RANDOM SAMPLES

edited by CONSTANCE HOLDEN

Green Crabs Advance North

The European Green crab, a voracious and invasive species that has been worrying West Coast ecologists, has made an appearance in Oregon—the farthest north it has yet been spotted in the West. Last week, an oysterman found a single male crab in an oyster farm in the northern part of Coos Bay. That's a "yellow light" that an invasion may be under way, says biologist Neil Richmond at the Oregon Department of Fish and Game.

The crab has plied the waters off the eastern shores of North America for about 180 years, but didn't make its West Coast debut—in San Francisco Bay—until the late 1980s. Scientists suspect that the crab rode to San Francisco in ballast water or in bait shipments.

Since then, the species has established itself along some 800 kilometers of the California coast, from Monterey Bay to Humboldt Bay. Although ballast water may again be to blame, marine biologist Edwin Grosholz, of the University of New Hampshire, Durham, says it is possible that the crabs' larvae have drifted north and south with ocean currents. The temperature-tolerant mollusk could thrive from Baja California to Alaska, he says.

Z. LESZCZYNSKI/ANIMALS, ANIMALS

Mollusk non grata. Seen in Oregon.

The green crab eats oysters, clams, and other crab species and has been blamed for destroying the softshell clam fishery off the coast of Maine in the 1950s. Now it's jeopardizing the huge commercial shellfisheries of the Pacific Northwest, says Grosholz. The invader sends ripples up the food chain as well. Grosholz says he and his colleague Greg Ruiz are watching for bird-population declines in crab-invaded areas in California, due to a competition between birds and green crabs for food.

Once the crab gains a clawhold, there are few ways to control it, says marine biologist Andrew Cohen of the San Francisco Estuary Institute. It's too small to catch for food, and any attempts at biological control—such as introducing a parasitic barnacle common in Europe—are risky, Cohen says. Even in Europe, these parasites don't make a big dent in the tough crab's population.

Healthy Gums for a Happy Heart

When bacteria inhabiting the mouth infiltrate the pocket between the gums and the base of the teeth, they can make gums bleed and teeth fall out. They also may make hearts fail.

That's the conclusion of researchers who found that in a group of 1372 Pima Indians in Arizona, those with periodontal disease were 2.7 times as likely to suffer a heart attack as were those with healthy gums. "That's a pretty big risk [factor]," comments oral biologist Dennis Mangan of the National Institute of Dental Research in Bethesda, Maryland—especially because 30% of the U.S. population has gum disease.

Other studies have suggested a link between mouth infections and heart disease, but have not factored out the effects of smoking, notes Robert Genco, an oral biologist from the State University of New York, Buffalo. Genco and his colleagues decided to study this group of Indians because very few smoked, although many have diabetes.

The researchers measured tooth loss and bone decay when they began the study in 1983. A decade later, 68 people had developed cardiovascular disease. Allowing for factors such as age, sex, weight, cholesterol, and high blood pressure, as well as diabetes and insulin use, the researchers found that among Indians under age 60, gum disease was an even more important risk factor than was high blood pressure. It was second only to having long-term diabetes. Genco reported the finding last month at the annual meeting of the International Association of Dental Research in Orlando, Florida.

Researchers must still elucidate the connection between gum and heart problems. Genco suggests that bacteria enter the blood through inflamed gums and cause small blood clots that help clog arteries. A recent study suggests a related mechanism for heart disease: that inflammation of artery walls, possibly caused by infection, promotes plaque formation. In the 3 April *New England Journal of Medicine*, Paul Ridker of Brigham and Women's Hospital in Boston reported that men with high levels of a marker for inflammation also had elevated heart attack risk.

Crater Pattern Says Europa Still Active

Planetary scientists poring over images of Jupiter's moon, Europa, are excited by what they're not finding—impact craters from incoming asteroids and comets. Europa's largely unscarred face means she has an inner life that's keeping her young, scientists say.

Close-ups returned by the Galileo spacecraft are revealing that some areas on ice-covered Europa have one-thousandth the number of small-impact craters expected, based on fuzzier, earlier Voyager images. So reported Galileo team member Clark Chapman of the Southwest Research Institute in Boulder, Colorado, at last month's Lunar and Planetary Science Conference in Houston. Says Chapman, "Europa hasn't died. I'm willing to bet there are things happening today, but we haven't seen them yet."

At the meeting, Galileo geologists presented examples of the sorts of geologic processes

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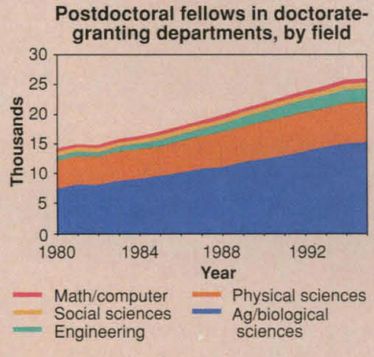
Postdoc Population Plateau



The number of postdoctoral positions at U.S. academic institutions—some 26,000—held steady in 1995 after a 13-year climb, according to new figures from the National Science Foundation. NSF officials say it's too soon to declare that the number of posts is dropping (it has nearly doubled since 1980). But if so, fewer postdocs would mean less competition for the next rung on the career ladder. The new figures, from an annual NSF survey, show that the number of U.S.-citizen postdocs is catching up with that of foreign postdocs, after several years during which locals were in the minority. The leveling off in the total number of postdocs stems largely from a lack of growth in the number of positions in physics and chemistry. By contrast, the ranks of postdocs in the biological sciences, almost 60% of the total, are still growing.

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that might be resurfacing Europa: cracking, ridging, and rafting of ice sheets; bulging, disruption, and collapse of the surface; and upwelling of soft, warm ice. The dearth of craters in some areas, coupled with an abundance of impacts elsewhere on Europa, suggests that the heat needed to drive such surface-renewing geological processes is still around. In theory, that heat could be coming from Jupiter's gravitational kneading of the moon.

Whether there is so much heat in Europa that its primordial ocean is still sloshing around beneath the ice—raising the prospect that something might be living there—remains unresolved. Robert Pappalardo of Brown University is skeptical, arguing that if a global ocean underlies the ice, the disruption and rejuvenation also should be global. An alternative to a liquid ocean, he notes, would be a 100-kilometer-thick layer of solid ice just warm enough to churn Europa's surface slowly and so disrupt it. Distinguishing between these two scenarios may require catching Europa in the act of remaking herself.

Early Music

A piece of bear thigh bone with holes in it, believed to be the world's oldest musical instrument, suggests that even Neandertals may have used the same seven-note scale on which Western music is based.

Bob Fink, a musicologist in Saskatoon, Saskatchewan, Canada, has analyzed the carving in a piece of bone found in July 1995 by Slovenian archaeologist Ivan Turk, in a cave in what used to be northern Yugoslavia. From the placement of the holes, Fink concludes the instrument could produce four notes corresponding with the third, fourth, fifth, and sixth notes of a minor diatonic scale (one composed of half tones and whole tones).

SLOVENIAN ACADEMY OF SCIENCES

Caveman's pipe. Carved bear femur.

Until now, says archaeologist Anne D. Kilmer of the University of California, Berkeley, the oldest definitive evidence for the use of seven-note diatonic scales came from 4000-year-old cuneiform tablets. And, according to Fink, the oldest known instruments were one-note whistle-type artifacts from 20,000 to 30,000 years ago.

Fink says the distance between the second and third holes on the bone is twice that between the third and fourth (where the bones' ends are broken). That means the first interval represents a whole tone and the second a half tone. "These three notes ... are inescapably diatonic," writes Fink in an essay on the Internet at http://www.webster.sk.ca/greenwich/fl-compl.htm.

Fink based his analysis on photographs obtained from geologist Bonnie Blackwell, of Queens College in Flushing, New York, to whom Turk had sent teeth from the site for dating. "I think he's got the analysis right," says Blackwell. She says the flute is the "only musical instrument ever associated with Mousterian [Neandertal] culture." Its age is somewhere between 43,400 and 67,000 years—based on dating of sediments above and teeth below the flute's layer.

Fink says his analysis suggests that the human brain's perception of musical tones and what constitutes harmony is at least partly hard wired—a view bolstered by recent research showing that young babies can distinguish discordant from harmonious combinations of notes.

Internet Link Brings China Into Focus

A trio of Chinese astronomers linked a piece of that country's scientific infrastructure to the rest of the world last month with an international hookup that provided real-time observations of astronomical phenomena—all for the cost of a local phone call. The scientists hope this demonstration will help persuade their more scientifically conservative colleagues that the Internet can be a valuable research tool.

The major players in the experiment carried out on 6 March were Ji Kaifan, who operated a 1-meter telescope at Yunnan Observatory in southwest China; Ye Binxun at Beijing Observatory; and Chu Yi of Nanjing University, currently visiting professor at the University of Florida, Gainesville. Over the course of 7 hours, the trio viewed Mars and its two satellites, Phobos and Deimos, in order to refine a photographic technique that makes both bright and dim objects visible on the same plate. The connection was made via an Internet Relay Chat network operating through a server in Pocatello, Idaho.

"The project has convinced us that we could do quicker and better research through the Net," says Ji. Ye plans another joint effort in May with a 2-meter telescope outside Beijing. The real-time connection can also be a boon to education, says Chu's Florida colleague, Chen Kwan-Yi. Already in the United States, for example, a project called Hands-On Universe enables students to operate distant telescopes remotely (at http://hou.lbl.gov).

WU PENG/CHINA FEATURES

Welcome sight. Yunnan's 1-meter telescope flashes its pictures around the world.

MIT: Cradle of Entrepreneurs

A survey of Massachusetts Institute of Technology graduates and faculty who have started companies shows that enterprises spawned by MIT people have created thousands of new jobs and generated billions of dollars.

The project, billed as the first national study of the economic impact of a research university and conducted jointly by MIT and the economics department of BankBoston, surveyed 4000 MIT alumni who are founders or chief executives of 3998 companies. The list of firms includes such venerable enterprises as Arthur D. Little Inc., in Cambridge, Massachusetts, started in 1886, and a host of other names such as Hewlett-Packard, Intel, Digital, Raytheon, Gillette, Genzyme, and Biogen.

MIT-related companies, if they formed a national economy, would have ranked as the world's 24th largest in 1994, with 1.1 million employees and $232 billion in global sales, notes the report. Software companies are particularly big; other areas are electronics, biotech, scientific instruments, and consulting. In Massachusetts alone, where 36% of MIT-offshoot companies are located, they have created 125,000 jobs. The other large concentration is in California.

Respondents to the survey, directed by BankBoston's chief economist, Wayne M. Ayers, credited MIT with encouraging them to become "risk-takers." Fifty years ago, 60% of company founders were engineering majors. Now only 40% are engineers, with the largest proportion coming from social sciences and management. Interestingly, 40% of biotech and medical products companies have been founded by engineering graduates, but only 18% by life sciences graduates.

Ayers says the survey reinforces the message that knowledge is power: "Given the results of this survey, it behooves government at both the state and federal levels to concentrate resources on investment in human capital."

The complete report can be found on the Internet at http://web.mit.edu/newsoffice/founders/.