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WARPTen

A Science Newsletter of Columbia College Journalism Department Vol.1, No.1



Of Mars and Men

By Robbie Robb

The lure of the red planet has tantalized humanity for centuries. Authors from H. G. Wells to Ray Bradbury have written about life on Mars and colonization of the planet. The Arnold Schwartzegger movie, "Total Recall," portrayed a Martian world inhabited by transplanted earthlings. Now the idea of human settlements on Martian soil is no longer just science fiction but emerging reality.

If the proposed Space Exploration Initiative (S.E.I.) is implemented, the first life on Mars may not be small and green. It may be big and pink. It may be us.

On July 20, 1989, the 20th anniversary of humanity's first footfall on the Moon, President George Bush publicly announced the Space Exploration Initiative (S.E.I.). S.E.I. is a long-term proposal for extensive exploration of our solar system. At the heart of the proposal is a projected human space flight to Mars, estimated to put humans on our neighboring planet by 2019.

S.E.I. would not be undertaken by the United States alone. Talks with the European Space Agency (E.S.A.), Japan, Canada, and representatives of the former Soviet Union, have produced a growing interest in the pursuit of a joint human space flight to Mars. President Bush has stated his wish that the United States become the "world leader to the solar system."

However, not everyone is convinced that the benefits of this ambitious mission outweigh the stunning price tag. The entire \$188 million that was earmarked as seed money for S.E.I. in 1991-92 was cut from the budget by Congress.

Although budget figures vary widely from plan to plan, the anticipated cost of a human space flight to Mars is, well, astronomical. Estimates range from \$100 to \$400 billion over the next 20 years. In the 1960s, the Apollo program put human beings on the moon at a cost of "only" \$40 billion (\$78.5 billion in 1992 dollars).

That's a big difference, but there are good reasons. A trip to

the moon, a distance of 384,000km (239,000 miles) is but a three day voyage. A one-way trip to Mars, a distance of 56.4 million km. (35 million miles) requires 280 days. The sheer scope of the project thus demands a more expensive spacecraft. But traveling to Mars would also require more resources at additional cost. Vast amounts of supplies, food, equipment, and fuel would be needed for a trip of this magnitude.

The \$100 to \$400 billion necessary for a manned flight to Mars covers many smaller programs that will build step by step to the proposed mission in 2019.

If S.E.I. goes forward the Shuttle fleet, already in place, would deliver building materials to an Earth orbit, where Space Station Freedom will be assembled. Assembly would take place over a three-year period and would require 20 Shuttle missions for delivery of all the materials. The initial supply launch is scheduled for 1995.

Space Station Freedom would, when finished, serve as the living quarters for those involved in the mission, as well as a research lab for earth-coordinated operations. Freedom will



—Planetary Society

HELLO

Welcome to the first issue of **Warp Ten**, the newsletter of Columbia College's Science Writing and Reporting Program. **Warp Ten** will be published regularly during the school year and will feature news from the world of science, medicine, and the environment, as well as articles of scientific interest. Our emphasis is on cutting edge information and fun.

The newsletter will be produced by students, under the guidance of the Science Writing and Reporting Program, a four-year course of study that prepares students for careers in science or health communication. If you wish more information about the program or the newsletter, please contact me. Meanwhile, relax and let us take you on a journey from the infinitesimal to the cosmic.

Many thanks to those who contributed to this issue, including Amy Aguirre, Tim Bentevis, Kate Carlton, Chip Howell, Paul Klatt, Rich Mulvihill, Dave Morton, Robbie Robb, and Marcos Sueiro.
—Jeff Lyon, Director of Science Writing and Reporting, ex.368 or 674

provide the future Mars-bound astronauts with extended exposure to a weightless environment and confined crew quarters much like those they will live in during the 2 1/2 year mission.

Construction of the Mars space ship would take place in space. Many of the elements for fuels would be supplied by the moon's mineral resources. The moon's most important contributions would be in the forms of oxygen, extracted from rocks containing metal oxides, and helium - 3, which would serve as fuel for the proposed fusion reactor engines. The Moon will serve as a so-called "bridge between two worlds."

By the year 2010, fully staffed colonies would be in place on the moon. Permanent observatories with both optical and radio telescopes would be in operation.

Meanwhile, new robotic probes would begin exploring Mars from permanent orbits, sending back pictures and technical information to help pick suitable landing sites for the human piloted ships and robotic rovers. The robotic rovers will collect soil samples and rocks to be returned to Earth.

Once on Mars, crews in land rovers would begin collecting more soil samples and rocks, exploring dried up river beds for fossil records of any previous life forms on Mars, and scouting out possible locations for future colonies.

This step-by-step plan has been plagued with criticism by those who feel the Mars mission package should not include Space Station Freedom and Moon colonization. Two of these alternative budget plans provide for the use of existing technologies at a much lower price tag.

One of the most favored proposals would place humans on Mars by 1999 at an estimated cost of \$80 to \$100 billion. This plan would send astronauts and equipment in 52 ton increments toward Mars using a Shuttle-derived heavy launch vehicle named "Ares". Former astronaut Michael Collins, has set out his own ideas in his recent book, "Mission to Mars". Collins calls for a modified version of Freedom to accommodate the Mars Mission but also eliminates the moon base proposal.

Collins sees the space station's function as a training device and proving ground for the Mars astronauts. The Moon colonies, in his opinion, would be a drain on the mission's budget.

Collins' plan is well thought out. The utmost care is given concerning the astronauts on an extended voyage. But this plan provides few supplemental space operations except those directly related to the Mars mission.

Of course, some wonder if humans should go to Mars at all. What, they ask, are the benefits of such a mission? It is argued

that a Mars mission would benefit almost every technology-based company and speed development of new products. The financial return from the Apollo program was \$7 to \$8 for every research dollar spent on development.

Others see political benefits. A project of this scope builds international cooperation toward a common goal, peaceful exploration of the solar system. Scientifically, we stand to learn a great deal about changing climates, and planetary development. Also, assessments of potential colonization can be more closely analyzed from the planet's surface.

Still others point to the social and educational benefits.

Many new young astronauts will be needed for construction of Freedom. More personnel will be required for design and building of new equipment for the station and future missions. Educationally, these events will hammer home the idea that the Earth is but one small fragile world in a vastly larger universe.

What are some of the disadvantages of a program of this nature? First, it is very expensive, and requires 15 to 20 years to realize. By then, the general public may not be willing to continue shelling out cash for a project with such minimal visible impact. And economically, most of the nations involved are experiencing financial difficulties. There are concerns about national security and the exchange of technologies related to defense issues.

Finally, there is the question of a commitment to long-term space exploration. The United States and the other nations must band together and brainstorm long range goals in the form of 50- and 100-year plans.

Planning on the scale of 100 years may sound unrealistic, but only this type of long term planning, not the stop/start planning of Apollo or the Shuttle programs, will make space colonies a reality.

Extra-long-range planning could give the National Aeronautics and Space Administration (NASA) and other space agencies the incentives they need to develop and maintain highly qualified staffs of technicians, engineers, and designers.

Mars is not a new target for humanity. United States space probes have been going to Mars successfully since 1964. The Mariner program had three successful flyby missions and one successful orbiter, Mariner 9. In 1976, Vikings 1 and 2 touched down on the red planet, giving the world a front-row view of its cratered and rocky terrain. Soil samples were also taken and analyzed by an onboard mini biochemistry lab in hopes of finding the essential elements for life. No life forms were found, but there is still hope for life on Mars.

Mr. Science

By Dave Morton

Greetings and welcome to the Mr. Science column, wherein we will try to unravel the eternal mysteries of the universe, not to mention even more mind-boggling questions that plague us, such as, "Why is it after I've spent an hour of my life and untold quarters at the local Duds and Suds laundromat I end up with five and a half pairs of socks when I started with six?" or "Why is it when you leave hard things out they get soft and when you leave soft things out they get hard?" This is not a promise to answer such riddles. We only said we would try. But then science is not an exact science and never has been.

Anyway, let's cut to the chase and begin our little quest for knowledge.

Rich Mulvihill, a recent animation graduate, writes:

"I was with some friends having a couple of beers one night. As the evening progressed one of them walked over and hit the top of my bottle with the bottom of his. To my surprise my beer suddenly turned into foam and erupted from the bottle like a miniature Mt. Vesuvius. Why did this happen?"

Well, Rich, anyone who has seen the movie, "Young Einstein," knows the real reason beer foams. As fate would have it, however, there is still some debate over the credibility of that finely crafted documentary. We will have to resort to the more commonly-accepted explanation.

First, it is necessary to know just what beer is. All beers have a slightly different recipe, which gives them their distinctive flavors. But they all have one thing in common, namely, they all contain that lowly inhabitant of bread and other edible things, yeast. Yeast is a vital component in the fermentation process, which is there for the noble purpose of creating alcohol. As we all know there is no point to drinking beer without this element (perhaps someone

should explain this to the manufacturers of nonalcoholic drinks). The reaction of the yeast also creates carbon dioxide gas which give beer its effervescence.

Second, we must look at the bottle. A beer bottle is essentially a cylinder. The cylindrical shape is excellent for confining and directing energy, as anyone who knows anything about guns can attest. Furthermore, the material the bottle is made from, i.e. glass, enhances the effect. Glass consists of densely-packed silica molecules. These molecules, because of their tight juxtaposition, are wonderful conductors of impact energy. When your friend taps the top of your bottle with the bottom of his, or with any object, for that matter, he is directing the energy of the blow into the bottle. This is similar to what happens when you take a garden hose and speak directly into one end while someone listens at the other. Your voice creates sound waves that travel through the hose and reach the listener virtually undiminished. The energy of sound would normally radiate out in all directions from the speaker and the sound would fade. But in the hose the sound energy is confined and directed to the opposite end. In the same manner, the shock energy from the tap on the bottle is focused down the sides and interior of the bottle, causing it to pass through the liquid beer. This action makes the beer molecules vibrate and release carbon dioxide bubbles, which until now have been held captive by pressurization. When the shock energy reaches the bottom of the bottle, it has nowhere to go but back the way it came. In passing through the beer a second time, it excites the liquid even more, releasing additional carbon dioxide. The gas bubbles erupt from the bottle, propelling everything else in their path along with them, including beer. As a result your *tres chic* Moose Head has been transformed into a frothy, undrinkable, altogether ookey mess determined to expand out of the bottle and all over you (talk about alcohol abuse).

Ron Schwartz asks:

"What makes a yo-yo yo?"

Like most toys, the yo-yo is associated with violence. It was originally designed as a weapon for killing small game (consequently it was quite a bit larger and heavier in those days). A hunter would quietly wait in a tree for his prey. When some unsuspecting woodland creature came foraging for food the hunter, while keeping the string tied to his finger, would hurl the yo-yo down with all his might. The device would race down the string gathering momentum, spinning faster and faster as it continued toward its prey. Then, when it reached the bottom of the string (hopefully missing the cute furry animal, due to the hunter's bad karma), it had a tough decision to make. The string that holds the yo-yo isn't simply a single strand that is tied to the little rod in the center of the yo-yo. In reality, the string is arranged cleverly so that it forms two strands with the yo-yo occupying a loop at the bottom. Picture it this way. A string is laid out flat and the two ends are brought together to form a "U". The yo-yo is placed at the bottom of the "U" and then the two halves of the string are twisted together to form one interwoven length, which at the top is knotted so they do not separate.

Now we have our yo-yo spinning at the bottom of a loop of string with all kinds of accumulated energy and nowhere to go. In effect, the yo-yo bounces off the very bottom of the loop the way a tennis ball reacts when it hits a wall. The bounce merely changes the direction of the momentum, without appreciably diminishing it. The accumulated energy allows the yo-yo to pull itself up, against the force of gravity.

In essence the yo-yo rolls down one side of the string and up the other. Now, a question for you. Would a yo-yo work in zero gravity? The answer is, of course. The laws of momentum are as valid in space as anywhere else.

The Mr. Science column will be a regular feature of this publication. Readers are invited to send their burning questions to us, care of the Journalism Department office, 8th floor, Wabash building.

A New Dimension in Sound — the Third One

By Marcos Sueiro

The future of stereo is about to go 3-D. New technologies allow us to create the illusion of three-dimensional sound, but, unlike the unsuccessful quadraphonic systems of the seventies, the new techniques are compatible with just about any stereo system, without any added cost to the consumer.

Pop singer Madonna is one of the first to capitalize on the new sound of stereo. Her recent collection of singles, *The Immaculate Collection*, uses one of the new 3-D processes, Q Sound. Sting's recent album, *The Soul Cages*, also uses this system.

At their simplest, these enhancements make sound "go

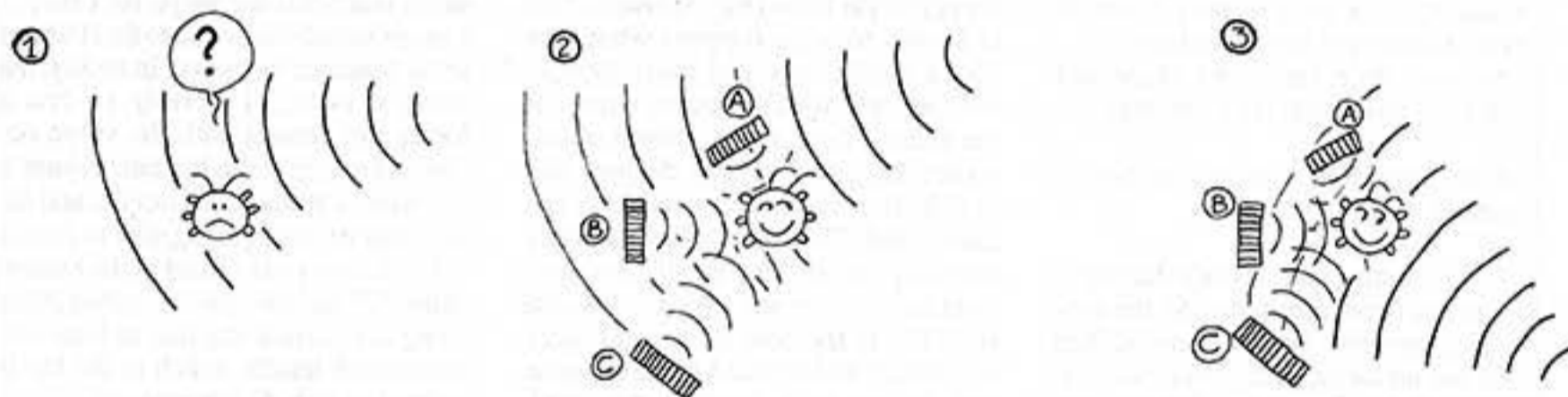
register as louder in that ear. This is the principle by which conventional stereo works. We can also tell to which ear sound arrives first: this is the principle behind some of the less sophisticated 3-D processing systems (such as B.A.S.E.), where sound seems to extend beyond the speakers.

There is a third factor in sound localization that is now known to be extremely important, the so-called **pinna cues**. The pinna is the outer ear, that funny-looking cartilage sticking out at both sides of our head. It seems its irregular shape helps us enormously in knowing where a sound originates.

In essence, when a sound wave hits the pinna it will bounce around its ridges differently depending on where the sound was coming from. This will create a distinctive pattern of tiny time delays that the brain can then decipher as "coming from there."

To illustrate this, imagine a creature that lives on the surface

THE PARABLE OF THE FLOATING BEING



by Marcos Sueiro

Flo-tee, a floating being that lives on a pond, has no way of telling direction in ①. In ② and ③, it has built a set of walls at precise distances, and now it can detect where ripples come from. Note that ripples in ② hit wall "A" first, while ripples, in ③ hit "C" first. Using these time differences (and the consequent interferences), Flo-tee can tell now the origin of the waves.

beyond the speakers," both sideways and forward. At their most sophisticated, individual instruments are precisely located at a point in space and move freely about: up, down, or even behind the listener's head.

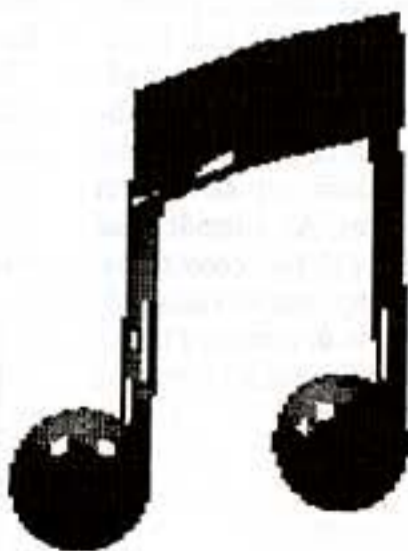
These techniques have developed from a better understanding of how the human ear localizes sound. Research on this field of psychoacoustics has been making steady progress since the 1960s, and today scientists feel confident they understand how it all works.

We can tell where a sound is coming from by three means. One is by differences in amplitude: if a sound is closer to, say, the right ear, it will

of a pond, and wants to know where the ripples that disturb it originate. This being has no way of knowing angles if it is there by itself. But if it builds a system of little walls around itself, and knows their exact location, pretty soon it would be able to know where the ripples are coming from, judging by how the ripples bounce off the walls and then hit it: it would depend on how long it takes to receive the reflection from wall A, which is at X inches, as opposed to the reflection from wall B, which is at Y inches. And so on. (See figure)

The actual procedure by which the ear/brain combo does this is much more complex, of course, and it involves resonance and diffraction as well as reflection. And not until recently have psychoacousticians been able to replicate the end result digitally, so that the ear can be convincingly fooled. At a demonstration at Columbia College by Evanston-based company Auris, the results were quite astounding. From a conventional stereo, sounds filled the room, circled it, and moved in every direction.

There is no doubt that the sound of the future will be



three-dimensional. Its applications to recorded music, TV broadcasts, and movie theaters are only beginning to surface. And, without having to purchase extra hardware, the consumer will be the ultimate beneficiary.

WHERE TO HEAR IT

MADONNA's and STING's latest albums, *The Immaculate Collection* and *The Soul Cages*, respectively, have been mixed using Q Sound. CHESKY RECORDS' *Jazz Vol. 1* sampler CD has 3-D examples in it, including one called LEDR. GAMMA ELECTRONIC SYSTEMS has put out a B.A.S.E. demonstration disc. For more information, contact the companies below:

Chesky Records, P.O. Box 1268, Radio City Station, New York NY 10101.

Gamma Electronic Systems Inc., 1631 16th St., Santa Monica CA 90404. (800)999-1343.

Roland Corp. US, 7200 Dominion Circle, Los Angeles CA 90040-3647. (213)685-5141.

Auris Corporation, 1801 Maple Ave., Evanston IL 60201. (708)8660479.

Lawyers in Space?

By Chip Howell

We have all seen mighty rockets blazing off launch pads and heading beyond the boundaries of the earth. We have heard of things that seem to defy the laws of nature, such as zero gravity or escape velocity. But when a spacecraft and its crew enters earth orbit, many of the abstract/ethical laws which govern life on earth are challenged as well. This is a major concern for the astronauts or cosmonauts involved, as well as politicians, lawyers, and journalists.

Due to rapidly developing space technology, the issue of First Amendment rights in outer space has become pressing.

Already conflicts have arisen between the federal government and news organizations regarding the release of photographs or telemetry transmitted from scientific satellites in near earth orbit. Such information can and has been interpreted as potentially sensitive to military and industrial interests. It is increasingly difficult to maintain the appropriate constitutional balance between national security interests and freedom of expression, especially when space shuttle crews deploy spy satellites. Does the fact that an intrusion originates in space make it any less of an intrusion? Are constitutional questions void simply because the venue in which they arise is ... the void?

Space debris is another major concern. In only 31 years, humans have placed a stunning amount of garbage into earth orbit; the Russians and Americans are responsible for the bulk of it, but in the 1980s, Europe, Japan, and China have made their contributions as well.

Whenever a satellite or other spacecraft is launched, there are items discarded that remain in orbit and become forgotten. These items include payload firings, used upper stages of

rockets, and bolts thrown off as part of the explosive deployment of booms, antennae, or solar panels.

When a spacecraft runs out of fuel, it, too, becomes a piece of floating garbage. Used fuel itself has become a great concern with some spacecraft powered by nuclear reactors. There is nearly a ton and a half of spent nuclear fuel in orbit. The exhaust from solid rocket motors contains aluminum oxide particles, which may corrode other spacecraft, as they are known to pit any surface they collide with.

Many craft are painted. After lengthy stays in orbit, the constant cycling in and out of the sun may cause the paint to flake off. These paint flakes often travel in excess of

A space shuttle window in Challenger had to be replaced when a pit was created by a 0.2 millimeter paint flake.

7 kilometers per second (15,639 miles per hour) and cause significant damage to other spacecraft.

The most famous example: a space shuttle window in Challenger had to be replaced in 1983 when a 4 millimeter pit was created by the impact of a 0.2 millimeter paint flake.

The garbage crisis has been complicated by anti-satellite tests by the former Soviet government, Strategic Defense Initiative (SDI) tests, and used rocket explosions. As a result, still more small pieces of junk have been added to the earth's debris halo. Some of the observed breakups of satellites without any known cause raise the possibility that collisions with other debris occurred.

The third legal concern connected concern with outer space centers around private enterprise. Domestic and international conflicts have arisen from the commercialization of outer space. In 1982, then-President Ronald Reagan outlined objectives for the expansion of private investment and involvement in space. In response to Reagan's directive, NASA produced the Commercial Space Policy (CSP) to reduce the risks of doing business in space and forge new links with the business sector in order to increase development.

By encouraging private space business, CSP clashes head-on with international treaties that limit such business and hints at U.S. unwillingness to negotiate future treaties. Also, the possibility of an international body to regulate space commercialization and dispersal of benefits has lost a great deal of support from the United States. Concern has also been raised about competition from our chief rivals, Japan and the European Space Agency.

For those who might feel that space, and the responsibilities that go with exploring it, have nothing to do with them, awareness of these concerns may very well change the way they, or anyone else views the next fiery, thunderous rocket launch.

Can You Dig It?

By Paul R. Klatt

To the victims of last year's war between the U. S. and Iraq

should be added one more: the field of archeology.

Due to United Nations economic sanctions against Iraq, all archaeological work by foreign scientists has been placed on hold.

This despite zealous signals from the Iraqi regime of Saddam Hussein that it would welcome the return of all foreign archaeological expeditions.

The ban has those who have spent their lives excavating the site of the ancient land of Mesopotamia sitting it out rather restlessly. "I don't know why scholarly research should come under these sanctions, but it does," chafes Mesopotamian specialist, McGuire Gibson, of Chicago's famed Oriental Institute. "Nobody has tried to challenge it."

Slowly and methodically over the last half century, the history of Mesopotamia has been scratched and sifted from the hot dust of what is now Iraq. Experts from around the world have systematically scoured the deserts of this nation of 12 million people to learn more about what is generally regarded as the cradle of human civilization. When the summer of 1990 came, and the yearly retreat from the hot furnace of sand brought archaeologists home to await their return to winter's more hospitable weather, little did the scientists realize they were going on an extended, and involuntary, leave.

In August of 1990, Saddam proclaimed to the world that Iraq, the Mideast's second most powerful nation after Israel, was staking claim to the neighboring kingdom of Kuwait. Within hours, his troops were overrunning the oil-rich emirate.

The invasion of Kuwait caused an abrupt cancellation of a planned conference of archaeologists to have been hosted in December, 1990 in Bagdad by Iraqi antiquarians. The title of the conference, ironically, was to have been "War and Peace"—in this case, the region's tragic history of bloodshed dating back thousands of years.

The moratorium could not have come at a more inopportune time. Recent digging in what is popularly known as the Fertile Crescent, where humans first began building cities nearly 6,000 years ago, has resulted in a number of major finds. The most startling of these came at the site of the ancient city of Nimrud in northern Iraq. Consisting of nearly 50 pounds of gold in the form of necklaces, armbands, and earrings, it was "...deemed by scholars to be the richest archaeological find since the discovery of Tutankhamen's tomb," according to Spencer P. M. Harrington, in *Archeology Magazine*.

With such treasures awaiting just below the sands, what does science stand to lose from the current ban? How much remains

to be found?

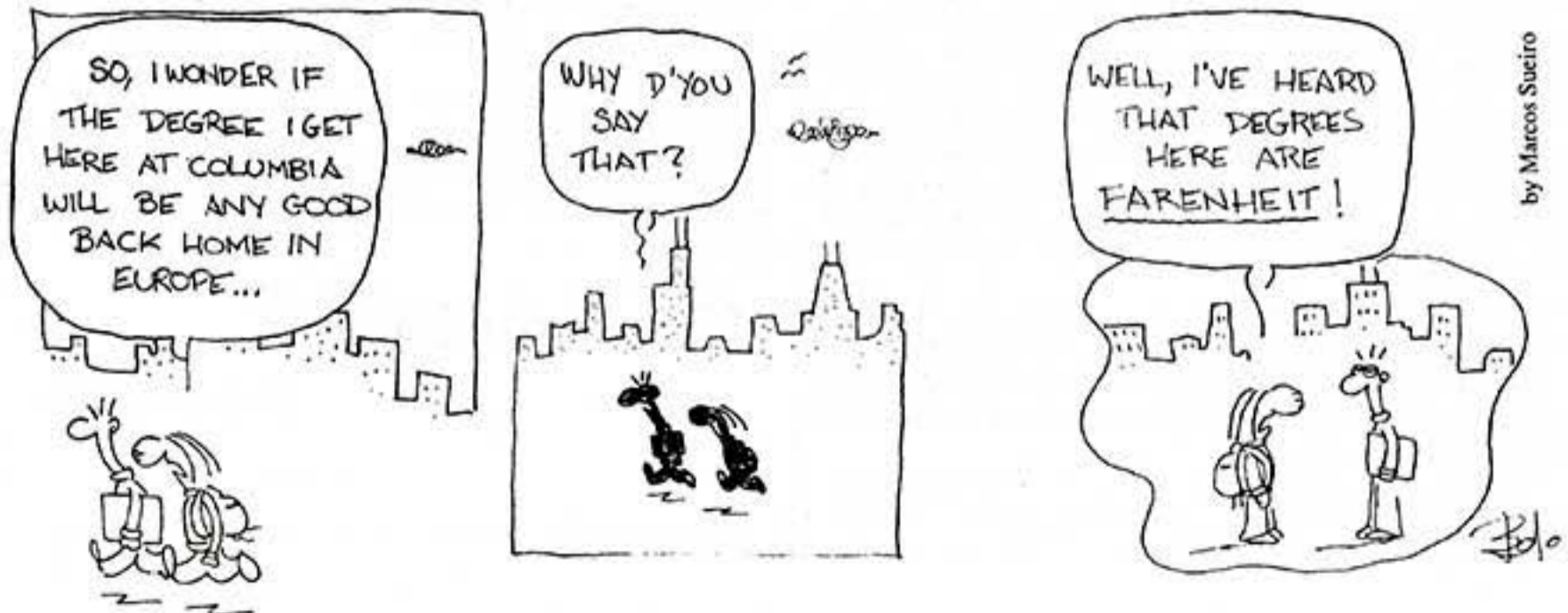
It is, of course, impossible to know how many irreplaceable artifacts were damaged by the U. S. Iraqi war, which exposed the sheltering earth to weeks of saturation bombing. But it is generally believed that only a few, perhaps ten percent, of all the historical sites in Mesopotamia have been uncovered. Sites number in the thousands because civilizations have been rising and declining regularly in the area for perhaps as long as 8,000 years. The influence of the earliest cultures on subsequent peoples has been immense. Bruce Bower, in the March 3, 1990 issue of *Science News*, wrote that the Sumerians, thought to have been the authors of the earliest human civilization, shaped not only later societies in what is now Iraq, Syria, Turkey, and Iran, but that of the ancient Egyptians, many hundreds of miles away. The Sumerians gave the world pottery, writing, trade, music, art, and law, among many other things.



Sumerian sites, such as the city of Ur, on the Euphrates river, 200 miles south of Bagdad, are the focal point of the search for civilization's beginnings. Much research involves the ancient city of Nineveh, north of Bagdad, where David Stronach of the University of California at Berkeley had set up shop before the ban. The city, which Stronach says is "second in size only to Babylon," is encircled by a wall seven miles in length. Two mounds on the western side date from a "later" era, that of the Assyrian Empire of three thousand years ago. The city has never been seriously disturbed because it is a holy place. Tradition has it that an ancient church was housed there. (The city is also reputedly the burial place of the Biblical Jonah).

Work at all of these sites and others has ground to a halt because of the ban, which seeks to compel the Saddam regime to destroy its war-making capacity.

While the regime is considered barbaric by many critics, its reputation for encouraging archeology is impeccable. Paul Zimansky, an Orientalist from Boston University, has nothing but praise for Iraq's working relationship with the research community prior to the outbreak of hostilities. He says Iraq had always kept its political views separate from its scholarly



interests. "Up to this point," he said in an interview, "it's been very easy to work there." Zimansky's main fear is that the war and its aftermath may have permanently disrupted relationships Americans scientists have with the Iraqi people. From a scientific point of view, he said it appeared "more beneficial to pursue a continuation with the same government" than to press for a new leader who might have less favorable policies toward antiquities.

U. N. sanctions call for a moratorium on any activity that would bring economic gain to Iraq. It is felt that archeological expeditions would feed the Iraqi economy in the form of payments for hotel rooms, workmen, food, and supplies. Open to argument, however, is the question of how much aid and comfort these rather small outlays would give to the recalcitrant regime. "You'll have to ask Washington about that," says Gibson.

Caviar Emptor

By Amy Aguirre

When the Shedd Aquarium opened its spectacular Oceanarium last year, there were hopes that the 170,000 square-foot facility would justify its huge price tag by attracting a million new visitors a year to the venerable old fish house at the south end of Monroe Street Harbor. By any measure, it has fulfilled those expectations. According to Aquarium spokesmen, more than 1.2 million people toured the Oceanarium between its opening on April 27, 1991, and the end of the year. That brought total Aquarium attendance in 1991 to 2.2 million, well beyond the projection of two million visitors, and some 900,000 more than passed through the facility in 1990. And it all occurred in just eight months.

"It's pretty amazing," says spokesperson Lisa Elkuss.

It is safe to say that most of the new visitors came to see the Oceanarium's featured attraction, two female beluga whales. The Shedd is currently seeking to acquire four more belugas to start a breeding program. To that end, it has obtained a permit from the United States National Marine Fisheries Service to display the new creatures, and is awaiting approval of a permit from the Canadian government allowing Shedd staff to enter Hudson Bay to catch more whales. Complications have arisen, however. Animal rights activists have filed suit, alleging that the Marine Fisheries Service permit was illegally issued. The suit could drag on long enough that the point would become moot — the permit expires in 1993. "We think that is their strategy, that it is a delaying tactic and that the suit itself has no merit," says Elkuss.

Wildlife defenders argue that it is cruel to keep whales cooped up. But what are the arguments FOR capturing whales and breeding them in captivity? "Conservation," says Elkuss. The beluga population in western Hudson Bay is approximately 23,000, but other populations of the whales, she says, are not thriving as well. "It is important to learn how to breed them, to understand the mother-calf relationship, the gestational needs, and so on, so that we can apply the knowledge in the wild and ensure that these mammals will be around a long time."

The Shedd is seeking two males and two females. Says Elkuss, "Our marine mammal specialists tell us that a group of six, four females and two males, is most conducive to breeding. It has something to do with social grouping."

The facility is much more than a whale tank, however. "The Oceanarium is a unique design in that it is a microcosm of the Pacific Northwest coastal environment," says Kenneth T. Ramirez, Assistant Curator of Marine Mammals and Supervisor of Training. As such, it houses a variety of marine mammals from that region.

Beside the belugas, the pools contain pacific white sided dolphins, false killer whales, pacific harbor seals, sea otters, and gentoo penguins. The sea otters are orphans saved after the Alaskan oil spill of 1989. The gentoo penguins are not from the Pacific Northwest. Rather they come from the Falkland Islands. But they are considered a prime example of how birds have adapted to a cold water environment such as that of the Pacific Northwest.

Originally, only the dolphins performed in public in the facility's huge amphitheater, where five shows per day are presented. But as of January, the belugas are performing as well. The animals first demonstrate natural behaviors, movements they would make in the wild. But then, on cue, they jump, breach, tailwalk, and spyhop, an activity in which they stick their heads out of the water and circle, trying to spy on the world around them. "The belugas aren't as agile or elegant as the dolphins, and they can't jump nearly as high. But they are versatile and have their own series of behaviors," says Elkuss.

There are five pools in the exhibit, four of them interconnected. These pools may be closed off from one other by gates installed to control and change the ocean environment. The pools are asymmetrical, allowing the mammals more lifelike swimming patterns. Windows were installed in a semicircular shape around the Oceanarium in order to expose the animals to natural light. There are also two sets of windows on the ceiling for the same purpose.

The staff at the Oceanarium is concerned with making the facility realistic and comfortable for not only the animals, but the public as well. An old growth forest has been recreated using both manmade and natural materials. Real tree branches, for example, have been dipped in preservative to prevent decay.

Ramirez explains, "Selecting the Pacific Northwest gave us the chance to do a lot of different things at one time. Most important it can tell a complete ecological story." As Ramirez



The Oceanarium

photo by Richard Mulvihill

points out, one purpose of the Oceanarium is to inform people about the speed with which the old growth forests are being cut down. Many people are aware of the rapid depletion of the South American rain forests, but few are also aware that the old growth forests of North America are being cut down by loggers at an alarming rate.

The Oceanarium's pools hold 3 million gallons of water that is recirculated through the life support systems. The water is from Lake Michigan, but it has been extensively filtered and salinated to make it safe for the animals. Since the animals are all cold water creatures, water temperature fluctuates between 50 and 55 degrees, too cold for us, but heaven to whales and sea otters.

Ramirez describes the Oceanarium as the best of a zoo, botanical garden, geological museum, and aquarium combined into one. The main focus, he says, is to educate people by displaying the animals in their natural environment, rather than in an obvious and sterile "captivity situation."

Admission to the Aquarium and Oceanarium is \$7.00 for adults and \$5.00 for senior citizens and children over three. Tickets for weekends and holidays are best purchased in advance, due to the large crowds.

Give Me Your Tires....

By Timothy Bentevis

While driving, have you ever wondered what happens to those huge piles of abandoned tires one sees stocked in old junkyards on the side of the road?

Despite some failed attempts to salvage scrap tires in the late 1960s and early 1970s, new efforts are afoot seeking to provide a safe and effective approach to discarding old tires. But according to one tire company official, some tire firms are balking at the idea.

"This problem really needs to be addressed by every tire company," said Jack Mecik, environmental spokesperson for the Michelin Tire Corp. "If the tire has our name on it, we would like to see it discarded properly."

The number of scrap tires has increased in recent years. According to Mecik, there are two to six billion tires sitting in dumps around the world.

"No one really knows the actual amount of tires disposed of," Mecik said. "There are piles on the side of roads, in the wild, in backyards, under porches, and in people's garages."



Tire yard at A. Lincoln and Sons on Webster Avenue.

Photo by Richard Mulvihill

The good news is that recycling tires, if undertaken in earnest, could provide a shot in the arm to the economy.

In the U.S. alone, the energy potential of scrap tires is equal to about 190 million barrels of oil.

"Every tire carries petroleum and other hazardous chemicals such as black carbon, zinc oxide, stearic acid, and sulfur, that may benefit the U.S. in the future if recycled properly," says Goodyear Director of Public Relations Angie Karister.

"On the other hand, they also are ugly, breed mosquitos, carry disease, and catch fire," she says.

Companies like Firestone, Kelly and Goodyear don't recycle as yet. Michelin is attempting to recycle but has run into problems.

"One method our company insisted on is cleaning up the blight by burning the tires," Mecik said. "However, we found that most furnaces don't burn hot enough to consume the noxious gases produced and melt the steel belts of tires. But our fight is not over yet."

Though it is not an immediate toxic threat, the petroleum and other chemicals contained in rubber tires may eventually work their way into the water system — thus posing a threat to the ground water supply.

"Chicago was virtually swamp land in the early 1900s. If a tire was to be incinerated, especially huge piles of them, it would allow the chemical agents in these tires to make their way into the soil," Mecik said.

Aside from burning tires, other methods of doing away with the ecological time bomb have been proposed which might turn old rubber tires into a gold mine.

A. Lakin & Sons, of Chicago, the largest tire recycling factory in the country, has, since 1982, provided a cost-effective way to reduce the solid waste headaches presented by old tires and has trailblazed the development of recycled products.

"Because the value of tire recycling has increased during the past few years, we have responded by turning tires into a



profit," said Dan Lakin, treasurer of the family-owned firm.

According to Lakin, tires that have been acquired in trade are collected from Sears Auto Centers and various other tire outlets and returned to central sorting stations in Chicago and Birmingham, Alabama. The trade-ins are inspected and categorized for recycling purposes.

"Our initial motivation is to make a profit," Lakin said. "We collect just about every size tire you can think of. The tires that we recycle become die-cut parts: tail pipe hangers, snowblower blades, conveyor belts and dock bumper pads."

Lakin also stressed that the tires that have significant tread life remaining are repaired if necessary, refurbished, and sold to Sears and other tire outlets as used tires.

The yearly tire output from the Lakin factory has benefitted consumers who want to spend less for a quality recycled tire. The process also contributes to health of the environment.

"Our recycled products represent a real value to the consumer and the environment," Lakin said. "Scrap tires make up slightly more than one percent of an estimated 170 million tons of municipal waste produced in the U.S. annually."

Lakin has even gone recycling one better. It is one of the very few companies in the tire business that has branched out into the new technology of "remanufacturing" tires.

"In 1985, we introduced the first American made remanufactured tire, where new rubber is applied over the entire exterior of the original casing," Lakin said.

Lakin recently received the Illinois Governor's 1990 Corporate recycling award for its contribution to the environment.

"We were all delighted," Lakin said. "Tire remanufacturing represents one of the best opportunities we have in the U.S. today to immediately decrease the number of tires requiring disposal."



THEY WERE OUT OF REEBOK
SO I BOUGHT A PAIR OF
GOODYEAR ALL SEASON RADIALS!

by Richard Mulvihill

Mermaid '92

By Hayley Carlton

"Bill, what's this for?" Lainey asked as she picked up one of the many tubes that her older brother had on his boat.

"To measure how energy is in the water," he snapped as he grabbed the tube out of her hand.

Lainey pouted. "I want to go scuba diving," she said, as she flipped her long curly hair which formed a cape down her back. "I don't see why we have to hang around here."

"You have to wait until I check the pollution level. The amount of dead fish washing ashore is incredible, and no one knows what's causing it." He glowered at her with blue-green eyes that were like the sea. Lainey stared back with similar eyes.

"Well, all right," she sighed. "I want to do some sun bathing anyway." She went over to the other side of the deck, turned on her boom box, and the sounds of The New Kids On The Block blasted the entire boat. Bill winced. His wife Mandy stormed over.

"Why did you have to invite her?" She put her hands on her slim hips.

"I didn't."

"Well then, what's she doing here then?" The sun shone off her butter blond hair.

"Look, she's a guest of Nick's. She's his girlfriend, and my sister. We'll just have to put up with her." He took out some gadgets. "Now will you please leave me alone? I have work to do."

"Well all right then." She stormed off. Bill continued his work.

"Evangeline, Evangeline, come in, this is The Rainbow." The voice on the two way radio said.

Bill picked up the receiver. "Corey, what did you find?"

"Mild pollution, but nothing to endanger any lives. How about you?"

"About the same, I guess."

"Well, talk to you later."

"Over and out."

Mandy came rushing over. "Do you really mean it? It's OK to go scuba diving."

"Yes it is. Why do you ask?"

"So we can get that teenybopper out of our hair and into the water, that's why." She pointed to Lainey who was dancing wildly by the edge of the deck.

"I'll tell her," he said as he got up and went over to her. It did no good however, because she couldn't hear him. He then turned off the radio, causing her to jump back in shock. "What are you waiting for? You wanted to go diving so bad, so do it." Without uttering a word, she turned on her heel and ran below deck, nearly falling over her boyfriend Nick. She grabbed him and shook him.

"Didn't you hear him? It's time to go diving."

"Well, all right, let me get the gear first." He got up and seized their stuff while Mandy looked up and whispered a silent thank you.

Once under water, it was like being in a different world. The coral reefs and schools of tropical fish took their breath away.

Suddenly, Lainey pointed to something. They went over to what happened to be the body of a dead girl tangled in sea weed by the reefs. When they went in for a closer look, they were shocked to see that it was not a girl at all, but a mermaid! Nick and Lainey looked at each other in shock. The mermaid struggled to free herself, and Nick pulled at the plants and freed her. Once he did this, he lifted the listless mermaid under the shoulders and carried her to the surface. Lainey followed in a daze. Nick struggled to put her on the boat, but with Lainey's assistance, he finally did it. The mermaid's screams attracted Bill and Mandy and they gathered around, unable to believe what they were seeing. Bill walked around her without saying a word, touching her alabaster skin over and over again. She stared up at Bill with her small jet black eyes. He touched her strawberry blond hair and stuck his finger in her mouth, getting bit in the process. He jumped back and tripped over her grayish, pink tail. The others laughed.

"This can't be real," said Mandy.

"*Que esperanza Tu loco!*" yelled the mermaid.

"Do you think that this might be an experiment?" asked Nick.

"No. There were probably mermaids here all along. How did you find her?"

"She was tangled up by the reef."

"Well, all right. What do you say, should we cut this trip short and take the mermaid straight to the lab?"

"You're not thinking of cutting her up are you?" asked Lainey.

"No, I'm taking her to my lab - and not the one I work in. I just want to keep this to myself for a while so I can find out what makes her tick."

"Yourself?" screeched Lainey. "We found her. We should be the ones who decide what to do with her."

"What do you want to do with her?" asked Nick.

"Clone her and sell the babies to sea world."

"We're going back," said Bill.

Once they reached Bill's lab, they set her up in a swimming pool filled with salt water. The mermaid refuses to come to the surface, preferring to stay under water with her back turned to the others. Bill, Mandy, and Nick watched her as her tail moves slightly into the water. "I've run some blood tests on her and it seems that she is affected by the same thing that is

killing the fish, though I don't know what it is. It's like nothing I've ever witnessed before. And look, he takes out a container with some green goop in it, she's been coughing this up."

"Is she going to die?" asked Mandy.

"I don't know. Hopefully we got to her in time."

"Have you figured out where this stuff is coming from?" asked Nick.

"I'm not sure yet. I know it isn't coming from anywhere on Key West."

The mermaid flipped over. Bill and Nick look down at her. Mandy's mouth twists in anger. "Bill, I don't like the thought of you looking at that topless mermaid all day."

"Well, what do you want me to do about it?"

"I have some old bikini tops that she could wear."

"Oh, get real. We can't even get her to eat yet. How are we going to get her to wear clothes?"

"What are you feeding her?" interjected Nick.

"Oh, canned fish," said Bill.

"Have you considered live? That's what she's used to eating."

"I never thought of that. Thanks."

Mandy leaves and comes back with a plate of cut veggies with plenty of salt. She holds the plate against the edge of the pool and holds out one of the vegetables. The mermaid sniffs it, and takes a tiny taste. She seems to like it and takes another bite. "She likes it," said Mandy.

She gives the mermaid another one. The mermaid starts to grab the veggies off the plate. "It's nice to see that she's feeling better."

"What do you say we leave her alone for a while?" said Bill.

"Why don't we go out to eat?"

"Lainey, too?"

"Why ruin it?" asked Mandy.

"You're right. Let's go," said Nick.

Later, when they returned from dinner, they went to check on the mermaid. The mermaid was lying face up with green goo coming out of her mouth. Bill checked her vital signs, and found that she was dead. "Now we'll never really know what life is like under the sea," he said mournfully.

"You can still study her body," said Mandy.

"It won't be the same, though."