, never count him out. His voice is strong, he's effervescent, and he still sounds like a bull in the pampas.

We are trying something different with this newsletter, we are absconding with some of the articles from THE ANTARCTIC SUN published austral summery at McMurdo by the contractor, Raytheon Polar Services Company. Their weekly magazine can be read online or downloaded and printed in PDF format by visiting www.polar.org/antsun But we are giving you hard copies herein on articles which seem particularly pertinent to this time when the Dry Valley' counterpart, MARS, is being inspected and analyzed by NASA.

Many of THE ANTARCTIC SUN articles are too long for our abbreviated newsletter. Such is a four-pager on the everlasting D-8, which was made by Caterpillar (Model SD-8 LPG, Stretch D-8 Low Ground Pressure). They were designed to carry heavy loads over snow, featuring a special cold-starting ability and a 54-inch wide track (instead of the 36-inch track found on modern equipment). They also had a drawbar pull capacity on snow of 30,000 pounds, compared to about 24,000 for the D-7.

The oldest D-8 in the current fleet is Mary-Ann, who once made a traverse to the South Pole. It may actually be in better shape than Mario Giovinetto, both survivors of the traverse. Others still in existence include Pam, Colleen, and Big John. Wonder if Big John was named for Big John Stagnaro, a very dedicated amateur radio operator out in Southern California who ran so many phone patches for Antarcticans in the olden days? Someone must know. There are quite a few of us in our Society, including Phil Smith who was on the traverse, when Max Kiel rode a D-8 tractor to his death in a bottomless crevasse en route to Byrd Station. When the 50th rolls around, the D-8s may be the most permanent niece of American hardware on the ice.

METEORITES, ICE, AND ANTARCTICA, by William A. Cassidy. NY, Cambridge University Press, 2003, 349 p. ISBN 0 521 25872 3 (Hardback). U.S. $30.00. (Reviewed by Dr. Gunter Faure, Professor Emeritus of Geology, The Ohio State University).

Bill Cassidy is well known to all who passed through McMurdo on their way to remote field camps in Antarctica in the late 1970s to the mid-1990s. He and his associates are justly famous for the thousands of meteorite specimens they have collected in the blue-ice areas of the polar plateau. In this book, Bill tells how the idea came to him that meteorite specimens accumulate in the ablation area of the East Antarctic ice sheet and what efforts were required to carry out the annual searches in places where "no man has gone before." It will come as no surprise to those who have been there that the cold weather and the remote location of the polar plateau were the least of his worries. In fact, speaking of the annual transit of McMurdo by his field party he says: "It is always a great relief to escape...the...complicated hierarchy of procedures, requirements and rules...to a deep-field camp on the ice plateau of East Antarctica, where survival may be more difficult but life is simpler."

The book opens with a foreword by Robert Walker and is divided into three sections entitled: Setting the Stage; Field Results and Their Consequences; and Has it Been Worthwhile? Evidently, this is not merely an adventure story about heroic deeds in a hostile environment. The purpose of this book is to inform the reader about working on the polar plateaus, followed by detailed information about meteorites that originated from Mars and from the Moon, including all specimens collected world-wide by the spring of 2002. This section ends with a discussion of the origin of all types of meteorites and what we have learned from them about the formation of their parent bodies 4.57 billion years ago. In the final section, Bill compares the collection of Antarctic meteorites to modern falls. This comparison leads to the observation that iron meteorites appear to be less abundant in Antarctica (0.4%) than elsewhere in the world (4.2%). A similar discrepancy exists in the abundance of Antarctic achondrites. These kinds of observation can be used to derive conclusions about the processes that cause different types of meteorites to be delivered to Earth. In this section, Bill also discusses the way in which meteorite specimens are transported by the ice sheet to the ablation areas where they accumulate on the so-called stranding surfaces or meteorite traps.

The book ends with appendices containing the US-Japan agreement for sharing meteorites collected during the 1976/77 field season and a listing of the participants of the seventeen search parties Bill took into the field between 1976 and 1994, including Ralph Harvey and John Schutt who are continuing the recovery of meteorites in Antarctica. In addition, the book contains indexes of place names and subject matter that will assist readers to find specific information.

This book is required reading for all students of meteoritics and for those armchair explorers who may wonder what drives people like Bill Cassidy to leave the comforts of home to roam the polar plateau of Antarctica in search of meteorites. The motivation for this enterprise arises from our need to understand the solar system in which we live. This book is a lucid explanation of the benefits to be derived by continuing the search for meteorites in Antarctica and elsewhere.

ANTARCTICA: ALMOST OUT OF THIS WORLD, (abstracted from the Antarctic Sun, Dec 29,2003), *Kristian Hutchison* and LANDSCAPES IN ANTARCTICA'S DRY VALLEYS HELP DECIPHER RECENT ICE AGES ON MARS (abstracted from NFS Press Release of Dec 18, 2003).

Dry streambeds, wind-carved rocks, red pebbles laid flat like paving stone — a landscape so alien it can be only Mars, or Antarctica.

Studies of the unique landscape in the Dry Valleys of Antarctica provide new insights into the origin of similar features on Mars and provide one line of evidence that suggests the Red Planet has recently experienced an ice age, according to a paper in a recent issue of the journal *Nature.* The National Aeronautics and Space Administration (NASA) comes to Antarctica to find out about space. More meteorites have been collected from the Ice than anywhere else, on Earth or off. Technology and people are tested in the harsh environment and NASA looks to the Antarctic to understand what life might be like on Mars or Europa. "Antarctica is more like Mars than any place else on Earth, and if you want to understand Mars, you start in Antarctica," said Carl Allen, astromaterial curator at the Johnson Space Center in Houston, Texas.

The distribution of hexagonal mounds and other features on the Martian surface at mid-latitudes similar to those in the Dry Valleys also supports previous scientific assertions that a significant amount of ice lies trapped beneath the Red Planet's surface. David Marchant, a Boston University researcher who has studied the Dry Valleys for 17 years, co-authored the paper in *Nature* with James W. Head (lead author), John Mustard and Ralph Milliken, at Brown University, and Mikhail Kreslavsky of Kharkov National University in Ukraine.

Although these polygon-shaped features occur throughout the Arctic and Antarctic, an unusual variety found in the western Dry Valleys region has received particular attention because it forms only hi perennially frozen soils with significant ice content. These polygons form as sub-freezing temperatures fluctuate, causing the underlying ice to contract in a hexagonal pattern. As the ice contracts, fine sediments sift down into the cracks, leaving a coarse-grained deposit covering the ice.

Mars is a polar desert. Without water eroding the surface, any weathering is from wind or sun, just like the Dry Valleys, said Dean Eppler, a NASA consultant with Science Applications International Corp., who studied the weather patterns in the Valleys in 1983 and 1984 in order to better understand Mars. The Dry Valleys look almost identical to photos the Viking lander sent back from Mars "right down to the rocks that are there," Eppler said.

The last ice age on Mars began about 2.1 million years ago and ended as recently as 400,000 years ago," according to Head. Like ice ages on Earth, Martian ice ages are driven by variations in the planet's orbit, particularly the tilt of the planet's axis. But Martian ice ages, unlike ice ages on Earth, appear to begin as the polar regions warm, rather than cool. The *Nature* findings complement a paper recently published in the journal *Geology,* in which Head and Marchant argue that features on the surface of the Red Planet are remarkably like glacial features found only in the Dry Valleys. The findings not only have implications for the search for microbial life on Mars, but also may help scientists better understand the unique Polar desert environment of the Dry Valleys, and in particular the ancient climate record that may be stored in the landscape.

"These extreme changes on Mars provide perspective for interpreting what we see on Earth. Landforms on Mars that appear to be related to climate changes help us calibrate and understand similar landforms on Earth. Furthermore, the range of microenvironments in the Antarctic Dry Valleys helps us read the Mars record," said Marchant.

If the analogy between the geologic processes on Mars and those in the Dry Valleys holds true, then scientists may conclude that Mars may be more hospitable to microbial life than previously suspected.

Although the Dry Valleys were thought to be a virtual dead zone when first explored a century ago, new evidence suggests that the lakes and other landscape features support microscopic life.

The comparison between Mars and Antarctica shouldn't be taken too far. The most obvious differences are air and gravity. Mars air is a thin, unbreathable combination of mostly carbon dioxide and little nitrogen, with a surface pressure the equivalent of 100,000 feet altitude on Earth. The South Pole's surface pressure fluctuates between the equivalent of about 10,000 to 11,000 feet altitude. Gravity on Mars is 0.38 of Earth's, so 100 pounds would feel like 38 pounds. But the mass of things is the same.

Mars is also much colder and drier than Antarctica, according to Berry Lyons, lead of the Long-Term Ecological Research Project in the Dry Valleys. The LTER is one of 24 LTER sites funded by the National Science Foundation around the world. Taylor Valley gets about 3 cm of precipitation a year; Mars maybe 1 cm. While the temperature in the Taylor Valley averages almost -4F(-20c), the temperature at the equator of Mars averages around —55F. Mars also has a more extreme variation temperature, even within a few feet. The Pathfinder found that when the sun shone on Mars the ground could get to 65F degrees, while five feet up it was 15F degrees. At night the same spot would drop to -130F at ground level and —105F at five feet up.

Still, each time biologists working in the Dry Valleys find life -frozen into the lake ice, hiding in the sandstone — they turn toward Mars. If it's here, they say, it must be there. A decade ago microbiologist E. Imre Friedmann found lichen and cyanobacteria growing in tiny spaces between sandstone rock crystals, a few millimeters below the surface of the rock. The cryptoendolithic organisms get just enough sunlight and water through the porous rock to survive. "That got the Mars people very excited," Allen said.

DRAKES REVENGE (The Antarctic Sun, November 2,2003), *Kristan Hutchinson* Just going to work makes Barbara Watson sick. It's a common problem among her fellow commuters, who pitch and puke with the waves during the 1,500-km ship trip from Punta Arenas, Chile to Palmer Station, Antarctica. The only way to Palmer is across the Drake Passage, where currents and storms meet in a tumult of wind and waves. At first, the rocking of the boat is lulling, making passengers sleepy. Then that thick feeling in the brain turns to pain, followed by an increasingly queasy stomach. The misery usually builds with the seas. "You get this knot in your stomach and you know if you don't lie down in the next 15 seconds you're going to be violently ill," Watson said. "The worst part is, once you've started being ill, it's all over unless you go to sleep and start over."

Marine projects coordinator, Skip Owen, has made more than 50 crossings and dealt with his share of seasick passengers. He says the illness has two stages. "The two stages of seasickness are when you are afraid you'll die," Owen said, "and then become afraid that you won't." Death is rarely a risk, though the nausea and inability to keep food or drink down can cause severe dehydration, said Dr. Kristin van Konynenburg. "That can become life threatening very fast," said Owen, who was aboard once when a passenger became so seasick they required an IV. He keeps an eye on all the passengers in bad weather, noting who is up and about, and who may be lying in their bunk in misery.

People who think motion sickness is all in the head are right. More precisely, it's caused by confusion between what we feel in the inner ear and what we see. As humans, we keep our balance with the help of three angled tubes in the inner ear. Fluid in the ears sloshes against tiny hairs, triggering signals sent back to the brain to tell us where we are in relation to the ground On boats, planes or other situations where people get motion sickness, the inner ear says one thing while the eyes see another. "It's a miscommunication between the visual information you're getting and the inner ear cues," van Konynenburg said. Everyone has a threshold at which they will get motion sickness, according to studies. But some people have a lower threshold than others.

Women are more prone to motion sickness than men and the symptoms often decline with age. In studies, Asians have also shown a higher tendency to get seasick than Caucasians, and more intense symptoms, indicating a possible genetic susceptibility. People also can adapt to motion with constant exposure, as seasoned sailors demonstrate. James Bellanger, third mate on the Laurence Gould, was frequently sick his first three years at sea. "Most of the time I wouldn't wait to get

sick. I'd go into the bathroom and make myself get sick so I'd feel better," said Bellanger, who hasn't been seasick in recent years. The chances of seasickness increase with speed, wave frequency and the motion of the ship. While seasickness has sometimes been pinned on a ship's heave, or up-down motion, the most nauseating voyages involve a combination of up-down, side-to-side and forward-back motions, according to studies. The Gould's design is famous for inducing sickness. "It has this motion where you kind of feel like you're circling the drain the whole time," van Konynenburg said.

The treatment van Konynenburg usually gives out on the Gould is meclizine, which reduces the sensitivity of the inner ear. Many people bring their own, but Owen also leaves a bottle out on his desk for anybody who needs it. "The meds allow you to keep food down," said van Konynenburg. Other antihistamines work to stop the nausea, including promethazine, Benadryl and Dramamine. They leave people drowsy and dry mouthed, but sleeping through the trip is better than being miserable, say those who take it. Watson swallows Phenergan when she boards, then goes to bed for the rest of the trip. "It tends to put you to sleep, which is not a bad thing being on the ship," said Watson, who left her cabin only briefly during her voyage in September.

Being in bed you feel better," said Wendy Beeler, who took meclizine for her nausea on the trip to Palmer. "That's part of why you stay in bed." Other people come on board wearing dime-sized patches behind one ear. The patches administer low doses of scopolamine, a narcotic that helps prevent nausea, but can also trigger hallucinations, depression and dry mouth, "hi the 20s it was used in large doses during childbirth," van Konynenburg said. "It was called twilight sleep because the woman wouldn't remember anything." She tried it on one voyage, but found the side effects too disturbing. She couldn't focus enough to read or knit. "I got so tired of being out of it all the time and being sleepy," said van Konynenburg, who decided to try herbal remedies on her most recent voyage. She put an herbal oil called Motion-eaze behind her ears and took a homeopathic remedy called Trip-Ease. After meals she drank ginger tea to settle her stomach. "All I have to say is I can enjoy the side effects and I feel great," van Konynenburg said a day into the trip. "I've had two meals today." When the seas got worse a day later, she resorted to meclizine, which she'd packed just in case. On his first voyage, Steve Barten wore acupressure bands on his wrists to prevent seasickness. "I have drugs too, but I'm not taking them yet," he said. "I just step out when I'm feeling a little dizzy."

Fresh air and looking out at the horizon can help recalibrate the inner ear with the outer world if the symptoms are mild. Breathing slowly and deeply can also ward off motion sickness. If you must be inside and away from windows, it's best to be at the most stable point on the ship, at the center of the axis. On the Gould, that tends to be low and toward the middle. It's also better to keep food in the stomach, even if all passengers can handle are crackers and water.

There is one guaranteed cure for seasickness - land. Most people are only sick for the two days that the Gould is actually crossing the rougher waters of the Drake Passage. And if they have been sick, they're more than happy to stay in Palmer for several months before making the crossing again. "I crawl out of bed every 12 hours, eat and then go back," said Jeff Kietzmann of his trip to Palmer. "I don't like it."

OZONE HOLE FOLLOWS ANTARCTIC WEATHER TRENDS (The Antarctic Sun, Nov 2, 2003), *Kris Kuenning* Like a fickle pop star, the ozone hole reinvents itself each year. Thanks to a global clean-up act, the world's most famous atmospheric trend is already going out of fashion. But in the meantime, the great gap is simply a slave to polar weather patterns. Last year, the hole in the ozone layer surprised researchers by being small and fragmented. This year, it's just short of the largest recorded size. But these variations are not related to the amount of ozone-depleting chemicals in the environment. Earth's protective layer of ozone is on track for a full recovery, but scientists expect a hole to appear around the polar regions once a year for at least the next 10 years. While the number of ozone-destroying chemicals in the atmosphere gradually begins to decline, variations in the size o1 the ozone hole are determined annually by polar weather. Ozone serves the planet by filtering the dangerous spectra of ultraviolet light. Ultraviolet-B light causes sunburn and skin cancer in humans. It also has the ability to change the genetic makeup of plants and therefore alter the food chain.

This year, with the ozone hole exceeding the size of the Antarctic continent and even exposing the southern tip of South America, its effects will be tangible for people living in southern latitudes. While weathermen alert Chileans to dangerous levels of ultraviolet light, Australians and New Zealanders should be spending another spring under a thick paste of sunscreen. Antarctica, in summer, is the temporary home for more than 2,000 sun-conscious people. Among them are scientists who track the levels of ozone above the continent. Terry Deshler of the University of Wyoming has been overseeing ozone research in Antarctica since 1986, one year after the ozone hole was first discovered.

Ozone is made up of three oxygen molecules (O3), brought together by the energy of the sun. From its equatorial breeding ground, ozone travels through the upper level of the atmosphere, the stratosphere, and some of it is transported towards Earth's poles. When the sun sets on the Antarctic summer, the dark air cools, causing a low pressure center called the polar vortex. Because of the Earth's rotation, warm air at the boundary can't get in to the low-pressure center. Inside the vortex, temperatures plummet to below -79 C. It is in this vortex that the systematic destruction of ozone occurs, so the size of the vortex determines the size of the hole in the

ozone layer. "The size and stability of the polar vortex is determined by the amount of tropospheric storm activity," Deshler explained. "A year with a lot of storms around the periphery of the continent of Antarctica can cause the polar vortex to become unstable and make it smaller."

Bad weather is good for minimizing the ozone hole, while less stormy weather brings a larger vortex. "In general, the vortex above Antarctica is quite stable and quite large," Deshler said. Last year's smaller hole was unusual. "Only two times in the last 15 years has the ozone hole been not as big as we were expecting." Last year's vortex actually split in two, causing two small ozone holes to go careening towards the edges of the Antarctic continent. Deshler said the vortex was sent into oscillation and then split in two by energy from frequent polar storms. This year, conditions conspired to make one big hole. Peaking at 28 million km square, it was the same size as the record hole in 2000, according to the World Meteorological Organization ozone bulletin in 2003. That's more than twice the size of Antarctica, its islands and ice shelves combined, or more than three times the size of the United States

With the launch of balloons into the stratosphere, scientists are able to tell exactly where ozone is lost in the atmosphere's profile. There may be a layer between 12 and 20 km above the earth where zero ozone is present, but above or below that, low levels of ozone still exist. The overall effect is more like a very thin layer of ozone than a true hole.

There are three factors that come together to wipe out ozone — naturally occurring polar clouds, human-released Chloroflorocarbons (or CFCs) and the magic ingredient — sunlight. Ozone depletion is a result of human release of chloroflorocarbons into the atmosphere. CFC's were first produced in the 1930s as a completely safe refrigerant. During World War II, they were used as propellants in insecticide spray cans. In 1947, the first automobile air conditioner was developed using CFCs, and production picked up further in the '50s and '60s, when it reached 60 million tons. Up to 70 percent of that went directly into the air. Wind currents distribute CFCs around the stratosphere. The chemical makeup of ozone is just one step away from the oxygen we breathe. When the CFCs get broken up by the sun's radiation, chlorine is released. The chlorine molecule then has the power to extract one oxygen atom from an ozone molecule, thus destroying ozone. "Chloride is an unhappy molecule because it's missing an electron," explained post-doctorate research assistant Jennifer Mercer. "It works as a catalyst to the ozone, stripping off an O."

In polar regions, the particles of polar stratospheric clouds provide an especially fertile staging area to convert chlorine, trapped in benign molecules, into an active state ready to destroy ozone. Because polar stratospheric clouds exist only at the poles, 90 percent of ozone destruction occurs there, Mercer said. The vortex forms in winter, but the destruction doesn't occur until the sun comes out in the spring. By mid-October the warmer weather is already weakening the vortex to release its contents.

Although a seasonal Antarctic ozone hole is a foregone reality for at least the next 10 years, the news is not all bad. By phasing out the production of CFCs, the Montreal Protocol agreement reduced atmospheric CFC levels by more than 86 percent in 13 years. According to the World Bank's Montreal Protocol Status Report, released on Sept. 17,2003, annual consumption of CFCs dropped from 1.1 million tons in 1986 to 150,000 tons in 1999. Without the protocol, the report estimates consumption would have reached 3 million tons by 2010. Deshler said the ozone story is a positive one. "A global problem created by local human activities was identified, and reasonable solutions were adopted by the world's leading countries to reduce and eventually eliminate the problem."

LEOPARDS OF THE SEA (Antarctic Sun, Nov. 9,2003), *Kristan Hutchison*

People and penguins react the same when a leopard seal swims by They get out of the water. It's a natural response to meeting a predator the size of a cow with serrated teeth and canines up to 2.5 cm long. "Usually the seal just seems curious, but when you've got a 10-foot-long (3 meter) predator a few feet away from you, you do worry he might get curious about what you taste like," said Chuck Amsler, a biologist who dives at Palmer Station.

This past winter a leopard seal did attack a science diver who was snorkeling near Rothera, a British research station on the Antarctic Peninsula. The researcher, 28-year-old Kirsty Margot Brown, was pulled under and drowned on July 22. It was the first time a leopard seal has caused the death of a person. Despite the attack, Amsler feels Antarctic waters are relatively safe. "In thirty-some years of people diving all over the Peninsula, there's been one attack," Amsler said

Though leopard seals have never attacked before, divers around Palmer Station have always treated them as potentially dangerous animals. The dive tenders keep an eye out for leopard seals and if one is spotted in the area, the dive is called off. If the divers are already in the water, they generally back slowly up to a cliff or wall, so they don't have to worry about the leopard seal surprising them from behind. "Most of the places we're diving are very steep," Amsler said. "You get out as soon as possible, but you don't frantically run away like game that's been flushed." In 80 dives last year, Dan Martin met leopard seals underwater about five times. He began to recognize individual leopard seals. One was particularly curious. "This one guy would just come closer and closer until he was close enough to touch," Martin said. "I could have scratched his chin." To Martin, the leopard seals

have an almost dog-like demeanor. But unlike dogs, little is known about their behavior or how they react in a given situation. Martin has noticed that when he's seen leopard seals down deep they generally circle from a distance, watching. As he rises toward the surface, the seal's circle often tightens.

Though leopard seals rarely threaten humans in the water, they do have a taste for the inflatable rubber boats frequently used around Palmer Station. "They tend to just gnaw on them like a teething baby," said Doug Fink, the boating coordinator at Palmer Station. "You don't find things torn apart as much as you do scrape lines and pinpoint holes from their sharp teeth." In one week last year, leopard seals punctured four of the boats. Fink instructs boat operators to leave the seals alone and to take any sign of aggression or curiosity on the seals' part as a signal that it's time to leave the area.

Penguins have more reason to fear leopard seals than people do. Though leopard seals are primarily krill eaters, they get a taste for penguins and are skilled hunters who always seem to get their prey. "The only way a penguin gets away is if it gets to shore," said Susan Trivelpiece, a bird biologist on King George Island. The leopard seals often start patrolling offshore of the penguin colony about the time the penguins start making frequent trips in and out of the water to feed their chicks. The seals will hide behind icebergs or work in pairs to catch the penguins. Like cats, leopard seals sometimes appear to hunt for the sport of it, playing with their prey. Trivelpiece once watched for 45 minutes as a seal caught a penguin, over and over again. The seal had already killed at least a dozen penguins that day, so it clearly wasn't hunting out of hunger anymore. Like a cat with a mouse, the seal would grab the penguin and drag it underwater briefly. Haifa minute later, the penguin would reappear, looking dazed and start swimming for shore. For a few moments the seal would follow lazily behind, then catch the penguin again. "We were rooting for the penguin toward the end, because the leopard seal didn't care if he ate it," Trivelpiece said.

Leopard seals have their fans too. Their sleek bodies are a silvery dark gray color with interesting spotted patterns, which lead to them being named after the spotted African cat. The seals live in the pack ice all around the continent and can live more than 26 years. They reproduce from September to January and by most recent estimates number about 220,000. Unlike other seals, the leopard seals use their large fore-flippers while swimming. Divers who have seen them underwater describe leopard seals as graceful and impressive. "In terms of just seeing one on land, the coloration and shape, in many ways you might say they're more beautiful than say, the elephant seal," Amsler said. "Underwater, the leopard seals are very maneuverable animals that can twist and turn. If you weren't worried about the business end, they would be fun to watch."

BOTANISTS GATHER LEAVES AND SEEDS IN STONE
(Antarctic Sun, Dec. 28,2003), *Kristan Hutchinson* Based on bulk, the Taylors' plant gathering trip to Antarctica was a huge success for OAEs Tom and Edith Taylor. The paleobotanists shipped home about 4,000 kg of leaves, seeds, stems, roots and free trunks, all in rock. "We got a special award for taking home the largest chunk of the continent," joked Edith Taylor. It's the third time she and her husband Tom have been to the Beardmore Glacier, so they knew just what they were looking for and where to find it. The goal was to collect perimineralized plants, a rare form of preservation in which the cell walls remain and silica fills in the spaces. Even the embryos within the seeds can be seen. "It is the rarest preservation for plants," Edith said.

Antarctica is one of only three places in the world with such well-preserved plants from the Permian age, and the only site with plant fossils of that caliber from the Triassic. This time they were heading back to Skaar Ridge, near the camping site where Scott collected coal and wood fossils, where they ve collected many important fossils before. "It's like a compost heap you've turned to stone," Edith said. The Taylors know which sites and rocks are likely to contain the fossils, but it's still a bit of a treasure hunt. "There's a great serendipity to it. You grab a rock, take a chisel, break it open and see what you find," said Tom. They look for rocks with clear layers and some black in them, indicating the presence of organic material. "It's luck," said Tom. "And persistence," said Edith.

Both have paid off for the couple. The fossils they collected on this trip will be added to the collection at the University of Kansas, already the second largest collection of Antarctic plant fossils in the world with about 50,000 rocks. Many fossils from their previous visits led to a greater understanding of ancient foliage. A fossil the Taylors left on display at the Berg Field Center has seed ferns pressed into its surface, as detailed as if they'd just been cast in plaster. The rock is 220 million years old "give or take a month," said Tom Taylor, with his usual humor. The seed fern is unique because it is part of an extinct group of plants with leaves like ferns and seeds like flowering plants. On a previous trip the Taylors found seed ferns with short shoots sprouting from them and seeds attached, similar to a gingko tree. It was a trait that had never been found in the fossil record before. "We carried that specimen back in our laps," Tom said.

Tom's specialty has been fungi. At the Permian site he found branches eight to 10 cm in diameter with clearly visible rings and cells. White holes were left throughout the petrified branch in a pattern recognizable as white pocket rot. The same fungus still lives in frees in the U.S., having outsurvived the trees in Antarctica by millions of years. The Taylors have also found free trunks with the rings still preserved, showing a growth record. The growth rings were 10 times wider than those found on trees in Alaska today, probably due to a warmer climate and the longer growing season. "These

plants were growing at higher latitude than any plants are growing today," Edith said. In the Gordon Valley, the fossil trunks of 99 Dicroidium trees stick up from the ground, all 0.75 meters to 0.9 meters tall. They still have root structures in the ground "It's like you cut the forest off with a chain saw and then turned them all to stone," Edith said. She suspects the trees were killed by a flood.

The Taylors still have many questions to answer about how trees adapted to survive the long, dark winter. It is possible the trees dropped their leaves, had smaller leaves or had some other adaptation, Tom said. He hopes the answer is waiting inside one of the stones they shipped home. Most of their work will be back in the lab, where they'll oversee students slicing the rock with diamond blades and then using acetone film to collect the preserved plant cells from the fossil surface. "It's just one page out of a huge novel that you get to read when you open that particular rock," Tom said

DINOSAUR HUNTERS DIG UP NEW BEAST (Antarctic Sun, Dec. 28, 2003), *Kristan Hutchison*

Wielding hammers, crowbars and dynamite, the dinosaur hunters tracked down a new animal, but they couldn't get all their quarry home. Paleontologist Bill Hammer suspects the newly uncovered bones on Mt. Kirkpatrick could be the remains of a primitive sauropod, a type of herbivorous dinosaur with long neck and tail that lived from 248 million to 65 million years ago. Though Hammer won't know until he has time to study it back in the lab, it is likely to be a new species. "Anything we find down here is very different from other parts of the world," Hammer said.

The last time Hammer visited Mt. Kirkpatrick, 13 years ago, he dug up the remains of the first, and only, carnivorous dinosaur found in Antarctica. The 22-foot cryolophosaurus turned out to be the oldest of its kind from anywhere in the world. "We know very little about the early Jurassic, particularly on the southern continents," Hammer said. The only other Jurassic site in the southern hemisphere is in South Africa. With about 35 percent of the cryolophosaurus' skeleton, Hammer was able to create a model of the entire dinosaur. A month after Sept. 11 he picked up a full-sized reconstruction of the dinosaur skeleton from a Canadian maker and tried to drive back across the border. "It was too crazy a story to make up, but we still got hassled," said Hammer, who spent two hours convincing customs officials the dinosaur was legitimate. The skeleton is now displayed at Augustana University, where Hammer teaches. This month Hammer led a team of six back to Mt. Kirkpatrick, hoping to retrieve any remaining cryolophosaurus bones, and find something new. He found about 35 more bones at the cryolophosaurus site, including vertebrae and a toe. The bones may belong to cryolophosaurus or other dinosaurs from the same site. About 100 feet above the cryolophosaurus, mountaineer Peter Braddock sported another bit of exposed bone. He showed it to Hammer, who identified it as either part of a pelvis or shoulder of a sauropod. Blaster Marty Reed set charges of dynamite near the surface of the rock at three foot intervals. A boom like fireworks exploded down the mountain, but only the six dinosaur hunters were close enough to hear it. The main thing is you have to use light charges so you fracture the rock," said Reed, who fractured the rock to within a foot of the bones. From there the team worked with pick axes, rock hammers, crow bars and rock saws to free the beast locked in rock. The team retrieved about 1,500 Ibs of rock and bone, but left more buried in the hillside.

"I'm happy with what we found," Hammer said "There's still more going back in there. We probably have another whole season's work there." Hammer also wanted to visit five other sites where dinosaurs may be hiding, but bad weather kept him from flying there. He believes many of the ridges between the peaks may hold Jurassic bones. "There's actually a lot more out there than it appears on the map," Hammer said.

FISHING FOR FOSSILS (Antarctic Sun, Dec. 28, 2003), *Kristar* Hutchison*

Loren Babcock looks at the bare rock in the Transantarctic Mountains and sees green forests alive with animals. "I see ponds, forests, somewhere down there eruptive fissures and some reptiles swimming around," said Babcock, a paleontologist from Ohio State University. "I see, in my mind's eye, something similar to the reconstructions you see in books." Babcock reconstructs the past from fragile fragments - an insect wing pressed in stone, the print offish scales, the marks left by soft shells the size of sunflower seeds. "We're looking mostly for exceptionally preserved fossils," said Babcock, who was working with fellow paleontologist Steve Leslie and graduate student Alycia Rode. "Think about what it takes to preserve an insect wing. You know how delicate they are."

Most paleontologists look for bones, teeth and shells. Those are the hard parts of the body most likely to last long enough for phosphates or other minerals to replace the cell structure. But only 15 percent of the creatures in an ecosystem have hard skeletons, inside or out. The other 85 percent seldom leave a trace. "Our fossil record is strongly biased toward those creatures that had mineralized skeletons," said Babcock. He is trying to counter the bias by seeking out the rare specimens of softer body parts, particularly arthropods, the family of spineless animals that includes spiders, crustaceans and insects.

Antarctica is one of the very few places in the world where such insubstantial specimens have been fossilized from the Jurassic age, 160 million years ago. As the only high-latitude

site, Antarctica allows Babcock to look at differences in the lakebed biology of different latitudes during the Jurassic period. During a week on Carapace Nunatak, Babcock's group filled 14 boxes with slabs of rock wrapped in white rags, about 315 kg in all. With years of experience behind him, Babcock easily found fossils in the layer of tan rock striping the red-brown basalt cliffs of the Kirkpatrick Formation in the Transantarctic Mountains. "One or two cracks with the rock hammer and it shows there's fossil," Babcock said. "It is incredible. These are some of the most fossiliferous rocks I've ever seen." He suspects similar deposits exist along the entire 1,280 km of the mountain range.

Many of the fossil rocks are flat slabs of fine-grained sedimentary stone, which the researchers will split open carefully in the lab and then look at under the microscope. They'll also do chemical analysis. The rocks are like history books. Babcock can see insects, crustaceans and plants on the cover, but is waiting to read the rest of the story on the pages inside. "Once these things are split back in the lab we expect to dramatically increase the number of organisms we know to be there," Babcock said. Even on the surface, many of the rocks show remarkably clear pictures of the past. An inch-long wing, shaped like a dragonfly's, is etched onto the surface of a sand-colored stone. The threadlike web of veins shows clearly. From other sites around the Beardmore Glacier Babcock's group caught six anchovy-sized freshwater fish, complete with eye sockets. "It's unusual to find complete fish like that with the scales on and everything," he said. "They look like someone just pulled them out of the water."

"We found stuff that had not been recorded (before) and what's really unusual here is we got a more complete set of creatures from sedimentary river beds than before," Babcock said. "They help to fill in some of the details of an ancient ecological community." "These kinds of deposits also give us incredible anatomical information about these sort of creatures, information that would normally be absolutely inaccessible to us," Babcock said. The fossils also tell researchers about the climate at the time. The remains of egg-laying creatures show the temperature was at least 10 C for a few weeks, since that's the temperature they require to incubate. The presence offish shows it was warm enough for the water to be liquid for extended periods and flying insects also indicate a warmer "greenhouse" world, Babcock said. "Once we're done with this study, this will almost certainly be the best known Mesozoic lake deposit in terms of fossilization history," Babcock said.

NEW **SOUTH POLE MARKER** (Antarctic Sun, Jan 11, *2004),Tracy Sheeley*

South Pole is returning to a work routine after the holiday season - and a busy one at that. January brings with it a high population, with visitors and workers coming in for the final push of the summer season.

On the first day of the year, the new marker was placed at the geographic South Pole. The ice sheet moves roughly 10 meters each year, and the marker is updated accordingly. Each winter crew has the honor of designing the pole marker for the following year. It is unmasked in a special ceremony on New Year's Day.

Work continues to make the new station grow and shine. The inspection for final occupancy of the new dining hall and berthing areas is scheduled for late January. Our goal is to receive conditional occupancy of areas under construction. Interior work will continue on those areas throughout the winter. The steel has been erected for the Bl pod, and panels will go up beginning this week. Footers are being placed for A4.

The January flight schedule is starting off on a great note, with up to *7* LC-130 flights a day from McMurdo. We receive science and construction cargo, as well as our fuel resupply to last us through the eight-month winter with no flights. Anticipating winter also means it is time for rest and relaxation in McMurdo for the winter crew - a week to explore Mactown and breathe in warmer air at sea level before settling into the Pole winter routine.

The South Pole Remote Earth Seismic Observatory (SPRESO) is again host to the Ice Core Drilling Service. Five drillers are putting in a third hole to be used by the U.S. Geologic Service to gather their seismological data.

PALMER (Antarctic Sun, Jan 11,2004), *Kerry Kells*
Throughout the holidays, Palmer's group of seabird researchers continued to count and track nests every day. New chicks are hatching within the brown skua and giant petrel populations. Bill Fraser, the principal investigator of this research, arrives to join his group. Some of the researchers will leave on the Gould. Maria Vernet and Ray Smith's group, the phytoplankton and bio-optics component of the Long Term Ecological study, continues to sample the water columns at two spots, joined by the bacterioplankton ecology group. Hugh Ducklow, the principal investigator for this research, also arrived on the Gould. Members of both teams will leave station on the Gould for the Long Term Ecological Research cruise while their colleagues continue research based at Palmer Station.

Robin Ross-Quetin, who is a partner in the long-term research of Antarctic krill, will join Langdon Quetin, co-principal investigator. Ross began her research in Antarctica the summer of 1981-82. In this past week they have continued their acoustic searches and collections of krill. In another realm of science, Tad Day's group has collected 180 cores (plant and soil samples with Antarctic hair grass and Antarctic pearlwort) from Biscoe Island. More samples need to be collected before their experiments can begin.