CHEMISTRY

Chemistry in the courts: Bendectin

A federal jury in Orlando, Fla., recently ruled unanimously that Bendectin — a drug used to treat the nausea and vomiting of pregnancy — did not cause the birth defects of David Mekdeci.

Mekdeci, born in 1975 with a sunken chest and malformations of the right arm and hand, was the subject of the first Bendectin lawsuit (SN: 12/27/80, p. 395). In a 1980 trial, his parents sought $12 million in a damage suit against Richardson-Merrell Inc. (manufacturer of the morning-sickness drug), but that jury's verdict later was ruled inconsistent.

Meanwhile, the Ralph Nader-backed Health Research Group recently petitioned the government to halt sales of Bendectin.

Primordial soup: A dash of ammonia

In the beginning, there was ammonia. But, according to recently reported calculations by T.M.L. Wigley and P. Brimblecombe of the University of East Anglia, United Kingdom, there wasn't very much.

Previously, researchers theorized a relatively large concentration of atmospheric ammonia (NH_3) in the primordial soup to explain the "faint sun paradox," or the contradicting clues that suggest how bright the sun was millions of years ago. Stellar evolution theory suggests that the sun's luminosity has increased by about 30 percent over the past 4 billion years; geological and biological evidence, though, indicates that the earth's mean global temperature between 3 billion and 4 billion years ago was as warm as, or warmer than, today's global temperature. To explain this apparent contradiction, researchers theorized that heat-absorbing ammonia gas in the earth's early atmosphere caused a greenhouse effect that counteracted the sun's reduced luminosity. But researchers estimate that at least 10^{-5} atmospheres partial pressure of ammonia would have been necessary to cause such an earth-warming effect, and they no longer are convinced that such a concentration of NH_3 prevailed in earth's early atmosphere. In fact, the likely primordial greenhouse gas candidate now is carbon dioxide (CO_2).

Nonetheless, a small concentration of atmospheric ammonia seems necessary for life to have evolved on earth, and Wigley and Brimblecombe report they have calculated that minimum concentration. In the May 21 NATURE, the two researchers explain that a minimum ammonia concentration probably was required to stabilize simple amino acids — the chemical precursors to life. Without that stabilizing ammonia concentration, amino acids would have decomposed, losing their amino group (NH_2) to primordial soup. Other factors influencing the critical ammonia concentration were pH (a measure of the acidity or alkalinity of a solution), temperature and the partial pressure of CO_2 in the primordial atmosphere. Using a series of equations that take all these factors into account, Wigley and Brimblecombe calculated critical concentrations of ammonia necessary for ocean and fresh water origins of life. ("There is...no *a priori* reason to assume that life originated in the early oceans," they report.) In the seawater case, the researchers' calculations indicate that as low as 10^{-8} atmospheres partial pressure of ammonia would have been sufficient to stabilize simple amino acids. This is similar to current atmospheric ammonia concentrations.

The ammonia calculations support the current revolution in chemical evolution that is changing the widely accepted recipe for primordial soup from one rich in hydrogen — composed primarily of methane (CH_4) and ammonia (NH_3) — to a hydrogen-poor atmosphere similar to today's sans the oxygen (SN: 1/31/81, p. 72). A hydrogen-rich atmosphere, Wigley and Brimblecombe conclude, "does not seem to be necessary for the origin of life."

EARTH SCIENCES

Rain forecasts inherit the wind

Local thunderstorms come on little cat feet. Their sneaking ways soon may be mastered, however, should a recently reported wind-monitoring technique pan out.

Surprise local storms form when moist winds converge. When these winds meet head-on, their only escape route is up. Traveling upwards, the winds cool and their moisture condenses to form rain clouds. Last year, National Oceanic and Atmospheric Administration researchers — under the direction of Andrew I. Watson and Ronald Holle — successfully used such surface wind patterns to forecast hard-to-predict local thunderstorms. But thunderstorms in Florida are slow-moving and easy to study, so the meteorologists now are testing the technique on faster-moving storms in Illinois.

Meteoroid in the sky with diamonds

When Roy S. Clarke Jr. and colleagues of the Smithsonian Institution suddenly found they could no longer slice their 10.4-kilogram iron meteorite, they decided to have a closer look. X-rays revealed that the researchers' saw had come up against tiny crystals of diamond.

The diamonds were discovered in a meteorite taken in 1977 from the Allan Hills region of the Antarctic ice cap, the researchers report in an article to be published in NATURE. This is the second diamond discovery in an iron meteorite. Diamonds found in the other meteorite — the Canyon Diablo, which formed the mile-wide Meteor Crater in Arizona about 50,000 years ago — are believed to have resulted from the pressure of impact when the carbon-containing metallic material hit the earth. But the smaller Antarctic meteorite probably did not hit with such an impact so researchers theorize its diamonds were formed millions of years ago after a collision in the asteroid belt. These tiny diamonds have no commercial value.

Dust over the Pacific

From the top of a 20-meter-high tower on Enewetak Atoll in the Marshall Islands, researchers from the University of Miami and University of Rhode Island at Kingston have collected significant amounts of atmospheric dust. The tower is on the windward (northeast) side of the island, so the scientists are fairly sure they are not picking up local dust. Instead, they believe the dust is blowing from the deserts of central and eastern Asia. Now, to be certain the concentration of dust already collected is not anomalously high, the researchers recently established other dust-sampling stations in the North Pacific (see map). Report project participants Robert A. Duce and Joseph M. Prospero, "This atmospherically transported desert dust may be an important source for material found in sediments at the bottom of the North Pacific Ocean."