

Sex, Violence and Plenty of Rest

A curious, polygynous lifestyle has bred success for the northern elephant seal, which was nearly extinct 100 years ago



J. Greenberg

By JOEL GREENBERG

... and we'll talk with
them too,
Who loses and who wins; who's in
who's out;
And take upon's the mystery of things,
As if we were God's spies...
—Shakespeare in KING LEAR

AÑO NUEVO POINT, CALIF. — Here, where the lush Santa Cruz Mountains meet the rugged Pacific, God's spies wear blue coats and carry squirt bottles of Lady Clairol Ultra Blue hair dye. They tread slowly over the duned beaches, among thousands of massive northern elephant seals (*Mirounga angustirostris*). The blue-clad scientists, from nearby University of California at Santa Cruz (UCSC), walk hunched over in groups of two or more. To be mistaken for an upright, male elephant seal might mean facing the wrath of a real one, which can measure 16 feet long and weigh 3 tons. And who would emerge the winner in that case would be no mystery.

But central to the lives of these huge pinnipeds is winning — or losing — the almost continual battles fought by the males, which sport Jimmy Durante noses. Through his elephant trunk-like proboscis

the male bull sounds his challenge with an eerie cry that resembles a hollow machine gun firing in slow motion. Another bull in the area may either flee the challenge or rise up on his front flippers and rush to meet him (once roused from sleep, elephant seals can move with surprising and frightening speed). The fights are fierce, noisy and sometimes bloody, though rarely is an animal killed as a result. After much pounding, thrashing and neck-biting — nature has armed the males with thick-skinned neck “shields” to absorb punctures from an opponent's sharp teeth — a victor emerges, usually the older and stronger of the two.

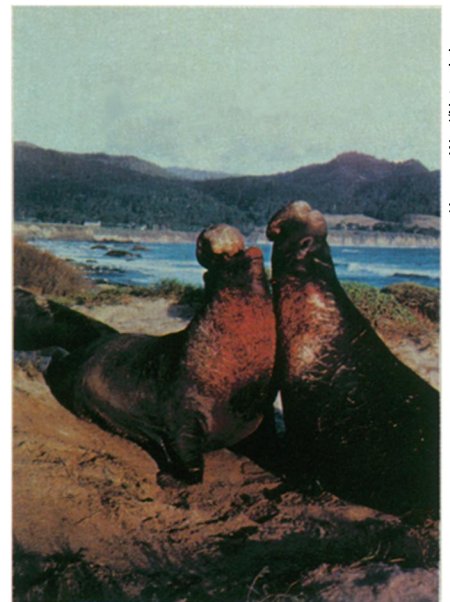
Biologists believe that elephant seals are among the purest examples of Darwin's theory of natural selection — the winners get the females. Many females. A winning bull typically has a harem of 50 or more females in a breeding season and may inseminate as many as 250 females in his lifetime.

The losers? They get to spend the season alone, watching the harems from places like “Losers Beach” and “The Bachelor Pad.” Most of them must wait until the following year for another chance to win.

This point of land, along with the small island just offshore, constitutes Año Nuevo State Reserve, northern California's largest elephant seal breeding ground, or rookery. This year, more than 4,000 males, females and pups will crowd the beaches here. For more than a decade, scientists from UCSC and elsewhere have ventured into this natural oceanfront laboratory to study and record the behavior of the massive mammals. In addition to identification tags, the researchers use the hair dye, mixed with bleach, to write names on sleeping seals. Sleeping, by necessity, takes up practically all the males' time between fighting and copulating. This year's

residents on one section of the beach include “Lucky,” “Sonny” and “No.” The bull with perhaps the largest harem on the point goes by the name of “Vinnie.”

During the breeding season, from December until mid-March, activity at the rookeries resembles the stuff of cheap paperback novels: Lust, sex, violence and jealousy, in addition to birth and death. Orphan pups often form your typical “gang of roving youths,” on the make for milk wherever they can find it. Some of the pups are killed by adult females in their attempts. And researchers have recently observed that some of the “loser” adults — not content to sit out the season at Losers



Kenman Ward/Nature's Image

Bulls, battling for supremacy over a harem, use their sharp teeth to draw blood. However, because the bites are aimed at the thick, toughened skin of the neck shield, rarely is either of the combatants killed or seriously hurt.

Kenman Ward/Nature's Image



Naming bull with a squirt of hair dye.



Losers Beach is the winter home for the "lonely guys"—the defeated bulls who must wait until next year to battle again for their own harem. The area has been described, rather cruelly, as a singles bar without women.



A newly born pup, apparently separated from its mother in the confusion of the harem, wanders from its placenta and searches for her among other adult females. Chances are, rangers say, the pup became an orphan.

Beach—have resorted to “rape” to satisfy their unmet urges.

Underscoring this seemingly chaotic plot-line, however, is a success story that may be unparalleled in recent history. In the late 1880s, the northern elephant seal—exploited for years for oil and other products—numbered fewer than 100, all on Guadalupe Island, Mexico. Today, aided by protection policies of Mexico and the United States, more than 75,000 northern elephant seals exist, from Baja California to Farallon Island outside San Francisco’s Golden Gate Bridge.

“This is the most fantastic comeback from near extinction by perhaps any large mammal,” says Burney J. Le Boeuf, professor of biology at UCSC and director of research for the elephant seal project. Le Boeuf currently is investigating, among other things, why elephant seals came back so strongly, while despite similar protection policies the Guadalupe fur seal, pretty much in the same boat in the late 1800s, today numbers fewer than 2,000.

This breeding success has spurred Le Boeuf and his colleagues to study a wide range of the physical and social aspects of the northern elephant seal. In many ways, the animals are quite predictable: Following the 30-day weaning periods of their newborn pups, the adult females copulate with a dominant bull of their harem, then head out to sea, where the seals feed on a variety of fish for 6 to 13 weeks before returning to land to shed their fur coat and grow a new one. Then it’s back out to sea until the next breeding season, when they return to the same place where they delivered a pup the year before. The males follow a similar schedule that keeps them at sea most of the time, except for the mating and molting periods.

It is the intricacies of these polygynous mammals’ lives, however, that continue to

surprise researchers. The scientists at Año Nuevo—one of 13 large rookeries along the West Coast—have found:

- Females invest an enormous part of themselves—literally—in weaning their newborn pups. An adult female, which weighs anywhere from 800 to 1,600 pounds, loses between 400 and 500 pounds while weaning her pup on milk that is 55 percent fat and at the same time fasting, herself, for the entire 30-day pe-

riod. (Adult males also fast voluntarily for the 91 days they are on land during the breeding season—which also helps explain why sleeping is a major activity at that time.) It takes months at sea for elephant seals to regain the lost weight.

- Despite the burgeoning population figures, pup mortality is quite high—from 15 percent in low-density harems to 40 percent in high density ones. During last year’s breeding season, when El Niño-



Mating is the privilege of the winning bull, who uses his flipper to hold the female in place during intercourse.

Some “loser” males attack and “rape” females who are weak and depleted after breeding. Some of the attacks result in the female’s death.





Orphaned pups often form small groups such as this one on the periphery of a harem. Unless they are adopted or can steal milk, their chances for survival are slim.

driven storms battered Año Nuevo, 70 percent of the 950 newborns on the island were killed. In normal years, most pups that die succumb to starvation, when separated from their mothers, or are killed—intentionally or unintentionally—by adults.

- A number of the losers, known to routinely hang around the edges of large harems hoping to sneak copulations with females, appear to display more disturbing characteristics that have an all-too-human flavor. In work yet to be published, Le Boeuf has identified loser males attacking and “raping” weakened females on their way back to the ocean from breeding. The biologist has also discovered that a small but significant percentage of the female victims are killed during such attacks.

Even a rare death of a female can have far-reaching implications, because most females will give birth to about 10 pups—one a year, beginning at age 5 or earlier until about 14, near the end of their lifespan. UCSC biologist Joanne Reiter has found that pups and mothers alike stand a better chance of surviving and being healthy if the mother waits to start breeding until age 5 or 6. Nevertheless, many young females attempt to breed as early as age 3—almost as if they realize they can produce more offspring in a lifetime if they start earlier.

“It’s a gamble,” says Reiter. “Birthing takes a lot out of them.” A female that starts reproducing at age 3—at only two-thirds the size of a 6-year-old—is nearly twice as likely to die after just three reproductive efforts than a female who waits until age 4, Reiter has found. “There is no payoff in an early birth, if you die within a few years,” Reiter says. “But if you don’t die there is a big payoff: more offspring.”

Young mothers risk more than just their own lives, though. Their pups generally

Among sleeping giants...

Tiptoeing through the elephant seal breeding ground at Año Nuevo Point—amidst a symphony of snores, groans and chilling battle cries—one senses how difficult it must be for an animal to cope with being that large (males measure 16 feet from trunk-like nose to flipper and weigh about 3 tons). Occasionally, a seal will use a front flipper—incredibly tiny for such a massive creature—to scratch itself or flip sun-shielding sand on its body. In the same way a heavy person finds it harder than others to get around, the elephant seal must invest a great deal of energy in moving; even in breathing.

For this reason—and because they don’t eat while on land during the breeding season—they mostly sleep. And while sleeping they frequently hold their breath for 25 minutes, breathe for 4 or 5 minutes, then hold their breath again. This is actually a form of sleep apnea, scientists say, that economizes the animal’s metabolism by preventing loss of body water through exhaling. In addition, the breathing/non-breathing pattern may be identical to the elephant seal’s behavior underwater, where it must hold its breath for long periods of time during dives.

Besides copulating, scratching, dirt flipping, rolling over or taking an infrequent, short stroll, the only thing that will rouse the male elephant seal from his rest is the challenge of another bull—or what he thinks is another bull. Since

any lone, upright figure may be mistaken as such, the researchers and rangers at Año Nuevo generally walk in groups, slightly hunched over. “Elephant seals are big, dangerous and unpredictable,” says Burney J. Le Boeuf of the University of California at Santa Cruz, director of research for the elephant seal project. “They can attack a human, and if they do, they can roll over you as if you were a log or a piece of flotsam.”

Statistically, the danger of this happening seems small. According to rangers at the point, only once over the years has a seal inflicted an injury on a researcher (a non-lethal bite several years ago). Still, the field scientists, whose blue coats identify them as non-intruders to rangers, glide through the harems with a healthy respect for the animals.

“Stick close to me,” biologist Joanne Reiter told a reporter on a recent visit. “There’s a particularly nasty old bull I have to name.” As she approached the huge, rather homely pinniped, his large black eyes opened briefly and stared at the intruders. He then returned to a fitful sleep, punctuated by staccato snores. “He must be having a bad dream,” Reiter said as she used her squirt bottle of a dye/bleach combination to write a name on his blubbery torso.

One can only hope that somewhere among the dunes of Año Nuevo Point the bad dreams have vanished and that “Joel” is resting comfortably.

—J. Greenberg



weigh less, and because the mothers are not fully mature in both the physical and behavioral aspects of parenting, these pups are simply not cared for as well as they would be by an older mother.

Although younger mothers may be more likely to lose their pups, older mothers may also lose their newborns in the chaos of large harems, amidst all the battles and challenges. When this happens, the disoriented baby seal is in greater jeopardy of being accidentally trampled by a fast-moving adult bull on its way to or from a fight, or to mate. Such incidents account for 30 to 35 percent of pup deaths at a rookery each year, according to Le Boeuf.

But the orphaned pups that escape that fate are faced with perhaps an even more grim form of death. Separated from their mothers, the orphans attempt to find a "foster mother." Some are lucky and succeed; the others — individually or in groups — must try to steal milk from mothers nursing their own pups. At first, the mother may simply threaten the intruder; if that doesn't work, she bites it. If that doesn't send it away, she begins biting the orphan repeatedly; when this happens, four or five other mothers for some reason join in, and the pup is killed. These intentional retaliations by the adult females account for 55 percent of rookery pup deaths, Le Boeuf says.

Some pups are even killed by the losers, who, it appears, attempt to copulate with them when they cannot get access to an adult female. Losing the dominance bat-

ties to the stronger, usually older seals does not seem to diminish the losers' desire to mate in the least. In their attacks upon adult females heading back towards the sea after breeding, Le Boeuf reports, these inexperienced and overzealous males may inadvertently puncture one of their victim's blood vessels with a misplaced bite. This, or some other type of misguided movement, results in the death of 1 in 1,000 adult females, he says.

Though this may seem like a low death incidence, Le Boeuf points out that the actual incidence is probably higher than that observed. More significantly, he says, even a 1 in 1,000 incidence is considered high in terms of the natural selection procedures. For example, he says, for a female to remain a producer of offspring she must, obviously, avoid the possibility of death — which in this case comes in the form of the attacking male. Le Boeuf has already observed some females returning to sea at high tide, apparently to cut down the potential attack zone.

Moreover, the biologist notes that among humans, the annual incidence of rape in the United States ranges from 8 to 35 per 100,000 people; from this perspective, he says, the incidence of death from rape among elephant seals, 100 per 100,000, is quite high.

But Le Boeuf and his colleagues acknowledge it can be extremely difficult to tell whether or not a female is willing, even during some of the post-breeding attacks by losers. Within the harem, Reiter has noted behavior similar to that observed at

drinking establishments in Oklahoma. She calls it the Okie Bar Effect, or the "Are you going to let this guy do this to me?" effect. In such a situation, the female appears to permit a lesser bull to mount her, and then proceeds to make a very noticeable vocal and visual show of it. This frequently will attract a "higher," dominant male, who will push off the other bull and take over himself.

Regardless of what mating scenario applies, it is clear that elephant seals continue to breed in record numbers. "It's at the peak slope of the exponential curve," says UCSC's Richard S. Condit. While this has biologists and naturalists pleased, some, like Le Boeuf, are beginning to feel slightly uneasy about potential overcrowding at breeding grounds. Elephant seals gravitate naturally to isolated islands, and until 1975 their rookery here was located solely on Año Nuevo Island. Since then, however, their density has driven an increasing number of them to the mainland, and it is expected that this year, for the first time, the population at the point will outnumber that on the island. Some of this may be traced to El Niño, which last year drove many females to the more-sheltered point, where they are bound to return for breeding this year.

As they become more comfortable around humans — public tours are conducted throughout each day at the point — Le Boeuf worries that elephant seals may migrate "to beaches where no one wants them." But then again, who would tell them that? □

Letters continued from page 115

Panic

In reference to your article "Low blood sugar no cause for panic." (SN: 1/28/84, p. 58), if you chemically induce a panic attack, then watch for corresponding drops in blood sugar levels, all you can conclude is that panic attacks may or may not cause hypoglycemia. I do not see how Dr. Gorman can conclude [that] low blood sugar itself is not the source of panic. It seems to me one would have to lower the blood sugar level, and see if you could trigger a panic attack to test that hypothesis.

Susan A. Kriz
Glen Ellyn, Ill.

Ed.'s note: The article should have said that Gorman and colleagues concluded that hypoglycemia is not the source of all panic attacks. They note in their journal report that they did not prove that hypoglycemia never causes panic attacks.

Mirror, mirror

I found that the cultural aspect of magic mirrors ("Inscrutable Mirrors," SN: 1/14/84, p. 30), is very well explained, including a citation from the New Testament. From this standpoint, I might point out that magic mirrors that projected the image of Mary or the cross were used by hidden Christians during the Tokugawa shogunate.

Chinese authors may be upset by reading the article because they would agree with my interpretation instead of the light penetration theory in the old days.

The author could have mentioned the Ayrton and Perry article in PROCEEDINGS OF THE ROYAL SOCIETY because they investigated the Makyo systematically for the first time, and Sir William Bragg based his description on their papers. For the specialists in optics, I could have cited other well-known names such as Brewster and Arago, as well.

Hideya Gamo
Professor, Electrical Engineering
Univ. of Calif.
Irvine, Calif.

What's in a Gray

I was surprised to read in your article "Irradiation — It Cuts the Gas" (SN: 2/4/84, p. 72) that the kiloGray (kGy) was reported to be equivalent to 0.001 rad.

In fact, the Gray, a unit derived from the International System of Units to describe absorbed dose of ionizing radiation, is equivalent to 1 J/kg or 100 rad. Thus, 1 kGy is equal to 100,000 rad, not 0.001 rad.

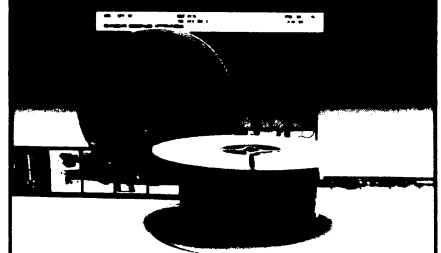
Charles H. Nauman, Ph.D.
Exposure Assessment Group
U.S. Environmental Protection Agency
Washington, D.C.

We went to the Nuclear Regulatory Commission for a kGy-to-rad conversion factor and were misinformed. — J. Raloff

Ed.'s note: Chris W. Patterson of the Los Alamos National Laboratory in New Mexico collaborated with William G. Harter in his work on molecular spectra (SN: 2/4/84, p. 76).

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