Earth Sciences

Richard Monastersky reports from Denver at the meeting of the Geological Society of America

Dinosaur coastal highway

If you think about all the cars traveling along Route 101, which skirts the West Coast from Washington through southern California, it hardly seems strange that dinosaurs may have had their own version of the coastal highway. Ichnologists, who study footprints, are beginning to piece together a dinosaur "freeway" they believe might have run for hundreds of kilometers along the coast of the ancient sea that filled the interior of North America during the Cretaceous period.

Martin G. Lockley and Mark W. Jones at the University of Colorado in Denver focused on a certain section of sedimentary rocks called the Dakota group, which formed the coastal plain for that inland sea approximately 140 million years ago. Outcrops of the Dakota group appear sporadically along the front range of the Colorado Rockies, and are filled with fossilized tracks from iguanodontids and other dinosaurs. The researchers are also finding signs that the tracks continue into New Mexico. These extensive tracks indicate dinosaurs roamed along the seashores, and are probably the firmest evidence yet that dinosaurs migrated up and down the coast, Lockley says.

Cosmic rays to date geology

In geology, the past often holds the key to the future. In order to predict the potential of an earthquake or a landslide in a certain location, geologists like to know when these events last wracked the area — a question sometimes quite difficult to answer. Scientists are now developing a promising technique using cosmic rays to help in the geological dating game.

Cosmic rays are high-energy radiation from space that can penetrate Earth's atmosphere. When this radiation hits rocks on the surface, it alters certain atoms to create radioactive chlorine-36. The rays can reach only a few feet into the ground, and so affect rocks on or near the surface. Therefore, it is possible to tell how long a rock has been at the surface by measuring its chlorine-36 content, says Fred M. Phillips of New Mexico Institute of Mining and Technology in Socorro. Phillips and his colleagues from New Mexico Tech and from the University of Rochester (N.Y.) report they have now tested the method by dating boulders atop glacially formed ridges in the Sierra Nevada mountains. Since earthquakes and other geological processes uncover new surfaces, the technique can help scientists date these events, says Phillips, who received the F.W. Clarke award from the Geochemical Society this month for work on chlorine-36 dating.

Novel mountains and chimneys in the sea

In a dive on the submersible ALVIN just west of the Mariana trench, scientists discovered a cache of unusual features, including chimneys spewing out mineral-laden cold water on top of submerged mountains that rise 2,500 meters from the seafloor. While volcanic eruptions form most seamounts, these mountains consist of a nonvolcanic rock called serpentinite, and oceanographers are not entirely sure how the serpentinite mountains formed, says Janet A. Haggerty from the University of Tulsa (Okla.).

The Mariana trench marks where the Pacific plate dives underneath the Philippine plate. These seamounts and chimneys have formed on the overriding plate, and Haggerty proposes they may owe their origin to the Pacific plate. She suggests that water trapped in rocks in the downgoing crust leaks out and rises until it hits the underside of the ocean crust. Here it changes these crustal rocks, forming serpentinized rock that is lighter than the surrounding material. The altered rock rises slowly through the crust and ultimately protrudes as seamounts. Chimneys on top may be venting fluids that contain some of this water from the diving plate, Haggerty says.

Science & Society

U.S. ratifies international NO_x treaty

Nitrogen oxides (NO_x) — among the most recalcitrant of combustion pollutants — contribute to acid rain and urban smog (SN: 12/20&27/86, p.388). As "greenhouse" gases, a number of them may also contribute to a global climatic warming. A treaty limiting these pollutants was negotiated on Oct. 31 in Sophia, Bulgaria, by the United Nations Commission for Europe, whose members include the nations of eastern and western Europe, Canada, the United States and Soviet Union. Known as the NO_x Protocol, the treaty would freeze future NO_x emissions in any ratifying nation at their 1987 levels, require that the "best available technology" be used to limit emissions from new vehicles and power plants, mandate annual reporting of NO_x emissions, set up an exchange among signatories of information on control technologies, and require that unleaded gasoline be available on all international routes.

The protocol goes into effect 90 days after the 16th nation ratifies it. Because compliance does not demand any action beyond that required by the Clean Air Act, the Reagan administration decided Senate ratification was unnecessary and empowered Environmental Protection Agency Administrator Lee M. Thomas to ratify it on Nov. 1.

International CFC limits to take effect

Last year, a treaty was drawn up to protect stratospheric ozone by dramatically cutting chlorofluorocarbon (CFC) emissions and freezing halon emissions. Ultimately signed by 47 nations, this Montreal Protocol aims to reduce global CFC emissions to 50 percent below 1986 levels by the year 2000 (SN: 9/26/87, p.196). It now appears those controls on ozone-destroying pollutants will go into effect at the earliest possible date — next Jan. 1.

Treaty enactment requires ratification by the European Community (EC) and 11 countries representing two-thirds of global CFC consumption. According to the United Nations, 14 countries — representing more than two-thirds of CFC production — have already ratified it. Ella Krucoff, in the EC's Washington, D.C., office, says EC ratification will be forwarded to the United Nations "within the next few weeks."

Legislative briefs

• East Coast beach closings made news all summer as illegally dumped medical wastes — including bloodied bandages, sutures and vials of AIDS-infected blood — washed ashore. And the defiling wastes weren't limited to seashores: 200 hypodermic needles were among the debris littering Lake Erie's banks. To date there hasn't been any way to trace who's responsible, according to Rep. Thomas A. Luken (D-Ohio). So he drafted a bill to track those wastes — from cradle to grave. This Medical Waste Tracking Act became law Nov. 1.

In states participating in a voluntary two-year demonstration program, anyone generating, storing, treating, transporting or disposing such wastes must keep publicly accessible records on them. Only generators producing less than 50 pounds of waste in any month may be exempted from the tracking rules. Violation of the law can carry fines of up to $1 million.

• Within two years, the U.S. government must issue regulations requiring that plastic-ring holders — used to carry cans and bottles — be biodegradable, according to a law enacted Oct. 28. These discarded devices can entangle and kill fish and wildlife.

• A law enacted Nov. 1 designates lead-lined water coolers (SN: 12/19&26/87, p.390) as "imminently hazardous," directs the Environmental Protection Agency to identify which models contain lead, and requires that within one year manufacturers repair, replace, recall or offer owners refunds for them.